THE COLLECTED WORKS OF L. S. VYGOTSKY

Volume 1
Problems of General Psychology

Including the Volume *Thinking and Speech*

Edited by
ROBERT W. RIEBER
and
AARON S. CARTON

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L. S. VYGOTSKY

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Volume 1
Problems of General Psychology

Including the Volume *Thinking and Speech*

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EDITORS' FOREWORD

The *Collected Works of Lev Semonovich Vygotsky* comprise a series of six volumes, originally published in Moscow by Pedagogika between 1982 and 1984 and comprising the work done by Vygotsky between 1924 and his early death in 1934. The present volume is the first of this series to appear in English but it is actually Volume 2 in the Russian series. It contains a complete rendition of *Thinking and Speech* (which may be known to English readers as *Thought and Language*, the title assigned to an abridged, interpretative translation by Hanfmann and Vakar in 1962) and five *Lectures in Psychology* which are here published for the first time in English and essentially comprise Vygotsky's systematization of psychological theory and data in respect to the development in childhood of perception, memory, thinking, emotions, imagination, and will. The volumes which are yet to appear in English are respectively concerned with: (1) theory and history of psychology; (2) problems of developmental psychology; (3) child and adolescent psychology; (4) "defectology" (or "special education" in American parlance); and (5) a "scientific archive" consisting of a critique of Spinoza's studies of the passions and an important essay, "Tool and Sign."

The decision by the Translator and Editors to render the title of the first segment of this volume, *Myschlenie i Rech'*, as *Thinking and Speech* and not as *Thought and Language*, as it was previously translated, was a very intentional one. We hope the decision will exemplify and signal the philosophy to be followed in preparing all six volumes. The translations will be as true as we can make them to the meanings we perceive Vygotsky intended. Reevaluations -- and possible reformulations -- of Vygotsky's contributions (if there are to be any) must *follow* upon the preparation of faithful translations. Although many readers perceive Vygotsky's ideas some six decades after his death not only as current and modern but also as precursors of theorization and research yet to come, the translation of his works must not be allowed to become an occasion for subtle revisions which would make the texts seem even more consonant than they are with one or another current belief or scientific trend.

Thus since *myschlenie* is a Russian present participle and *mysl* is a "thought" or "idea," and since Vygotsky describes a *thinking process* in his discussions, "thinking" seemed a better rendering of his intended meaning than "thought."

The rendering of *rech'* as "speech" rather than "language" is based first on the simple fact that dictionaries gloss *iazyk* as "language" or "tongue" and *rech'* as "speech."

More significant is the fact that we know Vyogtsky studied the linguistics of Troubetskoy, Baudouin de Courtenay, Jakobson, de Saussure, and possibly of Sapir and Bloomfield and that these thinkers rigorously distinguished, as did Vygotsky, speech from language. Speech (or in Saussure's terms, "speaking acts" or *paroles*) is what linguists studied and language (Saussure's *la langue*) is the grammatical and semantic system which is to be conceptualized or derived from observing speech. Vygotsky's care and consistency in using "speech" and "language" and his obvious interest in the relation between speaking and thinking, which is so ingeniously examined in the experiments he reported in Chapter 7 of the work, unequivocally justifies the rendering we have chosen. As Dr. Minick argued: "Sapir and Whorf were interested in the relationship between thought and language. Vygotsky was interested in the relationship between thinking and speech."

Since Vygotsky and the early linguists wrote, speech pathologists have sought to distinguish speech as a physiological product from language as a psychosocial product. They are concerned with distinguishing motor processes from intellectual ones. But the distinction they seek to make, however important, is not the distinction Vygotsky had in mind and it would be improper and possibly misleading to allow the translation to suggest that he did. Nor is Vygotsky's use of "speech" to be construed as being in any way equivalent to Chomsky's use of "language." Indeed, despite differences in their concerns for the relations between language and mind, Chomsky and Vygotsky for the most part agree in their usage of the terms "speech" and "language."

The process of collecting materials already published in Russian as well as hitherto unpublished manuscripts from Vygotsky's personal archives and elsewhere, the identification of references where necessary, and other editorial tasks were carried out by a commission of leading Soviet psychologists consisting, in large part, of Vygotsky's former students and collaborators. This Editorial Commission was led by A.V. Zaporozhets and included T. A. Vlasova, G. L. Vygotskaya, V. V. Davydov, A. N. Leontiev, A. R. Luria, A. V. Petrovskii, A. S. Smirnov, B. C. Khelemendik, D. B. El'konin, and M. G. Yaroshevskii. The Editorial Secretary for the Commission was L. A. Radzikhovskii. It was this Editorial Commission which, as far as possible, organized the volumes according to their themes, and within each volume they arranged the papers, monographs, books, lectures, lecture notes, and occasional fragments in chronological order. In publishing the English translation, each volume will retain the form of its Russian model -- including the critical apparatus provided by the Moscow-based Editorial Commission -- but will be published in a different sequence and will contain additional notes, introductions, and commentaries from selected contributors outside of the Soviet Union.

Dr. Bruner's Prologue to this volume describes, at some length, the scant supply of Vygotskyian materials which have heretofore been available to English-speaking readers. The present series of six volumes will not only make available a number of works which have not ever before been translated but also include archival materials located by the Moscow-based Editorial Commission which have never been published at all. Yet these *Collected Works* do not include a number of entries which are to be found in the inventory provided by Michael Cole and his editorial associates as an epilogue to the volume they called *Mind and Society* (1978). That list includes references to youthful works of literary criticism produced between 1915 and 1923 as well as references to pieces which, for the most part, seem to be either variant forms of those to appear in the present collection, or popularizations of scientific concepts for the public media or for special audiences. If the six volumes now to appear in English do not provide the most complete collection possible, they will at least provide the En-

glish-speaking reader with the bulk of what Vygotsky had written and taught in his classes and they will certainly provide a richer and wider range of Vygotskyian materials than has been available. If it should turn out that some of the omissions are of a significant nature and are reflective of earlier tendencies to censor aspects of Vygotsky's thought, we must hope that continued scholarly exchange and a widening of the scope of academic freedom throughout the world will eventually remedy those defects.

The present publication of the *Collected Works* in English was first made possible through the efforts of Frank Columbus, who was a Senior Editor at Plenum. At Robert Rieber's suggestion, Mr. Columbus negotiated the necessary copyright agreements with the Soviet publisher of the six volumes. Later, Eliot Werner assumed the role of Senior Editor and manager of the project at Plenum, and both Mr. Columbus and Mr. Werner are owed acknowledgment and thanks for their help in bringing this volume out.

For many of those who participated in widening and enriching American psychology in recent decades, the available Vyogtskyian literature provided considerable promise as a basis for further theorization, for continued experimental research on his postulates, for deriving the ontogenesis of mind from society rather from nativist givens or from a random and chaotic environment, and for a socially oriented psychology implicitly and immediately applicable to education and to the therapy of cognitive defects. Among those who have directly or indirectly contributed to the establishment of an American branch of Vygotskyian psychology are several whom we have constituted as an informal advisory board for the publication of the *Collected Works*. These include Jerome Bruner, Michael Cole, John Dore, Joseph Glick, Sylvia Scribner, the late Gilbert Voyat, and James Wertsch. While none of them can be held accountable for any of the defects which may appear in these volumes, they are all to be acknowledged and thanked for one or another form of contribution to the production of this volume.

In the present volume, the endnotes of the Moscow-based Editorial Commission are marked in the text by superscript arabic numerals and their translations appear at the end of the text. The endnotes to the English Edition are marked in the text by arabic numerals enclosed by square brackets, [ ], and they appear in a separate section at the end of the text. Unless initialed by the translator or editors, footnotes are translations from the Russian text.

Robert Rieber and Aaron S. Carton

New York

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PROLOGUE TO THE ENGLISH EDITION

Jerome Bruner

Twenty-five years ago, I was privileged to write an Introduction to the first translation of Vygotsky's classic, *Thought and Language* (1962). In the opening paragraph of that Introduction, I remarked,

> Lev Semenovich Vygotsky...in his student days at the University of Moscow...read widely and avidly in the fields of linguistics, social science, psychology, philosophy, and the arts. His systematic work in psychology did not begin until 1924. Ten years later he died of tuberculosis at the age of 38. In that period, with the collaboration of such able students and co-workers as Luria, Leontiev, and Sakharov, he launched a series of investigations in developmental psychology, education, and psychopathology, many of which were interrupted by his untimely death. The present volume, published posthumously in 1934, ties together one major phase of Vygotsky's work, and though its principal theme is the relation of thought and language, it is more deeply a presentation of a highly original and thoughtful theory of intellectual development. Vygotsky's conception of development is at the same time a theory of education.

Before the translation of that book in 1962, there were no extended writings of Vygotsky available in English, and only a few shorter articles. Since then, many important works have reported or commented upon his work -- the volume of Michael Cole and his collaborators (1978); the rich volumes of Alexander Romanovich Luria (1961, 1976, 1979), presenting and expanding many of Vygotsky's ideas; and, finally, James Wertsch's useful synoptic volume (1985) on Vygotsky's thought. All of them have suggested that *Thought and Language* is, as it were, only the tip of an iceberg, that Vygotsky's depth was far greater than the book suggested. The six volumes to appear in this present series confirm that point dramatically.

For Vygotsky was not only a psychologist but a cultural theorist, a scholar deeply committed to understanding not simply Man, conceived as a solo "organism," but Man as an expression of human culture. When I remarked a quarter century ago that Vygotsky's view of development was also a theory of education, I did not realize the half of it. In fact, his educational theory is a theory of cultural transmission as well as a theory of development. For "education" implies for Vygotsky not only the improve-

ment of the *individual's* potential, but the historical expression and growth of the human culture from which Man springs. It is in the service of both a psychological and a cultural theory that Vygotsky places such enormous emphasis upon the role of language in man's mental life and upon its cultivation during growth. For Vygotsky, language is both a result of historical forces that have given it shape, and a tool of thought that shapes thought itself. In the end, as we shall see, it is also a liberator: the means whereby man achieves some degree of freedom from both his history and his biological heritage. In mastering language in all its forms -- in scientific, artistic, and spontaneous dialogue -- the individual reflects history. But Vygotsky did *not* subscribe to the Soviet Marxist dogma that then viewed man as a mere "product" of history and circumstance. For him, the heart of the matter is the interaction between man and his tools, particularly the symbolic tool of language. In the end, Vygotsky flirts with the idea that the use of language creates consciousness and even free will.

Never for a moment overlook Vygotsky's objective. Like Karl Marx, he was in search of a theory of development that would embrace a scientific, historical determinism and a principle of spontaneity as well. Spontaneity is not so much "overcoming" history as it is turning it to new uses, converting it, so to speak, from a fate into a tool. And, of course, one of the chief boons of human history is language and its ways of use. He was forever intrigued with the inventive powers that language bestowed on mind -- in ordinary speech, in the novels of Tolstoi and the plays of Chekov and the *Diary* of Doestoevski, in the stage directions of Stanislavskii, in the play of children.

Vygotsky's Marxism is closer to Althusser (1978), Habermas (1971), and the Frankfurt School than to the Soviet Marxism of his times or of ours. Not surprising, then, that his work was suppressed in the early 1930s. It was appealing enough, however, to circulate underground from hand to hand , and by the testimony of Luria it affected an entire generation of psychologists. The official reason given for the suppression was that his monograph on the Kazakhistan and Kurdistan peasants flouted the interdiction against attributing faulty mental processes to peasants, particularly at a time when Russia's peasantry were undergoing collectivization. My own surmise is, rather, that Vygotsky's vigorous espousal of the place of consciousness in mental life made him suspect to the increasingly rigid Stalinist ideologues who overlooked matters psychological. After the suppression was lifted, the "battle of consciousness" moved officially to center stage in Soviet psychology, with Vygotsky's followers arrayed against such orthodox Pavlovians as Ivanov-Smolensky. In time, with the acceptance of Pavlov's theory of "Second Signal System," the atmosphere improved. Vygotskian theory could be restated in the language of the Second Signal System in a way that captured the distinction between stimuli acting directly on the nervous system (the First Signal System) and those that were mediated by language and concepts (the Second).

* * *

The publication of these six volumes (beginning with the present one) is an event. Vygotsky's reputation has grown enormously in the last decades and many psychologists have been awaiting the appearance of these volumes. The first volume makes available in English for the first time a full version of his *Thought and Language*. It also contains a course of six remarkable lectures that he gave in Moscow in the early 1930s, shortly before his death. These lectures provide an extraordinary conspectus of his psychology as a whole -- and expose his views with an energy and charm that is captivating.

In the new lectures, it is quite evident once again that instrumental action is at the core of Vygotsky's thinking -- action that uses both physical and symbolic tools to achieve its ends. The lectures give an account of how, in the end, man uses nature and the toolkit of culture to gain control of the world and of himself. But there is something new in his treatment of this theme -- or perhaps it is my new recognition of something that was there before. For now there is a new emphasis on the manner in which, through using tools, man changes himself and his culture. Vygotsky's reading of Darwin is strikingly close to that of modern primatology (e.g., Washburn, 1960) which also rests on the argument that human evolution is altered by man-made tools whose use then creates a technical-social way of life. Once that change occurs, "natural" selection becomes dominated by cultural criteria and favors those able to adapt to the tool-using, culture-using way of life. By Vygotsky's argument, tools, whether practical or symbolic, are initially "external": used outwardly on nature or in communicating with others. But tools affect their users: language, used first as a communicative tool, finally shape the minds of those who adapt to its use. It is one the themes of Vygotskian psychology and his six lectures are dedicated to its explication in the context of human development. His chosen epigraph from Francis Bacon, used in *Thought and Language*, could not be more apposite: neither hand or mind alone suffice; the tools and devices they employ finally shape them.

Vygotsky was an engaged intellectual and a child of his revolutionary times. He did not treat psychological issues in isolation from the issues that then preoccupied Russian intellectual life. He was closely in touch with linguistic thinking as represented by Jakobson, Troubetskoy, and the so-called Leningrad Formalists. Indeed, his studies of linguistics preceded his formal work in psychology. Emphasis upon meaning, for example, was central in that linguistic tradition. It was Jakobson (1978), after all, following in the footsteps of his teacher Baudouin de Courtenay, who first enunciated the principle that even the sound system of language was not to be understood through analysis based on the muscle groups implicated in sound production, but rather through an understanding of how sound changes affected meaning -- the famous concept of the phoneme.

And in those days, Vladimir Propp (1968) was formulating a theory of the structure of the folktale that conceived of the characters and the elements of plot as functions or constituents of the plot structure as a whole. The spirit of the work of that time was decidedly "top-down": higher functions controlled lower functions, whether it was lexemes dominating phonemes or plots dominating character and episode. Indeed, Roman Jakobson was fond of asserting years later that Vygotsky's approach to psychology as well to language was far more in the "high Russian intellectual tradition" than was the bottom-up approach of the Pavlovian reflexologists.

The same can be said of Vygotsky's treatment of the role of consciousness, which I shall discuss more fully later. Russian literary theory (particularly poetics) -- and Vygotsky was well versed in its debates -- placed great emphasis on poetic language as an instrument for arousing consciousness. The critic Viktor Shklovsky (1965), for example, had introduced the concept of *otstranenie*, the "making strange of the ordinary," and proposed that it was the means that the poet used for creating consciousness in the reader. And poets like Mayakovsky, Mandelstam, and Akhmatova thought of themselves as engaged in a struggle for new consciousness. So when Vygotsky argued that "climbing to higher ground" conceptually with the aid of language also increased consciousness, he was not making his proposal in a cultural vacuum. For all that, let it be said that he vociferously opposed any Bergsonian view of autonomous consciousness. Such "bourgeois idealism" was not for him. Rather, consciousness emerges out of the interaction of higher mental processes with the tool of language. But for all his

appeals to dialectical materialism, he never quite escaped the suspicion of the official ideologists. If his being Jewish did not arouse their distrust, his cosmopolitanism did, for his lectures are full of references to the work of German, French, Swiss, and American investigators.

Later I shall also want to say more about the Russian roots of Vygotsky's ideas about the role of dialogue in language and consciousness. Here he was influenced by the ideas of the stage director Stanislavskii (whom he cites) and possibly indirectly by those of the linguist Bakhtin (1981). He rejected the notion that human development could be viewed as a solo achievement. It starts initially as a conversational, dialogical process, and then moves inward and becomes the "inner speech" of thought. Let me turn directly to that issue now.

* * *

The "moving inward" of speech is nowhere better illustrated than in Vygotsky's now famous idea about the Zone of Proximal Development (ZPD). It is a stunning concept on its own, but it also serves to give connectedness to a wide range of Vygotsky's thought. It refers to the brute fact, perhaps first celebrated by Plato in the *Meno* where he discusses the young slave's apparent "knowledge" of geometry while being questioned appropriately by Socrates, that ignorant learners can do far better in understanding a matter when prompted or "scaffolded" by an expert than they can on their own. The idea of the ZPD focuses attention on the role of dialogue as a precursor to inner speech, in this case the dialogue between a more expert teacher and a less expert learner. Once a concept is explicated in dialogue, the learner is enabled to reflect on the dialogue, to use its distinctions and connections to reformulate his own thought. Thought, then, is both an individual achievement and a social one.

There is another outcome that results from such "assisted" learning, that bears upon consciousness and volition. For when one climbs to higher conceptual ground -- as in going from arithmetic to algebra with the aid of a teacher -- one achieves conscious control of the knowledge, what Piaget in another context calls a "prise de conscience," a taking into consciousness. Vygotsky (like Plato, Piaget and others who have confronted this riddle) was obviously never fully able to explain how consciousness takes over. "Inner speech" was plainly implicated, but *how* language serves as an instrument of consciousness escaped Vygotsky as it has escaped us all. His student, Luria (1976), studying the role of language in the actions of very young children, made a start toward untying this riddle with an experiment showing that one role of language in thought is to help inhibit action, the inhibition being in the form of a command to oneself. The implication (and we shall return to it later) is that consciousness and direct action stand in an inverse relation to each other. But inhibition of action was only one function of inner speech.

Far more important for both Vygotsky and Luria was a general "organizational" function of inner speech whereby a complicated world of stimuli was consciously rendered into a meaningful and syntactically well formed structure. An example was provided years later in a study of conditional learning in young children carried out again by Luria (1976). They were to discriminate between the silhouette of an airplane when it was displayed against a yellow background, and when it appeared against a gray background. At first they could not make the discrimination. But when the children consciously and deliberately learned the formula "planes can only fly in sunny weather, but not in cloudy weather," they mastered the task. Without the intermediation of this verbal formula, they failed.

But this was not enough either (though it would have pleased Vygotsky). Rather, he was interested as much in how it was that language and thought managed to fit together so well, so well indeed that there was scarcely a situation in which one could not find words to fit the experience. Recall that he believed that there were two independent "streams," one of thought and the other of language, and that they "flowed" together with the effect that language gave shape and conscious direction to thought. How do we get over the seemingly "uncrossable Rubicon that separates thinking from speech." His proposed solution is strikingly different from the one proposed by Benjamin Lee Whorf (1956) who saw the fit between language and thought in the form of a correspondence between lexicon and grammar on the one side and concepts on the other. Vygotsky rejects such correspondence notions. To explicate his point (in the concluding chapter of *Thought and Language*) he turns to the literary arts, and makes the following remark:

> The theater faced this problem of the thought that lies behind the word earlier than psychology. In Stanislavskii's system in particular, we find an attempt to recreate the subtext of each line in a drama, that is, to reveal the thought and desire that lies behind each expression. Consider the following example: Chatskii says to Sophia: "Blessed is the one who believes, for believing warms the heart." Stanislavskii reveals the subtext of this phrase as the thought, "Let's stop this conversation." We would be equally justified, however, in viewing this phrase as an expression of a different thought, specifically, "I do not believe you. You speak comforting words to calm me." It might express still another thought: "You cannot fail to see how you torture me. I want to believe you. For me, that would be bliss." The living phrase, spoken by the living person, always has its subtext; there is always a thought hidden behind it. In the examples above in which we tried to show the lack of correspondence between the psychological and grammatical subject and predicate [an earlier reference to the fact that *topic* did not always correspond to subject, nor *comment* to predicate, a central point made by Jakobson and the Prague Circle], we broke off our analysis at midpoint. We can now complete it. Just as a single phrase can serve to express a variety of thoughts, one thought can be expressed in a variety of phrases. The lack of correspondence between the sentence's psychological and grammatical structure is itself determined by the manner in which the thought is expressed in the sentence. By answering the question, "Why has the clock stopped?" with "The clock fell," we can express the thought, "It is not my fault that the clock is broken; it fell!" However, this thought can be expressed by other words as well: "I am not in the habit of touching other's things; I was just dusting here." Thus, phrases that differ radically in meaning can express the same thought."
>
> This leads us immediately to the conclusion that thought does not immediately coincide with verbal expression. Thought does not consist of individual words like speech... Thought is always something whole, something with significantly greater extent and volume than the individual word... It does not arise step by step through separate units in the way that...speech develops. *That which is contained simultaneously in thought unfolds in sequence in speech...* Therefore, the transition from thought to speech is an extremely complex process that involves the partitioning of thought and its recreation in words. That is why thought does not correspond with word, why it does not even correspond with the word meanings in which it is expressed. The path from thought to word lies through meaning. There is always a background thought, a hidden subtext in our speech. The direct transition from thought to word is impossible, the construction of a complex path always required. This is what underlies the...lamentation that the thought is inexpressible.

And this leads him to the final step in this astonishingly modern argument, one that gets him very close to Austin's (1962) and Searle's (1969) Speech Act Theory and to Grice's (1968) distinction between utterer's meaning and timeless meaning.

> We must now take the final step in the analysis of the internal planes of verbal thinking. Thought is not the last of these planes. Thought is not born of other thoughts. It has its origin in the motivating sphere of consciousness, a sphere that includes our inclinations and needs, our interests and impulses, and our affect and emotion. The affective and volitional tendency stands behind thought. Only here do we find the answer to the final "why" in the analysis of thinking... A true and complex understanding of another's thought becomes possible only when we discover its real, affective-volitional basis. The motives that lead to the emergence of thought and direct its flow can be illustrated through the example we used earlier, that of discovering the subtext through the specific interpretation of a given role. Stanislavskii teaches that behind each of a character's lines there stands a desire that is directed toward the realization of a definite volitional task. That which is recreated here through the method of specific interpretation is the initial moment in any act of verbal thinking in living speech. ...A volitional task stands behind every expression.

What is especially interesting about Vygotsky's conception is that not only is each act of speech guided by illocutionary intention, as in Austin or in Searle, but that illocutionary intentions are, so to speak, multiple. That is to say, an utterance is driven by such conventional and manifest communicative intentions as requesting, indicating, promising, and so forth, but it is also guided by a more latent subtext of intended meaning that is idiosyncratic in nature and related entirely to the interaction of the characters involved in the exchange. This is where the Stanislavskii method serves him as his model. And you will find at the conclusion of the final chapter of the new draft of *Thought and Language* a detailed *explication du texte* of an exchange between three characters in a play illustrating this multi-levelled interpretation that must be carried on between interlocutors if they are to grasp meaning fully. Then he concludes with the following characterization of "the living drama of verbal thinking":

> An understanding of another's words requires more than an understanding of words alone; it requires that one understand the other's thoughts. However, even this understanding is an incomplete understanding if we do not understand the other's motive, the reason that he has expressed his thought. In precisely this sense, we take the psychological analysis of any expression to its end only when we reveal the final and most secret internal plane of verbal thinking, that is, its motivation. With this, our analysis is finished.

And so we see Vygotsky revealed. We see him as an interpretivist who, in Geertz's (1973) sense, urges that "thick interpretation" is indispensable for the extraction of meaning, interpretation that takes into account not only grammar and lexicon and the conventions of the social setting, but also the underlying intentions and desires of the actor in the situation. In any act of speech, then, cultural and historical as well as personal and idiosyncratic demands are expressed by the speaker and must then be interpreted by the listener. Learning to *speak*, acquiring the *use* of language, must then be viewed not simply as the mastering of words or of grammar or of illocutionary conventions, but of how to textualize one's intent and to situate a locution appropriately in a personal context involving another person with whom one shares a history, however brief. That is what Vygotsky is seeking to illustrate in his citation of Stanislavskii's stage directions.

I mentioned earlier the involvement of Vygotsky in the literary-linguistics debates of the post-Revolutionary Russia of his formative years. Let me say a word further about other ideas that may have grown out of that involvement. For the Russian Formalists, for example, the essence of literature was the relation between a *fabula* and its *sjuzet* -- between a timeless "theme" or thought that lay behind a story, and its sequential linearization in both plot and in language. Vygotsky too saw the relation of thought and language in this way. Thought was, as it were, simultaneous; language was successive. The problem for the speaker was to convert his all-present thought into the linear form of speech in a particular situation. It was no happenstance that Vygotsky found his inspiration in Stanislavskii. This was more of the "high Russianness" of Vygotsky.

Let me add one further word to this discussion about the place of "consciousness." I have already mentioned its centrality in Russian literary debates -- particularly in the debates of the Symbolists, Acmeists, and Futurists that swirled first in the coffee houses of Leningrad and then spread throughout literary Russia in the 20's and 30's. The critic Viktor Shklovsky (1965) typically proclaimed the consciousness-raising function of poetry and invoked *otstranenie* ("making the familiar strange") as its principal linguistic tool. There were others who were concerned in different ways with the question of what shapes imagination. One such voice was Bakhtin's (1978) whose discussion of the "dialogic imagination" also touched on the arousal and shaping of consciousness and meaning. His interest was in the idea of "voices" that enter into the construction of fiction, and the manner in which voice in this sense was an element in imagination and thought. It is hard to know how well the two were acquainted with each other, Bakhtin and Vygotsky. But obviously the idea of dialogic imagination was very current in post-Revolutionary Russia, and even the avidly modernist and eccentric Anatoly Lunacharsky, Lenin's eccentric Commissar of Public Education, appreciated its significance for a Marxist theory of mind and culture, and gave it his public blessing (e.g., Hughes, 1981). Unfortunately, Lunacharsky did not last long in office; his blessings were never turned into official action. Bakhtin, opposed by what had already become the Old Guard, was exiled to far Kazakhstan; and Vygotsky's work was banned. But, ironically, the discussion of the role of dialogue in the shaping of thought and imagination has today an even higher place on the agenda of contemporary debate in literary theory and psychology than it did when first introduced. Bakhtin and Vygotsky have become posthumous world figures: what was once a Russian issue in danger of cultural extinction has become a topic of worldwide discussion.

The renowned Russian linguistic theorist, V. I. Ivanov (1982), eulogizing Roman Jakobson, characterized him as a "visitor from the future." I believe that describes as well the whole post-Revolutionary generation of literary-linguistic-philosophical thinkers of which Vygotsky was so incandescent a part. They were indeed "visitors from the future," as will be evident to the reader perusing the pages of these volumes.

* * *

Vygotsky's previously unpublished six lectures on human development reveal the true derivational depth and detail of his thinking. Though written half a century ago, and though based on the research findings of that distant time, they have an uncanny ring of modernity. They deal successively and cumulatively with the classic problems of psychology: perception, memory, thought, emotion, imagination, and will -- all treated from the perspective of development. They are timeless masterpieces: elegantly and powerfully argued, full of surprises, swift. The philosopher, Stephen Toul-

min (1978), once referred to Vygotsky as "the Mozart of psychology." Reading these lectures is like listening to the Hafner or the Jupiter. You understand why Vygotsky's reputation shone so brightly for those sophisticated Moscow students a half century ago, and why his banned writing circulated so widely among them.

I propose to set forth the argument of each of the lectures in turn so that the reader, not familiar at first hand with the form in which the issues are raised, will be helped to understand the scope and daring of his approach. At the end, I shall try to put them together in a broader perspective.

In the opening lecture on the development of perception, Vygotsky begins with a riddle. If we accept the work of the Gestalt psychologists, as we must, how can we account for the fact that adult perception differs so strikingly from perception in the young child? How can early perception be both organized and immature? Vygotsky, like the Gestaltists, rejects the associationist approach to perception on grounds that a theory of memory (which is what a theory of association necessarily is) cannot explain perception. How can the past, organized by memory, explain a present perception? How did memory, in the first place, take its current form unless it had been shaped as well by the nature of perception? No present mental function can be "explained" by association without begging this question. There must also be principles that operate within perception and that precede any influence that memory may have upon it, associative or otherwise.

To make his point, he explores several classic phenomena in perception: the *constancies* (why white looks white even in shadow, a dinner plate circular even at an angle, why people, for example, do not seem to change size as drastically as the size of their retinal images in our eye when they walk away from us, etc.); the compellingness of *meaning* in perception (how difficult it is for anything to seem totally meaningless); and how we perceive in a two-dimensional picture what it represents in a three-dimensional world. He laments that Gestalt psychology does no better at accounting for the development of any of these phenomena than the associationists whose errors they deplore.

I will not recapitulate his argument in full here, lest I steal the reader's pleasure, for the lectures are full of suspense. But let me whet the reader's appetite with an example. The constancies develop over time during development: that much is known. Akin to the constancies is the size-weight illusion -- of two lifted objects of equal physical weight, the smaller will almost invariably be judged heavier. Vygotsky sees it as a form of "density conservation." If the illusion does not develop with age, it is usually symptomatic of severe mental subnormality. This strongly suggests that some other mental function is "fusing" with perception in the course of growth that permits the taking in of more related stimulus information (both the size *and* weight of an object).

We also know that some subnormal children are not as likely to "perceive meaning" in events. Consider the emergence of various phenomena in the development of picture perception as children grow older. The youngest children, faced with pictures to interpret, first report isolated objects. Then, as they grow older, they report the objects in action. Still older, they report features or properties of the objects. And finally they reach an age when they can report the overall scene. How can one reconcile this finding with a common one, reported by Gestalt psychologists in studies of nonpictorial, real-world perception, that children first perceive the global properties of the visual world and only gradually are able to isolate its parts?

Vygotsky notes that there is something different about perceiving the world and interpreting a picture, that the latter involves more than perceptual processing. Some other process is involved. He comments (almost with glee!) that the order of emer-

gence of the child's "stages" of picture perception corresponds precisely to the order of acquisition of parts of speech: first he learns nouns for objects, then verbs for actions, then adjectives for features or properties, and finally sentences for the overall scene. He offers an hypothesis: does not the developing organization of the percept of a picture depend upon the fusing of language-dependent thought with the process of perception? Is it not better thought of as perception entering the sway of higher order processes that can then use lower order processes instrumentally? Obviously the *potential* to deal with the whole scene is there from the start, but it is not yet organized analytically, as would be required for the interpretation of pictures. He says, half tongue in cheek, "It would be extraordinarily difficult if the child actually achieved the potential of perceiving the whole meaningful situation only between the ages of ten and twelve!" What the child can report in an artificialized task (like picture interpretation) depends upon how his perceptual capacities interact with other mental functions.

He then reports a study of his own that turns the whole question on its head. Let another function interact with perception -- this time imaginative play with other children. Now the child who in a strict picture viewing experiment could name only isolated objects will describe the *full* scene to his companions with considerable imagination. "At each stage in the child's development we observe changes in interfunctional connections and relationships." The interacting functions bring into being new powers and create new functional systems. One cannot consider perception in isolation, but must always take into account other mental functions with which it interacts. Perceptual development is the development of new functional connections between perception and other functions.

The lecture on memory centers immediately on the problem of representation. After rejecting "bourgeois idealist" efforts to cope with the relation of mind and brain, to see memory as the "bridge between consciousness and matter," he takes as his starting point the well known experiments of Gottschaldt and of Zeigarnik. The former showed that no matter how much one practiced remembering certain abstract geometric forms, practice had no effect whatever on how well one was able to recognize those same figures when they were embedded and masked in more complex figures. This demonstrated for Vygotsky that memory depends upon structural laws governing mental activity, in this case laws of figural integrity. So too Zeigarnik's finding. In her still well known experiment, subjects were better able to recall uncompleted tasks than ones that they had completed. This immediately implicates the role of *intention* in memory. For Vygotsky, both studies show that memory is not autonomous, that it takes multiple forms and that it cannot be explained by a single generalization such as the laws of association. For what have such laws to do with such matters as intention?

Finally, we know that memory depends upon the meaningful organization that we can impose upon the material to be remembered. Where initially meaningless material can be represented in a meaningful way, remembering is guaranteed by a single encounter.

When we turn to children's memory, the first thing we note is how astonishingly good their raw memory is, language learning being the prime example. So what develops? One must distinguish between *direct* and *mediated* memory, the latter made possible by all manner of memory aids from strings on the fingers to note taking and precis making. The principal tool of mediated memory is, of course, the verbal formulation or reformulation of what has been encountered and needs to be remembered. By means of such formulation and reformulation, memory is converted from an involuntary, automatic activity into a conscious, intentional, instrumental function. The progress from direct to indirect memory, moreover, characterizes not only the development of the child, but the emergence of man into modern culture. So at the start

of life, the child's thinking depends upon memory. With time and development, memory comes increasingly to depend upon thinking, upon acts of formulation and reformulation.

And so to the lecture on thinking, a polished gem of Russian intellectual argumentation. It begins with an attack on association, his favorite opening target in all the lectures. The associationists, he charges, have such an abstract and undifferentiated conception of thought that they are forced foreover to bring in special mechanisms to account for newly observed events. So, for example, they need special processes to deal with such commonsense matters as the fact that thought is generally goal directed and that it very often exhibits a quite logical, orderly pattern. To account for these ordinary matters, they invoke the idea of perseveration. Perseveration counterbalances association: the flow of thought is thereby slowed from "a gallop or whirlwind of ideas" (the flow of association) and yet, thanks to the balance of the two processes, is kept from being mired down in static obsession (perseveration). Imbalances between the two tendencies are invoked by the associationists to account for various mental diseases. The development of thought in the child is also accounted for in these terms. The terminus of growth is the balancing of the two tendencies.

But for Vygotsky, all the balance in the world cannot account for why, in the first place, thought tends toward a logical form and serves in the fulfillment of human intentions. Vygotsky sees the shortcomings of associationism as having provoked three corrective efforts. The first, behaviorism, restated the old position in "objective" terms, but to no avail. Frequency and reinforcement, related to overt behavior, do no better than the old mentalistic laws of association in accounting for the intentionality and orderly logic of thought. The second corrective was the idea of a "determining tendency" that propels thought toward goals. However it might account for intentionality, it still left the internal logic of thought unexplained. The third corrective effort was Act Psychology which argued (and tried to demonstrate) that thought was non-sensory or "imageless" and therefore not governed by association. "Rationality" is then stipulated as a feature of this non-sensory process, just as associativeness is stipulated as a property of image processes. Vygotsky dismisses this as rank dualism and charges the Act Psychologists with dragging vitalism into the explanation of mind. Vygotsky dismisses all three views -- behaviorism, determining tendencies, and Act Psychology -- as grossly insufficient for dealing with questions of human development.

He then turns to Piaget -- appreciatively, but with a critical edge. His critique will be familiar territory to the modern reader and needs little further comment. In effect, he applauds Piaget's description of the process of growth, but complains about the total lack of a mechanism in his system to account for how or why growth takes place at all -- a not unfamiliar complaint a half century later.

Vygotsky proposes to approach the problem in a new way. For him, of course, the key issue is the relationship between thought and speech during development. He rejects both the Wurzburg proposal that "the word is nothing but the external clothing of thought" and the behaviorist's formula that thought *is* speech, but going on subvocally. A paradox serves Vygotsky as his point of departure. It is this: in the child's mastery of uttered or vocal speech, he progresses from single words, to two-word phrases, to simple sentences, and so on. Yet, at the semiotic or "meaningful" level, the meanings that are inherent in the child's utterance begin as though expressing full sentences (the so-called holophrase), and only gradually differentiate to express meanings that correspond to phrases or to single words. In short, external speech grows from part to whole; meaning from whole to part. We would express this idea today by saying that early language is highly context-dependent or intentionally imbedded, and that, as Grace deLaguna argued, it cannot be comprehended without knowing the context and

state in which it is uttered. Only gradually does the child's meaning come to be more or less directly mappable onto his actual utterance. Vygotsky argues that it is for this reason that the child, though only able to *utter* single words, is nonetheless able to *act out in play* the full meaning contained in "one-word utterances." For acting out in play entails different processes than talking out in speech.

The next step in his argument is an important one and is already familiar to the reader. In speech generally, syntactical or grammatical forms do *not* map uniquely on one and only one meaning. Lexically and the grammatically, *polysemy* prevails. Meaning is never fully determined by, and does not correspond directly to utterance. The reader of the earlier version of *Thought and Language* may remember the quotation in the last chapter of that book from Dostoevsky's, *The Diary of a Writer.* Five drunken workman carry out a complicated dialogue for five minutes, though the only word any of them utters is a "forbidden noun not used in mixed company." Intonation and circumstances determine its meaning in context. Vygotsky concludes that if language operates in this way, then "the child's work on a word is not finished when its meaning is learned." He cannot be said to have mastered the language when, at five or six, he has mastered its lexicon and grammar. He must also understand when, under what conditions, and how to combine language with his intentions and how, then, to do so with appropriate subtlety. What is at issue, as we would say today, is mastering the pragmatics of a language -- the forms and functions of its use.

With the development of higher mental functions, the child is finally able to reflect, to turn around on his own language and thought and to differentiate and integrate them still further. To readers of later Piaget, of course, this attainment will be recognized as akin to "formal operations" where the object of thought is no longer the world as such, but propositions about the world. But for Vygotsky, unlike Piaget, there is no "stage" but only a progressive unfolding of the meaning inherent in language through the interaction of speech and thought. And as always with Vygotsky, it is a progression from outside in, with dialogue being an important part of the process.

Vygotsky then moves on to emotion. He begins this time with a trenchant critique of post-Darwinian thought. Since Darwin's publication of *Expression of Emotions in Man and Animals* (1965), emotions have always been interpreted "retrospectively": as remnants of the expression of animal instinct. Emotions are rudiments, "the gypsies of our mind." "Fear is inhibited flight; anger inhibited fight...remnants that have been infinitely weakened in their external expression and their inner dynamics." The result of this view was the implicit assumption that the course of emotional development in childhood was a tale of suppression and weakening. He mocks Ribot as absurd for celebrating "the glorious history of the dying out of this entire domain of mental life."

While the James-Lange theory had the effect of freeing emotion from its phylogenetic roots, the formula "we are sad because we cry" still keeps emotion tied to its old status as an accompaniment of more or less primitive instinctive action. It endows emotion with a "materialistic nature." In time, indeed, James modified his view and proposed that the original theory held only for the lower emotions inherited from lower animals, but not for the higher, subtler ones like religious feeling, aesthetic pleasure, and the rest. These were, he felt, *sui generis*. Vygotsky finds James's retreat even worse than the original formulation. For him, the James-Lange theory was a step backwards from Darwin. It introduced a misleading psychophysical dualism into psychology, and, once James excepted the tender emotions as arising *sui generis*, ended in a metaphysical muddle in which there were now purely "mental" emotions whose historical derivation was left unexplained.

It is not surprising then, says Vygotsky, that the James-Lange theory soon came under attack. And it was W. B. Cannon who led the way. (Cannon's classic book on

pain, hunger, rage, and fear (1929) had been translated into Russian and, we know from record that he had himself lectured in Russia and visited Pavlov's laboratory. I do not know whether Vygotsky heard his lectures, but the present lecture reveals a close knowledge of his work.) For while Cannon paid lip service to James, his research conclusions left James's theory in shreds and provided Vygotsky with just the key he needed. "James argued that we grieve because we cry. Cannon suggested that this formulation needs to be modified to read that we grieve, feel tenderness, feel moved, and generally experience the most varied emotions, because we cry. ...Cannon rejected the concept that there is any simple connection between an emotion and its physical expression. He demonstrated that the physical expression is nonspecific to the emotion." Then later Cannon showed that even when animals were sympathectomized, their viscera entirely desensitized, emotional reactions could still be elicited by appropriate situations. And still later, it was discovered that injection of adrenaline in human subjects did not necessarily produce emotional reactions, but that more often than not, the result was "cold emotion" in which one felt aroused but did not know what one was aroused about. These were the openings that Vygotsky needed.

He concludes from Cannon's research that the original function of emotion must have been the facilitation or priming of appropriate instinctive action. What recedes in man is not emotion, but its original links to instinctive actions. In man, with his attenuated instinctual system, emotion takes on new functions. Emotion moves from the periphery to the center, as it were; moves to the cerebral cortex where it has an equivalent status to other cerebral, central processes. It now can interact with those other processes. As with other processes, then, the development of the emotions cannot be understood separately from their connections with other mental processes. And it is from that vantage point that Vygotsky begins his inquiry.

Freud is the pioneer in rejecting the organic primacy of emotions. It was he who gave them a role in mental life proper. But he dismisses Freud's substantive claims as "false," though commenting, "there is a great deal of truth in what he says if we limit ourselves to the formal conclusions based on his studies" -- for example, Freud's finding that conflict is a source of anxiety. And he applauds Freud for recognizing that the emotions of the child and adult are different.

But his most approving words are for Karl Buhler and his now all but forgotten distinction between *Endlust*, *Funktionslust*, and *Vorlust*: pleasure derived respectively from the *consummation* of an act, from the actual *performance* of the act, and from the *anticipation* of it. Instinctive activity is characterized by *Endlust*. But the development of skills in an action, even an initially instinctive one, depends on the growth of pleasure in the performance itself, *Funktionslust*. Finally, planfulness and the weighing of alternatives becomes possible only with *Vorlust*. This progression Vygotsky sees as providing a model for the development of emotion.

He couples these distinctions with two other sets, one attributed to Claparede, the other to Kurt Lewin. Claparede distinguishes between emotion and feeling: the former is affect accompanied by action, the latter affect without action. Lewin's distinction is between direct and displaced affect -- part of his notion of substitution whereby affect aroused by one mental process can be displaced on to other mental processes that have substitute value for the first.

Buhler, Claparede, and Lewin, by Vygotsky's reckoning, demonstrate ways in which emotion is converted from an *external* to an *internal* role in mental life -- the "movement to the center" of human emotion, a process in which emotion becomes increasingly dominated by central processes rather than being peripherally excited as in the James-Lange theory. Once one recognizes this centripetal developmental trend in emotion, it becomes possible to understand more clearly such matters as the deranged

mental activity of the schizophrenic. In that illness, emotional "autistic" processes come to dominate mental life and to use rational problem solving processes as their instrument, rather than *vice versa*, as in normal imagination. This idea leads Vygotsky directly to his penultimate lecture.

It is on the development of imagination. "The very foundation of...imagination is the introduction of something new, the transformation...such that something new...emerges." Imagination, of course, contains representations of the past; but to these it brings something that is productive as well, something that goes beyond memory. But even the flight of fantasy, however transformed it may be, is lawful and determined. "A given [fantasy] representation can remind the individual of its opposite, but not of something entirely unrelated," for imagination "is deeply rooted in memory."

Where does the productive, transformative activity of imagination come from? Vygotsky first considers Piaget's idea of egocentrism, which he takes to be an extension of Freud's idea of primary process: that the young child's thinking is at first wishfully pleasure seeking, unrelated to such reality constraints as means-ends compatibility. It is also unconscious and uncommunicable. But Vygotsky finds this view unconvincing from a phylogenetic perspective. It is impossible to imagine that thinking first arose in a primitive form with the function simply and solely of yielding pleasure without regard to reality. Moreover, observations of children do *not* reveal that children get satisfaction from imagined rewards, but rather from the real thing, from the satisfaction of *real* needs. They are notably inconsolable by imaginary pleasures.

Finally, one has to question the "non-verbal" nature of early imagination in view of the striking lack of playful imagination in children who, through deafness, autism, or other defects, are retarded in the development of speech. If playful imagination were non-verbal, this deficit should not be present. Moreover, aphasics who lose their capacity for speech also show a marked decline in playfulness and imagination, and even lose the capacity to pretend. It seems that "speech gives the child the power to free himself from the force of immediate impressions and to go beyond their limits." From this one must conclude that the growth of imagination is linked not only to the development of language, but also to its developing concurrent mental processes. On this line of reasoning, there must be something deeply flawed, Vygotsky concludes, in both Freud's and Piaget's giving primacy to either primary process or egocentrism in the growth of imagination.

And so he rejects the view that imagination is a process driven by passions or emotions -- even initially. He even questions whether unrealistic imagination or fantasy are always more emotional than reality-oriented thought. How "cool" are we when, for example, we plot something complicated whose outcome is crucial to our well-being? We would do far better, in Vygotsky's view, to look more closely at the different forms that imagination takes -- whether realistic or fantastic -- and inquire what they entail by way of the interaction of different mental processes in producing their effects.

A first conclusion from such an examination is that we must stop drawing a contrastive distinction between "autistic" or "day dreaming" imagination on the one hand and "realistic," productively inventive imagination and thought on the other. Both entail the use of language. Both may be conscious or not. Both may be affectively charged or not. The difference between them is relative, not absolute. It would seem that the starting point of each is related to the appearance of speech, and imagination and speech seem to develop as a unity. Moreover, when we examine effective, "reality oriented" thinking, it becomes plain that there are many aspects of it that are quite fantastic. "No accurate cognition of reality is possible without a certain element of

imagination, a certain flight from the immediate, concrete, solitary impressions in which this reality is presented in the elementary acts of consciousness."

Yet, it would be in error *not* to distinguish in some way between realistic thinking and imagination. Though both, to be sure, free one from the here and now, they do so by different means and with different purposes. And it is to this matter, the issues of purpose and intention, that Vygotsky's last lecture is devoted. How by an act of will does one "frees" oneself by leaps of imagination or of thought?

He begins by rejecting theories that reduce volition to non-volitional processes. With a first lance, he disposes of his *bete noir*, associationism. However elaborate a chain of associations one supposes to exist, he argues, its elaboration cannot yield volition -- unless one covertly posits some step of "volition" entering along the way. Even Ebbinghaus's associationist trick of claiming that when an act leads to a result, the association between them becomes reversible, and thereby lets the person anticipate each from the other fails, for one has to bring in "anticipation" as a *deus ex machina*.

He also rejects theories that introduce volitional, vitalistic processes operating *ab initio*. As for Herbartian and other theories that introduce an extraneous will, they fail to specify how this extraneous force arises and how it comes then to interact with other processes. But what is revealing about Herbart's and other theories of autonomous volition, is that they always insert the operation of will into the processes of problem solving in order to account for rational action being kept on track. For that seems to be where a directive process is needed.

How steer one's way between the Scylla of a futile determinism about the will, and the Charybdis of a vapid teleology? How maintain a scientific approach while still honoring what is most essential about voluntary action -- its freedom. Vygotsky was greatly impressed by the approach of Kurt Lewin to this dilemma. Lewin, to simplify the argument, demonstrated a difference between adults and children in terms of the latter's capacity to initiate and to sustain an "arbitrary" intention, one not naturally related to the situation in which the person finds himself. Not only can adults pursue arbitrary intentions, but they can even transform the situation in which an arbitrary act occurs into one that seems more "rational" to them. If, for example, we have to wait for something to happen whose time of occurrence is randomly scheduled (unbeknownst to us, of course), we find ways of "making sense" of the arbitrariness -- what Lewin called "changing the psychological field." All of which suggests to Vygotsky that "will" involves an ability to talk oneself into an action, no matter how arbitrary, and to transform or rationalize the situation in which one must act into a form that makes some sense. He even goes so far as to cite a neurological observation of Kurt Goldstein's suggesting that this form of "self-instruction" may involve a unique neurological structure. He ends with a characteristic Vygotskian query: might it be that the route to the learning of self-instruction is through learning to repeat internally to ourselves the commands that others have given us from outside, until, finally endowed with the fullness of language, we can make up our own novel and even arbitrary commands and use them at will?

Vygotsky's argument on the nature and the growth of "will" is not, alas, an overwhelmingly convincing one. Like philosophers and psychologists before him (and after), he is thrown off his usual thumping stride by this intractable set of issues. But, for all that, he makes his points, and manages at least to do so in a fashion consistent with the previous lectures. He strikes materialists and idealists hip and thigh. He points to the importance of the integration of functions. And finally, he manages to make an interesting, if not a convincing, case for the centrality of language and inner speech in mediating "willed" action.

Volition is a topic that rarely comes up for discussion in contemporary psychology. It is usually concealed in theories of motivation or attention or in discussions of Self -- in all of which contexts its philosophical dilemmas can be handily disguised behind a mass of data. I think that Vygotsky *had* to confront the issue of will, not so much because he was a child of his times, but rather because he was so dedicated to the concept of self-regulation, a concept that demands one take a stand on the issue of will. It is not surprising that the reflexive use of language is given so prominent a place in the "attainment" of will. For language is the linch-pin in his system of cultural-psychological theory. Man, who lives by his history, learns that history through language. In the end, man frees himself from that history through language. In the end, man frees himself from that history by the very tool that history placed in his hands -- language. It is a Promethean thread that Vygotsky weaves.

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Now let me sum up what appears to be, at least for this reader, the forming themes of Vygotsky's thought -- both in *Thought and Language* and in the *Six Lectures*. Perhaps I can do best in the style of linguistics, setting forth a list of critical contrasts that structure his thinking. At a minimum, the list should contain the following:

Inner (central) *vs.* Outer (peripheral)
Interdependent *vs.* Autonomous
Ordered *vs.* Chained
Symbolic *vs.* Biological
Depth *vs.* Surface
Historical *vs.* Ahistorical

For Vygotsky, becoming human implies the "centralizing" or cerebralization of mental processes -- whether in development, in cultural history, or in phylogenesis. Emotion moves inward and escapes peripheral control. Speech starts externally and ends as inner speech. Imagination is play gone inward.

Processes go inward, and they are thereby made amenable to interaction with other processes. Interactiveness, "interfunctionality," becomes the rule of maturity. The existence of autonomous processes is a sign of immaturity, of pathology, of phylogenetic primitiveness. Perception operating on its own, for example, yields the symptomatology of mental subnormality.

Through interaction, human mental processes become ordered, systemic, logical, and goal oriented. By the achievement of generative order in interaction, we become free of the immediacy of sensation, free of the chaining of associations, capable of applying logic to practical action. Kurt Goldstein once said in a seminar that wherever you find associative mental activity, you are sure to find pathology. Vygotsky would have applauded.

The chief instrument of integration and order in human mental life is language, language used in the service of other higher mental functions. But language is not to be taken in Saussure's (1955) sense as a system of signs. Rather, for Vygotsky, language is a powerful system of tools for use -- for use initially in talk, but increasingly and once inwardness is achieved, in perception, in memory, in thought and imagination, even in the exercise of will. In contrast, there is the biological system -- operating by what would later be called the First Signal System. For Vygotsky, there

appears to be a Rubicon that is crossed, going from biological to cultural evolution, some point at which Prometheus steals the fire of the Gods.

Because of the mediation of the language system in mental life, and because natural language is necessarily polysemic, the conduct of mental life requires interpretation. This implies that all human action, because it is mediated by language, is subject to multiple interpretation. There will always be a "surface" manifestation that constitutes the superficial interpretation of what seems to be going on in human behavior. But there is also an alternative interpretation of what something "means." And it is this existence of "subtexts" in human behavior that gives depth to human behavior and to its interpretation -- in life as in art.

Finally, insofar as language is not only a tool of mind, but a product of man's history, man's mental functioning is a product of history. But paradoxically, it is the systemic productivity of man's language use that makes it possible for him to rise above history and even alter its course: to reach higher ground never before populated by a member even of our language-using species.

Vygotsky was one of the great theory makers of the first half of this century -- along with Freud, McDougall, Piaget, and a very few others. Like them, his ideas are situated in his times. But like the best of them, those ideas still point the way to the future of our discipline.

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THE DEVELOPMENT OF VYGOTSKY'S THOUGHT: AN INTRODUCTION

Norris Minick

1. Preamble

The first part of this volume contains Vygotsky's classic monograph *Thinking and Speech*, a work which was first published in Russian in 1934. The second contains a series of lectures that Vygotsky delivered in Leningrad in 1932. In addition to differences in subject matter and style, these two works are separated by an important conceptual shift in Vygotsky's thinking which occurred in 1932 and 1933. Indeed, since several chapters of *Thinking and Speech* were written prior to 1933, the papers which constitute that volume also span this conceptual shift in the development of Vygotsky's thought. As a consequence, if we are to understand these works, their relationship to one another, or their significance as part of the broader Vygotskian corpus, it is critical to consider the major changes that emerged in Vygotsky's thinking as his perspectives developed between 1924 and 1934.[1]

Three major phases in the development of Vygotsky's thought can be identified by focusing on the constructs that served as his analytic units and explanatory principles. The first two phases have been discussed by several Soviet scholars (Bozhovich 1977; El'konin 1984; Leont'ev 1982a; Radzikhovskii 1979). The third phase has not, perhaps in part because many of the papers representing that period are being published for the first time as part of these collected works.

Between 1925 and 1930, Vygotsky focused on an analytic unit that he called the "instrumental act," a unit of activity mediated by signs that are used as tools or instruments to control behavior. During this phase of his career, the assumption that the stimulus-response unit provides the common foundation for learning and behavior in both humans and animals was fundamental to Vygotsky's theory. He argued, however, that speech and other historically developed sign systems provide humans with a unique form of stimuli that they can use to influence or control their own behavior. He saw the use of signs in the mediation of behavior as the foundation for the development of volitional forms of behavior that cannot be fully understood

1. Vygotsky became a significant force in Soviet psychology following his move to Moscow in 1924. He died of tuberculosis in the spring of 1934. For a translated bibliography of his work, see Vygotsky (1978a, pp. 141-151). [The footnotes in this introduction are mine. N. M.]

in terms of stimulus-response laws. Noting that the initial function of signs is communication, Vygotsky sought the explanation of the phylogenetic, historical, and ontogenetic development of these forms of behavior in verbally mediated social interaction.

In a lecture delivered in October of 1930, Vygotsky (1982a) shifted the focus of his research to an analytic unit that he called the "psychological system." In this lecture, Vygotsky argued that psychological research must focus not on the development of individual mental functions but on the development of new relationships between mental functions, on the development of psychological systems that incorporate two or more distinct functions. Thus, where Vygotsky had once argued that the use of the word as a sign-stimuli provides the foundation for a more advanced, mediated form of memory, he now argued that this use of the word constitutes the formation of a new functional relationship between memory and speech, the formation of a new psychological system. Conspicuously absent in Vygotsky's work between 1930 and 1932, however, was any systematic attempt to explain how or why new psychological systems develop.

A third phase in the development of Vygotsky's thinking is reflected in papers and lectures written in 1933 and 1934. The most obvious change in Vygotsky's conceptual framework during this period was associated not with his unit of analysis but with his explanatory principle. During this period, Vygotsky attempted to explain psychological development in terms of the differentiation and development of social systems of interaction and action in which the individual participates. In parallel with this change in his explanatory principle, Vygotsky reduced his emphasis on the relationship between specific mental functions in psychological systems. Rather, he began to develop a system of psychological constructs that would facilitate the analysis of psychological processes in connection with the individual's concrete actions and interactions.

It is important to emphasize at the outset that there is a great deal of continuity between these three phases in the development of Vygotsky's theoretical framework. First, as we shall see, the attempt to study the development of consciousness in connection with the development of behavior was fundamental to nearly all Vygotsky's work. Second, Vygotsky consistently emphasized several concepts, including the importance of the mediation of psychological processes by speech and the socio-historical nature of certain psychological processes in humans (Wertsch 1981, 1985). Indeed, Vygotsky rarely abandoned concepts that had been central to his work as his thinking developed. He tended, rather, to redefine useful concepts and integrate them into the more general and powerful conceptual frameworks he was developing.

2. Mediation and the Higher Mental Functions (1925-1930)

As Davydov and Radzikhovskii (1985) have argued, there were three major groups of psychologists in the Soviet Union when Vygotsky began his work in the early 1920s: (1) a small noninfluential group led by Chelpanov who continued the traditional focus on consciousness as the object of psychological research, (2) a much larger and clearly dominant group lead by Pavlov and Bekhterev who eschewed the study of subjective phenomena and defined psychology as the science of behavior, reflexes, or reactions, and (3) a group led by Kornilov who argued for a synthesis of these two perspectives.[2] Vygotsky's rejection of all three of these positions is reflected in

2. For a useful discussion of the early development of Soviet psychology see Kozulin (1984).

papers written in 1924 and 1925 that initiated his rise to national prominence as a psychologist in the Soviet Union (Vygotsky, 1982b, 1982c).

The central thrust of the argument developed in these papers was quite simple. Vygotsky argued that the conceptual isolation of mind and consciousness from behavior that had been characteristic of the traditional introspective psychologies championed by Chelpanov had led to a false definition of the object of psychological research. The study of behavior -- and for Vygotsky human behavior was inherently socially and culturally organized behavior -- was fundamental to the development of any adequate psychological theory. However, far from simply accepting the redefinition of the object of psychological research offered by American behaviorism or its Soviet counterparts, Vygotsky argued that these perspectives had retained the conceptual isolation of mind and behavior, effectively extending the conceptual limitations of traditional psychology to the study of behavior (Vygotsky 1982b, 1982c). Referring to the behaviorist approaches, he wrote:

> This is the other half of the same dualism. Previously we had mind without behavior. Now we have behavior without mind. In both cases, we have "mind" and "behavior" understood as two distinct and separate phenomena (1982c, p. 81).

The final sentence of this statement was extremely important to Vygotsky. Like the group of Soviet psychologists led by Kornilov, Vygotsky had insisted that consciousness and behavior are both proper objects of psychological research. However, Vygotsky differentiated himself from Kornilov and his colleagues by rejecting the notion that a unified psychology could be created through an integration of subjectivist and behaviorist theories and constructs. In Vygotsky's view, the conceptual isolation of consciousness and behavior that had been initiated by the subjectivists and extended by the behaviorists had led to a fundamental misconceptualization of both consciousness and behavior. To achieve a truly unified psychological science, he insisted that a new system of concepts and theories would have to be developed which would overcome the conceptual isolation of behavior and consciousness that was so fundamental to existing theoretical frameworks. In his 1924 and 1925 papers, he suggested that consciousness is "a problem of the structure of behavior," "a feature of human labor activity." More generally, he argued that the development of a psychological theory adequate to its subject required the development of psychological constructs that would allow consciousness and behavior to be conceptualized as aspects of a unified whole.

In these papers, however, Vygotsky was stating a problem for which he had no clearly developed solution. In an important sense, the entire history of the Vygotskian school, including the contemporary development of what is known as the "theory of activity" (Leont'ev 1978; Minick 1985; Wertsch 1981, 1985), must be understood as an attempt to solve the conceptual problem that Vygotsky outlined in these articles. Still, while Vygotsky did not resolve this problem in these early works, he did introduce several concepts that were fundamental to the research carried out by the Vygotskian school between 1925 and 1930.

Like many of his contemporaries, Vygotsky differentiated humans and animals by arguing that consciousness and thinking are characteristic only of the former. Emphasizing the need to explain rather than merely describe psychological processes that are unique to human beings, Vygotsky argued that they have their source not in biological structures or the learning of the isolated individual but in historically developed sociocultural experience. Suggesting that the mechanisms governing the development of innate behaviors had been identified by Darwin and that those governing individual learning had been identified by Pavlov, Vygotsky emphasized the need to identify

the mechanism that allows the development of psychological processes in the individual through the acquisition of social and cultural experience. In these early articles, Vygotsky identified speech and the social interaction that it mediates as the key to this problem, arguing that speech is the mechanism common to both social behavior and the psychological processes that are unique to human beings.

In these early articles, Vygotsky did not provide any clear definition of the aspects of consciousness, thinking, or mind that differentiate humans from animals nor did he specify the mechanisms through which speech and social interaction contribute to their development. These articles are nonetheless fundamental to any attempt to understand the subsequent development of the Vygotskian paradigm because they indicate an important motivation for Vygotsky's concern with the connection between verbally mediated social interaction and the development of psychological functions. Specifically, it was here that Vygotsky first saw the potential for a system of theoretical constructs which would allow him to retain the connection between the organization of behavior (again, for Vygotsky this always meant socially and culturally defined behavior) and the organization of mind that he found lacking in extant psychological theories.

In the research that Vygotsky and his colleagues carried out between 1926 and 1930, they focused on a relatively narrow range of psychological processes and developed a fairly sophisticated theoretical framework in their attempt to demonstrate that speech and social interaction underlie the development of these processes. During this period, the research of the Vygotskian school focused on what were called the higher mental functions, functions such as voluntary attention, voluntary memory, and rational, volitional, goal-directed thought. Vygotsky argued that the fundamental difference between the mental processes of humans and animals is the presence of these volitional higher mental functions in humans. Having accepted the concept that the common foundation for psychological development and psychological functioning in both humans and animals is the stimulus-response unit, the central problem Vygotsky faced was that of explaining the origin of these volitional processes.

Vygotsky's explanation of the origin of the higher mental functions included two components. First, he argued that the higher mental functions rely on the mediation of behavior by signs and sign systems, the most important of which is speech. Vygotsky saw signs as a special type of stimuli that are used as "psychological tools," tools that are "directed toward the mastery or control of behavioral processes -- either someone else's or one's own -- just as technical means are directed toward the control of nature" (1981a, p. 137). With its inclusion in behavior, "the psychological tool alters the entire flow and structure of the mental functions...by determining the structure of the new instrumental act, just as a technical tool alters the process of natural adaptation by determining the form of labor operations" (1981a, p. 137). Vygotsky described the psychological mechanism that provides the foundation for this restructuring of behavior through psychological tools in the following way:

> In natural memory, the direct (conditioned reflex) associative connection A-B is established between two stimuli, A and B. In artificial, mnemotechnical memory...two new connections A-X and B-X are established with the help of the psychological tool X (e.g., a knot in a handkerchief, a string on one's finger, a mnemonic scheme). As is true of the connection A-B, each of these two new connections is based on the natural conditioned response process and is instantiated by the properties of the brain. What is novel, artificial, and instrumental about the new connection is the fact....(that an) artificial direction is given to the natural process....by means of an instrument (1981a, p. 138).

Vygotsky called this basic unit of the higher mental functions the "instrumental act."

Second, to explain the historical and ontogenetic development of mediated or instrumental forms of behavior, Vygotsky turned to the primary function of speech as a means of social interaction and communication. Vygotsky argued that the higher voluntary forms of human behavior have their roots in social interaction, in the individual's participation in social behaviors that are mediated by speech. It is in social interaction, in behavior that is being carried out by more than one individual, that signs first function as psychological tools in behavior. The individual participates in social activity mediated by speech, by psychological tools that others use to influence his behavior and that he uses to influence the behavior of others. Subsequently, the individual "begins to apply to himself the same forms of behavior that were initially applied to him by others" (Vygotsky 1960a, p. 192).[3]

In this way, both the organization and the means of social activity are taken over entirely by the individual and ultimately internalized, leading to the development of mediated, voluntary, historically developed mental functions that are based on stimulus-response components but cannot be reduced to them. It was these psychological processes that Vygotsky referred to as the "higher mental functions." Vygotsky formulated the general principle underlying the development of the higher mental functions in the following way:

> Any higher mental function was external [and] social before it was internal. It was once a social relationship between two people....We can formulate the general genetic law of cultural development in the following way: Any function in the child's cultural development appears twice or on two planes....It appears first between people as an intermental category, and then within the child as an intramental category.[4] This is equally true of voluntary attention, logical memory, the formation of concepts, and the development of will (1960a, pp. 197-198).

Thus, Vygotsky saw the higher mental functions as "social" in two senses. First, like other aspects of culture, their development is part of the development of the socio-cultural system and their existence is dependent on transmission from one generation to the next through learning. Second, they are nothing other than the organization and means of *actual social behavior* that has been taken over by the individual and internalized (1960a, p. 198).

Wertsch has made what I consider an extraordinarily important contribution to our understanding of Vygotsky's thinking by emphasizing the significance of this second point (1985, chap. 3). Frequently, psychologists tend to represent society and culture as macrovariables associated with variation in the amount of various kinds experience available for individual learning rather than with qualitatively unique learning mechanisms or psychological processes. In contrast, research traditions such as social learning theory or cognitive anthropology are based on the concept that there are important mechanisms of learning and development that are inherently social. Vygotsky took this perspective one step further, linking the social not only with unique mechanisms of psychological development such as social interaction and internaliza-

3. Vygotsky attributed this general concept to Janet.

4. As Wertsch has noted (1985, p. 235), these terms have commonly been translated as inter/intrapsychological rather than the more literal inter/intramental. I have used the more literal translation in this volume because it seems to highlight Vygotsky's view that mental activity can be attributed to two or more people who are acting cooperatively and that the organization and means of his mental activity is comparable to that of the individual who is acting alone.

tion but with types of mental processes that are themselves inherently social, specifically, the higher psychological functions.

This perspective on the higher mental functions and their development provided Vygotsky with a conceptual link between an important aspect of human consciousness and an important aspect of human social behavior. By adapting the mediational means and the modes of organization involved in carrying out certain actions on a social or "intermental" plane and using them to mediate activity, the individual develops not only new means of carrying out specific actions but qualitatively new kinds of mental functions. Significantly, these mental functions were seen as developing not merely through the individual's experience in social interaction but through the transformation of social behavior from the intermental to the intramental plane. As reflected in Vygotsky's use of the terms "intermental" and "intramental," this representation of psychological development allowed Vygotsky to overcome the conceptual isolation of behavior and consciousness that he had earlier rejected. Thus, it was in these constructs that Vygotsky first found a means of reconceptualizing consciousness and behavior as aspects of a integral system.

Between 1926 and 1930, Vygotsky and his colleagues carried out two types of research. First, they collected material on the use of rudimentary external sign systems in the mediation of behavior. For example, they discussed the use of knots or notched sticks in remembering, the use of fingers and other external devices in counting, and the use of practices such as drawing straws and casting lots in decision making (1960c). Vygotsky saw these rudimentary sign-means as evidence of the historical transition from natural to mediated forms of behavior, forms of behavior in which "man himself determines his behavior with the help of an artificially created stimulus means" (1960a, p. 101). Second, Vygotsky and his colleagues conducted extensive experimental research in which they attempted to demonstrate how the child's behavior is restructured through the introduction of external sign-means and to explore how this behavior is internalized (Vygotsky 1929, 1981b; Leont'ev 1931).

Noticeably absent in this work was any attempt to carry out empirical research on the development of mental processes in social interaction.[5] Two factors would seem to account for the absence of this kind of research.

First, it is important to recognize that the central purpose of this research was simply to demonstrate that the structure and origin of the higher mental functions differs from that of behavior based on instinct or conditioned reflexes. Just as Pavlov had used simple experiments on salivation to demonstrate the unique characteristics of the conditioned reflex, the historical and empirical research carried out by Vygotsky and his colleagues during this period was an attempt to demonstrate the socio-historical roots of the higher mental functions and the differences between these functions and instinctive or conditioned reflex behaviors.

However, a second factor should be mentioned here if we want to understand the forces that led to subsequent developments in Vygotsky's thinking. Vygotsky had been interested in semiotics, semantics, and the role of speech in social interaction long before his career as a professional psychologist began. He had long been familiar with some of the most advanced thinking on these issues both inside and outside the Soviet Union (Radzikhovskii 1979; Wertsch 1985, Chapter 1). While simple sign-means such as a notched stick used as an aid in memory could be analyzed within a framework in which signs were conceptualized as "stimuli," to conceptualize speech in this way would have resulted in the kind of simplistic notions characteristic of Watson's attempts to deal with the role of speech in human behavior. To apply

5. Studies of the type are now being carried out in the West (e.g., Wertsch 1985; Rogoff & Wertsch 1984).

his profound understanding of speech and communication to the analysis of the mental processes and their development, Vygotsky had to abandon the concept that speech functions as a simple stimulus in human behavior. This required the rejection of the assumption that the stimulus-response unit is the basic building block of behavior.

3. Interfunctional Relations and the Development of Word Meaning (1930-1932)

By 1929 Vygotsky had begun to abandon this assumption. This shift in Vygotsky's perspective, and some of its immediate implications, are apparent in Vygotsky's 1929 paper, "The Genetic Roots of Thinking and Speech" (Chapter 4 of *Thinking and Speech*).

A useful index of the shift that occurred in Vygotsky's thinking during this period are his citations of Kohler's research on the intelligence of the higher apes. Where earlier references to this research had emphasized the chimpanzee's use of tools as an embryonic form of mediated behavior (Vygotsky 1929, 1960b), Vygotsky began to argue in this paper that:

> Kohler's experiments demonstrate clearly that the rudiments of intellect or thinking appear in animals independent of the development of speech and absolutely unconnected with the level of speech development. The "inventions" of the higher apes, their preparation and use of tools, and their use of indirect paths in the solution of problems, clearly constitute an initial *pre-speech* phase in the development of thinking, a *pre-speech* phase its development (Chapter 4 of *Thinking and Speech*, p. 101).

Beginning 1929, then, Vygotsky's writings no longer reflect the assumption that all animal behavior is restricted to systems constructed on the basis of stimulus-response units. Rather, Vygotsky had begun to argue that certain primitive forms of intellect are found in animals and young children independent of any functional connection with speech.

Vygotsky did not, however, abandon his view that the functional relationship between speech and thinking was an extremely important factor in the psychological development of human beings. Rather, he argued that speech -- like intellect -- has developmental roots in the higher apes and very young children which are independent of intellect, citing in this connection indicative gestures and emotional expressions (i.e., means of communication that do not involve the naming of objects or events, the relating of word and object). However, citing Buhler's notion that there is a time in the child's development when he or she "discovers that every object has its name," he argued that the independent developmental paths of intellect and speech "intersect" here and at other points in the developmental process leading to the emergence of "verbal thinking" and "meaningful speech." Vygotsky saw these as qualitatively new types of mental functions that have developmental dynamics and psychological characteristics not present in either of their precursors.

The new perspective on the relationship between thinking and speech that emerged as Vygotsky abandoned the view that complex behaviors are constructed on the foundation of stimulus response units liberated Vygotsky from the need to demonstrate how complex and volitional mental functions emerge on the basis of the mediation of behavior by signs. It also allowed him to begin to incorporate his knowledge of semiotics and communication more fully into his analysis of psychological development. Equally significant, however, was the more general conception of psychological development that emerged from this new perspective on the genetic relationship be-

tween what Vygotsky now represented as the independent functions of thinking and speech.

This perspective was outlined by Vygotsky in a lecture that he delivered to his students and colleagues in October of 1930, a lecture entitled "On Psychological Systems" (1982a). In this lecture, Vygotsky argued that:

> In development, and in particular in the historical development of behavior, what changes is not so much the functions as we earlier studied them (this was our mistake) -- not so much their structure or the dynamics of their development -- as the relationships and connections between them. In development, groupings of psychological functions emerge that were unknown at preceding stages (1982a, p. 110).

Thus, in this lecture, Vygotsky extended his insight concerning the emergence of verbal thinking on the basis of the independent functions of thinking and speech to the whole of psychological development, arguing that the key to understanding psychological development is the study of the changing "interfunctional relationships" among the mental functions, the study of the emergence and development of new "psychological systems."

In 1930, then, Vygotsky abandoned the "instrumental act" and the "higher mental functions" as his unit and object of analysis, turning his attention to changes in interfunctional relationships, to the emergence and development of what he called "psychological systems."

Once again, this is not to say that Vygotsky abandoned his interest in the role of speech in psychological development. His interests in the relationship between thinking and speech were reflected in work on the development of verbal thinking, particularly in studies of the development of word meaning (i.e. verbal concepts) and the role of egocentric and inner speech in the mediation of thought. Similarly, his interests in the verbal mediation of memory processes were reflected in discussions of the emergence of logical memory. At the same time, however, Vygotsky was able to extend his analysis of psychological development beyond cognitive processes, including the study of motivation and affect.

Nonetheless, while this shift in Vygotsky's definition of his analytic object was in many respects a positive step in the evolution of his thinking, he failed to adapt his explanatory framework to this new conception of the mental functions and their development. The attempt to explain psychological development in terms of the individual's participation in social interaction was largely abandoned. In several contexts, Vygotsky did discuss relationships between social variables and the development of psychological systems. He noted that dreaming plays an important role in certain decision making processes in some societies but not in others. He cited Piaget's claim that argument is the foundation for the development of logic. He suggested that imagination has its roots in play. Nowhere, however, did he attempt to generalize these ideas into a coherent explanatory framework.

As a consequence, Vygotsky was left with no general explanatory framework, no explanatory principle. He explained the emergence of new psychological systems in terms of the development of new functional relationships between mental processes. On the whole, however, he made little attempt to explain how or why these new functional relationships emerge. Throughout his career, Vygotsky had criticized psychological paradigms that simply described the nature and development of mental functions without trying to explain them. With equal consistency, he criticized paradigms that failed to differentiate the biological and the social in psychological development. Because he was unable to adapt his explanatory principles to his new

conception of psychological development, however, Vygotsky's writings were open to precisely these criticisms during this period.

Nowhere was this reflected more clearly than in his attempts to analyze the development of word meaning. Under Vygotsky's direction, L. Sakharov had carried out a series of experiments that resulted in the identification of several stages in the development of word meaning (i.e., complexes, pseudoconcepts, and concepts) (Chapter 5 of *Thinking and Speech*). In important respects, the design and analysis of these experiments reflected features of Vygotsky's conception of psychological systems that separated the second phase in the development of his thought from the first, while connecting it with the third. Vygotsky insisted that the analysis of concept development cannot be divorced from the analysis of the development of word meaning and he insisted that the development of concepts is not the development of thought as such but the development of the word, the development of the functional relationship between thought and speech in verbal thinking. Conspicuously absent in this work, however, is any explanation of how and why this development occurs.

Both the strengths and weaknesses of Vygotsky's developing perspective are clearly reflected in the psychological constructs utilized by Vygotsky during this second phase in the development of his theoretical framework. First, in concepts such as "psychological system," "verbal thinking," and "word meaning," Vygotsky defined constructs at differing levels of abstraction that allowed him to analyze the integral development of psychological systems, to avoid the conceptual isolation of mental functions that was inherent in his conception of the "higher mental functions." On the other hand, these constructs did not allow Vygotsky to link psychological development with the development of social behavior in the way that his conception of the higher mental functions and their development in social interaction had. Fundamental to the third and final phase of Vygotsky's work was the attempt to develop an explanatory framework and a system of constructs that would permit an analysis of the development psychological systems in connection with the development of social behavior.

4. Functional Differentiation and Analysis According to Units (1933-1934)

In much the same sense that Vygotsky's 1929 paper on the genetic roots of thinking and speech (Chapter 4 of *Thinking and Speech*) was pivotal to the transition from the first to the second phases in the development of his theory, his 1932 critique of Piaget's work on egocentric speech (Chapter 2 of *Thinking and Speech*) represents an important first step toward the emergence of the explanatory and conceptual framework which constitutes the third and final phase of his work. As early as 1929, Vygotsky had cited Piaget's work on egocentric speech, arguing that the non-communicative speech with which young children often accompany their ongoing activity represents a transitional phase between the intermental and the intramental plane, a transitional phase between speech that functions to mediate social behavior and speech that functions to mediate the behavior of the individual (Chapter 4 of *Thinking and Speech* pp. 113-114, 1984g pp. 16-23).

In his 1932 critique of Piaget, however, Vygotsky's discussion of the transition from social to inner speech is reformulated in significant ways, with a focus emerging on what he called "functional differentiation." In this paper, Vygotsky moved beyond the simple claim that egocentric speech represents a transitional stage between social and inner speech to argue that the characteristics unique to egocentric and inner speech can be understood in terms of their changing function in the individual's activ-

ity. Specifically, Vygotsky argued that the phonetic and grammatical abbreviation of inner speech as well as its nonvocalized character, emerge in connection with a change in the function of speech from the mediation of social behavior to the mediation of individual behavior. In the same spirit, he argued that the vocalized quality of egocentric speech is a reflection of its inadequate differentiation as a form of "speech for oneself" from communicative speech.[6]

The explanatory framework that emerged in Vygotsky's work in 1933 and 1934 was a direct extension of this notion of functional differentiation. Fundamental to all Vygotsky's work during this period was the notion that psychological processes develop in connection with transformations in behavior, whether these transformations are the consequence of biological maturation (e.g., the emergence of the capacity for locomotion in the infant), the internal development of the child's own activity (e.g., the differentiation of inner speech from communicative speech or the early stages of the development of play), or the inclusion of the child in new forms of social interaction and social practice (e.g., the development of "scientific concepts" in school or the development of written speech). In concluding his critique of Piaget's work, Vygotsky wrote that "what is missing, then, in Piaget's perspective is reality and the child's relationship to that reality. What is missing is the child's practical activity. This is fundamental" (Chapter 2 of *Thinking and Speech*, p. 87). And he continued:

> Conceptualized in this way, development is not self movement but a logic of arbitrary circumstance. And where there is no self movement, there is no place for development in the true sense of the word. Here [i.e., in Piaget's theory -- NM] one phenomenon replaces the other, but it does not emerge from the other" (ibid, p. 29).

In contrast to his perception of Piaget's approach, Vygotsky attempted to analyze what he called the internal development of the child's activity or practice in the final phase of his work, focusing on how one form of practice emerges from another and how new "psychological formations" develop in connection with these newly emerging forms of practice.

Vygotsky's work the development of word meaning between 1933 and 1934 provides a useful illustration of this emerging explanatory framework. In many respects, the empirical data he cites in this work are identical to those he cited in 1931 in his discussion of the Vygotsky-Sakharov studies on concept formation (Chapter 5 of *Thinking and Speech*). Vygotsky used many of the same examples to illustrate the nature of the child's speech at various points in its development in these discussions. Methodologically and conceptually, however, his approach was very different in 1933-1934 than it had been in 1931.

The central premise of Vygotsky's new approach was that the analysis of the development of word meaning must be carried out in connection with the analysis of the development of the function of the word in communication. Fundamental to the experimental design of the Vygotsky-Sakharov studies was an assumption Vygotsky explicated in his discussion of that work, the assumption that the "function" of word meaning is abstraction and generalization (Chapter 5 of *Thinking and Speech*). In contrast, in 1933 and 1934 Vygotsky began to reemphasize the central function of word meaning as a means of communication, as a critical component of social practice. Vy-

6. These ideas were developed in much greater detail in Chapter 7 of Thinking and Speech (written in 1933-1934), where Vygotsky extended his discussion of the differentiation of speech functions to written speech and poetic speech.

gotsky's emerging perspective was outlined in the first chapter of *Thinking and Speech* where he wrote that:

> It may be appropriate to view word meaning not only as *a unity of thinking and speech*, but as a *unity of generalization and social interaction, a unity of thinking and communication*.
>
> This statement of the problem has tremendous significance for all issues related to the genesis of thinking and speech...[and] reveals the true potential for a *causal-genetic analysis of thinking and speech*. Only when we learn to see the unity of generalization and social interaction do we begin to understand the actual connection that exists between the child's cognitive and social development (p. 49).

Here, Vygotsky argued that one cannot understand the development of word meaning if one begins by divorcing the "communicative function of speech from its intellectual function" (Chapter 1 of *Thinking and Speech*, p. 48). Along similar lines, Vygotsky elsewhere criticized Buhler and Koffka for failing to recognize that the act of naming is not only a mental activity but a means of social interaction.

> Child speech is not the personal activity of the child....Only viewing individual speech as part of dialogue, of cooperation and social interaction, can provide the key to understanding its changes" (1984b, p. 356).

In contrast to the approach he had taken in his earlier work with Sakharov, then, Vygotsky began to insist in 1933 and 1934 that the analysis of the development of word meaning must begin with the analysis of the function of the word in mediating specific types of social interaction and communication, in mediating specific forms of social practice.

The only empirical work on the development of word meaning that Vygotsky and his colleagues were able to complete within this conceptual framework prior to Vygotsky's death in 1934 was the research of Zh.I. Shif on the development of scientific concepts within the context of formal schooling (Shif 1935; Vygotsky 1935, Chapter 6 of *Thinking and Speech*). In discussing this research (Chapter 6 of *Thinking and Speech*), Vygotsky argued that the instruction of the child in systems of scientific knowledge in school involves a unique form of communication in which the word assumes a function which is quite different from that characteristic of other forms of communication. Specifically, he argued: (1) that the child learns word meanings in certain forms of school instruction not as a means of communication but as part of a system of knowledge and (2) that this learning occurs not through direct experience with things or phenomena but through other words. As it is used in these communicative contexts, then, the word begins to function not only as a means of communication but as the object of communicative activity, with the child's attention being directed explicitly toward word meanings and their interrelationships. Consistent with his emerging theoretical framework, Vygotsky argued that this new function of the word in the child's activity leads to the development of a new type of word meaning or concept, what he referred to as the "scientific" or "true" concept. Where in his earlier work he had simply noted the emergence of a new type of concept (Chapter 5 of *Thinking and Speech*), he now linked the emergence of a new type of word meaning to the child's participation in a new form of social practice.

This new approach to the analysis of the development of word meaning is further illustrated by Vygotsky's discussion of word meanings in what he called "autonomous speech" (1984f). In most respects, the characteristics Vygotsky attributed to word meanings in this form of speech are identical to those he had attributed to "complexes"

in his earlier discussions of the Vygotsky-Sakharov research (Chapter 5 of *Thinking and Speech*). In fact, he used many of the same examples in the two contexts to illustrate the nature of the child's speech.[7] Once again, however, the conceptual and explanatory frameworks differ in important respects.

In several contexts, Vygotsky had discussed the emergence of the indicative gesture in the infant's interaction with the adult (1981b, 1960b). He argued that when the infant cries or reaches for an object, the adult attributes meaning to that behavior. Though the infant has no communicative intent, these acts nonetheless function to communicate the infant's needs to his caretaker. Here, as in the adult's attempts to interact with the infant, the infant is included in communicative social activity before he has the capacity to use or to respond adequately to communicative devices. Vygotsky argued that this provides the foundation for the transformation of the infant's behaviors into intentional indicative gestures.

In his discussions of autonomous speech, Vygotsky argued that the initial stages in the development of word meaning represent a transitional stage between these indicative gestures and true word meanings. According to Vygotsky, the child uses words in autonomous speech to refer not to a single type or class of objects but to what adults would consider different kinds of objects in different situations. In contrast to his earlier claims that the concept simply has a diffuse or inconsistent content for the child at this stage of development (Chapter 5 of *Thinking and Speech*), Vygotsky now began to argue that -- like the indicative gesture -- the word in the child's autonomous speech has no meaning outside the concrete contexts in which it is used. At this stage in its development, the function of the word is to designate or isolate one aspect of a situation from others. Thus, the word has an indicative but not a signifying function. In Vygotsky's words, at this stage in the development of the child's speech the word is simply an "oral indicative gesture" (1984f, pp. 332-337). Consistent with his emerging explanatory framework, then, Vygotsky argued that the characteristics of word meaning at this stage -- what he had earlier referred to in his discussion of complexes as the instability of word meaning -- is a product of the peculiar function of the word in the child's developing communicative activity.

There is no need to speculate about how Vygotsky might have treated other stages in the development of word meaning within this new explanatory framework. The logic of the approach is clear. The characteristics of word meaning reflect the characteristics of the communicative activity in which it develops. The characteristics of the word as a generalization or abstraction are a reflection of the child's use of the word as a means of communication and social interaction, a reflection of its function in social practice.

> Whatever the form of social interaction, such will be the nature of generalization. Social interaction and generalization are internally connected (Vygotsky 1982d, p. 166).

The analysis of the development of verbal concepts and verbal thought must begin with the analysis of the forms of social interaction and communication that the word mediates.

Given his focus on social interaction and cognitive development in the first phase of his work and his strong emphasis on the centrality of language during the second, it is important to emphasize that Vygotsky extended his explanatory framework beyond social interaction and sign systems in this third phase of the development of his theory.

7. In his discussion of autonomous speech, however, he does not mention Sakharov's research or the scheme of concept development elaborated on the foundation of that research.

Though implicit in many respects in his critique of Piaget in 1932 (Chapter 2 of *Thinking and Speech*), this effort is perhaps reflected most clearly in a 1933 paper on the development of imagination in play (Vygotsky 1966, 1978c) and in a series of lectures on child development written in 1933 and 1934 (Vygotsky 1984d).

Vygotsky's paper on imagination and play provides a particularly good illustration of the change which characterized the shift from the second to the third phases in the development of his thought. In a variety of papers written in 1931 and 1932 (Vygotsky 1983 p. 325, 1984g pp. 14-15, 1984b pp. 347-350), Vygotsky had represented play and imagination as a product of the power of speech to free behavior and thought from the domination of the immediate perceptual field. In his 1933 paper on play[8], Vygotsky began in much the same way that he had in his earlier papers, arguing that the young child is bound to the perceptual field. Far from invoking language as the force which frees the child from the perceptual field, however, Vygotsky argued here that word meanings are similarly bound to their objects for the young child, with the word and thing fused in the child's consciousness. Reversing his earlier arguments, Vygotsky maintained in this paper that it is through the development of the child's play activity that thought and meanings are liberated from their origins in the perceptual field, providing the foundation for the further development of speech and its role in advanced forms of thinking and imagination.

The earliest forms of play, Vygotsky argued, are the child's attempts to reproduce a situation or action that he has actually experienced. Playing with dolls, for example, the child reproduces the actions of his caretakers. Vygotsky saw this primitive form of play as "more memory in action than a novel imaginary situation" (1978c, p. 103) and represented it as a transitional stage between behavior based on memory and behavior involving developed imagination. To explain how more advanced forms of play could emerge from these more primitive forms, Vygotsky needed a mechanism which would facilitate the child's separation of meaning from object or action.

Vygotsky argued that one such mechanism could be found in what he called a "pivot," an object used to function as another object in the play situation. He represented the nature and function of the pivot in the following way:

> Thought is separated from the thing because a piece of wood begins to play the role of a doll, a stick becomes a horse; action according to rules begins to be defined from thought rather than things themselves....The child doesn't do this suddenly. To tear thought (word meaning) from the thing is a terribly difficult task for the child. Play is a transitional form. At the moment the stick (i.e., the thing) becomes a pivot for tearing the meaning from the real horse...one of the basic psychological structures that defines the child's relationship to reality is changed.
>
> The child cannot yet tear the thought from the thing. He must have a pivot in another thing....To think of the horse, he must define his action by this horse in the stick or pivot....I would say that in play the child operates in accordance with meaning that is torn from things but not torn from real actions with real objects....This is the transitional character of play. This is what makes it a middle link between the purely situational connectedness of early childhood and thinking that is removed from the real situation (1978c, pp. 69-71).

For Vygotsky, the child's initial substitution of a stick for a horse did not represent a manifestation of symbolic or imaginative capacities. In these early stages in the devel-

8. What follows is based on the version of this article in the original Russian (Vygotsky 1966). These aspects of Vygotsky's discussion of play and imagination emerge less clearly in the edited English translation (Vygotsky 1978c).

opment of imagination, the child cannot yet use any object to stand for another in the way that the adult does in symbolic activity. For the young child, the object that is substituted for the horse must have characteristics that allow it to act as a functional substitute for the horse in play activity. It is only within the activity of play that the child can substitute one object for another in this way, only within the activity of play that he begins to separate the object's meaning from the object itself by using another object as a pivot. In brief, then, Vygotsky saw the development of the child's play activity as providing the foundation for the emergence of new forms of behavior and for the development of forms of imagination and abstract thought that are connected with them.

Thus, just as he had argued that word meaning develops in connection with the development of communication and social interaction or that inner speech develops through the functional differentiation of social speech, Vygotsky argued here that imagination develops in connection with the development of play and other forms of socially organized action and interaction. To paraphrase a statement Vygotsky made in his analysis of the development of word meaning (Chapter 1 of *Thinking and Speech*, p. 49), the central premise of his work on play was that "only when we learn to see the unity of imagination and play do we begin to understand the actual connection that exists between the child's cognitive development and his social development." Just as new psychological characteristics of word meaning are connected with kinds of communication that are particularly prevalent in school, Vygotsky saw the rudiments of imagination emerging in connection with particular forms of object play. Indeed, at certain points in development, Vygotsky saw the psychological characteristics of imagination as inseparable from play in the same way that he saw the psychological characteristics of the scientific concept as inseparable from the way that the word is used in certain types of verbally mediated social activity.

As I suggested earlier, in his arguments on the development of imagination in play, Vygotsky had quite consciously moved beyond an explanatory framework in which speech and social interaction were seen as the sole motive force underlying psychological development. In a series of papers and lectures written in 1933 and 1934 (1984d), Vygotsky attempted to outline this more general explanatory framework.

In these papers, Vygotsky identified two tasks as basic to the analysis of the child's psychological development: (1) the analysis of the social situation that defines the child's life, and (2) the analysis of the psychological structures that develop in connection with this mode of life.

> The social situation of development, which is specific to each age, strictly defines the child's entire mode of life, his social existence....Having clarified the social situation of development that forms at the beginning of a given age and defines the relationships between the child and the environment, we must then clarify how the new formations characteristic of this age necessarily arise and develop from the child's life in this social situation (1984d, p. 259).[9]

In these papers, Vygotsky applied this general conceptual framework to a broad range of issues. In his analysis of infancy, he emphasized the infant's dependence on the adult, arguing that the development of early forms of speech and mobility in the first

9. Vygotsky contrasted his conception of the "social situation of development" with the concept "objective environment," that is, with the environment conceptualized in isolation from the behavior and psychological characteristics of the child. For Vygotsky, when the infant learns to crawl or the toddler learns to speak, the social situation of the child's development changes. Vygotsky defined the social situation of development as "the system of relationships between the child of a given age and social reality" (1984d, p. 260).

year of life radically transform the child's mode of life and his potential for social interaction and that the development of new communicational skills and new needs and motives in the ensuing years lead to continued changes in the social situation of the child's development. At the same time, focusing on changes originating from the side of the social environment, Vygotsky explored the way that the child's introduction to organized games, formal schooling, or work activity changes his mode of life. In each of these cases, he attempted to indicate how new psychological formations emerge in connection with the developing social situation of development, exploring the kinds of connections between the development of social behavior and the development of psychological processes that he had discussed in his work on egocentric speech, scientific concepts, and play.

Fundamental to Vygotsky's efforts to develop this explanatory framework were his attempts to establish criteria for defining psychological constructs. In the first two phases of his work, Vygotsky had developed systems of novel theoretical constructs that allowed him to develop his theory and research. In each of these phases, he carefully defined a construct which represented his general analytic object (i.e., the "higher mental function" or "instrumental act" in the first phase and the "psychological system" in the second). In this third phase in the development of his thought, Vygotsky did not identify a comparable analytic object, but he did initiate a major effort to describe how psychological constructs would have to be conceptualized and defined if they were to facilitate the study of psychological development in connection with social interaction and social practice.[10]

One of Vygotsky's efforts to address this issue is found in his discussion of what he called "analysis according to units" in the first chapter of *Thinking and Speech*. This discussion is extremely important to any understanding of the nature of Vygotsky's theoretical framework during this third and final phase in the development of his thought, though it is important to note that Vygotsky fuses two distinct issues in this particular attempt to address the problem of defining appropriate analytic constructs.

The first aspect of this discussion, which is not particularly relevant to our current concerns, deals the identification of constructs that are appropriate for the study of mental functions as they are functionally related in psychological systems. Focusing on the problem of the functional relationship between thinking and speech, Vygotsky argued that it is impossible to understand this relationship by first studying the characteristics of speech and thinking in conceptual isolation from one another and then trying to analyze their functional relationships or interactions. As he had in earlier papers, Vygotsky argued that verbal thinking is qualitatively different from the speech and intellect that serve as its precursors, that it is a unique psychological system with its own functional and developmental dynamics. To study this unity, he insisted, one must identify an analytic unit that retains the characteristics of the whole. Vygotsky found this unit in "word meaning," a component of verbal thinking that contains thinking (i.e., generalization) and speech in functional relationship.[11]

The second aspect of this discussion of "analysis according to units" is more relevant to the present discussion, focusing as it does on the relationship between psychological processes and social interaction. Vygotsky argued that "it may be appropriate

10. See Davydov & Radzikhovskii (1985) and Zinchenko (1985) for interesting discussions of Vygotsky's criteria for "analytic units."

11. To illustrate this general concept, Vygotsky argued that the proper unit for the analysis of water is not the atom of hydrogen or oxygen but the molecule of water, since it is only through the analysis of the relationship of these atoms in the molecule that what we know of hydrogen and oxygen can help us to understand the characteristics of water, characteristics that are not found in either of its components.

to view word meaning not only as *a unity of thinking and speech*, but as a *unity of generalization and social interaction, of thinking and communication*" (Chapter 1 of *Thinking and Speech*, p. 49). This conception of "word meaning" as a unit of both thinking and social interaction provided the foundation for Vygotsky's analysis of the development of word meaning during this phase of his career, providing the potential for a causal-genetic analysis of the development of word meaning that was lacking in the Vygotsky-Sakharov research discussed in Chapter 5 of *Thinking and Speech* and more generally in all of Vygotsky's work carried out under the "psychological systems" framework.

In the last of the series of lectures he delivered in 1933 and 1934, Vygotsky developed an argument dealing with "analysis according to units" that paralleled this argument on "word meaning" (1984c, pp. 376-385). Focusing on the relationship between the individual and the environment, Vygotsky stated the problem in the following way:

> We have inadequately studied the internal relationship of the child to the people around him....We have recognized in words that we need to study the child's personality and environment as a unity. It is incorrect, however, to represent this problem in such a way that on one side we have the influence of personality while on the other we have the influence of the environment. Though the problem is frequently represented in precisely this way, it is incorrect to represent the two as external forces acting on one another. In the attempt to study the unity, the two are initially torn apart. The attempt is then made to unite them (1984c, p. 380).

Vygotsky argued that the fundamental inadequacy of most attempts to study the influence of the environment on the child's development is the practice of describing the environment in terms of "absolute indices." That is, the problem lies in conceptualizing the environment as it exists in isolation from the child rather than studying it in terms of "what it means for the child," in terms of "the child's relationship to the various aspects of this environment" (1984c, p. 381).

In a manner comparable to his conceptualization of the environment as the "social situation of development," Vygotsky argued that the key is the identification of an analytic unit representing the individual in the individual/environment relationship that maintains the functional relationship between the individual and the environment. He proposed "experience" as an adequate psychological construct in this context, arguing that:

> The child's experience is the kind of simple unit of which it is impossible to say that it is the influence of the environment on the child or a characteristic of the child himself. Experience is a unit of personality and environment as they exist in development....Experience must be understood as the internal relationship of the child as an individual to a given aspect of reality (1984c, p. 382).

Of course, by "relationship" Vygotsky meant here not a passive relationship of perceiving or processing incoming stimuli, but a relationship defined by the child's needs and goals, a relationship defined by the forms of social practice that "relate" the child to the objective environment and define what that environment means for the child. Here again, we find the psychological inherently tied to the organization of social practice.

These explicit attempts to develop units of analysis adequate to his emerging conceptual framework were accompanied by the use of a whole series of constructs which maintained the connection between mind and social interaction/action that Vygotsky had called for in his discussions of "units of analysis." This connection was maintained,

for example, in Vygotsky's treatment of "imagination" in his work on imagination and play (Vygotsky 1966, 1978c) and in his definition of the concept of the "social situation of development" in his lectures on child development (Vygotsky 1984d). It was further developed and elaborated in other key concepts developed by Vygotsky during this period as well, one of the more significant of which was his concept of the "zone of proximal development" (Minick 1987; Rogoff & Wertsch 1984; Wertsch 1985).

In developing these theoretical constructs, this general approach to the definition of constructs in psychological theory, and the explanatory framework which was emerging in his work during this phase in his career, Vygotsky was making some significant strides toward the realization of the goal that he had established in 1924 and 1925, the goal of developing a theoretical perspective that would allow a unified analysis of behavior and consciousness while recognizing the unique socio-historical nature of the human mind.

5. Conclusion

Vygotsky has had a tremendous impact on the development of Soviet psychology, associated primarily with a psychological paradigm developed by Vygotsky's students and associates that is commonly referred to as the "theory of activity" or the "activity approach" (Wertsch 1981, 1985; Minick 1985; Leont'ev 1978, 1982b). In the late 1930's and early 1940's, extending what they saw as the central concept in Vygotsky's later work, a group of Vygotsky's associates led by A. N. Leont'ev developed a set of theoretical constructs based on the concept that the phylogenetic, historical, and ontogenetic development of psychological processes in both animals and man is intimately connected with the development of the actions and activities through which the organism is related to the external world. Over the past 50 years, the research paradigm that developed on this foundation has become one of the most influential in Soviet psychology. Significantly, however, it has failed to develop several of Vygotsky's central ideas, in particular, those associated with the significance of social interaction and the development of word meaning in ontogenesis. The publication of Vygotsky's collected works is associated with a movement within this research tradition to develop these aspects of Vygotsky's thinking.

Vygotsky's influence on the development of psychology outside the Soviet Union is much more difficult to characterize (Cole & Wertsch, 1986). Until recently, access to Vygotsky's works in the West has been extremely restricted, due both to the limited amount of translated material and to a lack of understanding of the relationship of that material to the general system of theory, problem, and research that it represents. In the past decade, through the efforts of scholars such as Cole[12] and Wertsch (1981, 1985) in the United States and their counterparts in Europe, we have begun to have access to a much wider selection of translations representing the works of Vygotsky and the Vygotskian school and to develop a much better understanding of the general theoretical framework that these works represent. Of course, psychologists and social scientists in the West who are now incorporating concepts based on the works of the Vygotskian school into their own research differ widely in their interpretation and application of these concepts. What unites them, however, is a shared conviction that Vygotsky and his intellectual descendants in the Soviet Union have devel-

12. In addition to extensive research influenced by the Vygotskian paradigm (e.g., Cole & Scribner (1974) and Scribner & Cole (1981), Cole has played a leading role in facilitating the translation of key works of the Vygotskian school through his editorship of the translation journal *Soviet Psychology* and several important books (e.g., Luria 1976, 1979; Vygotsky 1978a).

oped a conceptual framework that overcomes many limitations of other attempts to represent the relationship between the social and the individual in psychological development.

As a rule, the publication and translation of the works of a scholar such as Vygotsky who lived and worked nearly a half century ago would be carried out because the ideas they contain are perceived in retrospect to have been "ahead of their time" or because they had considerable influence on the subsequent development of science. The Soviet publication of Vygotsky's collected works, and our translation of them, is motivated by different concerns. They are motivated by the conviction of Vygotsky's students in the Soviet Union and in the West that his ideas and insights are in many respects considerably ahead of our time, by the conviction that his influence on the development of psychology and the social sciences has not been nearly as considerable as it must be.

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THINKING AND SPEECH

PREFACE[1]

This book deals with one of the most complex and difficult problems of experimental psychology, the problem of thinking and speech. To our knowledge, there has as yet been no systematic attempt to address this problem experimentally[1]. An extended series of empirical studies is required. These studies must address issues such as the nature of concepts formed in experimental contexts, the nature of written speech, and the relationship of written speech to thinking. These studies are a necessary and important first step in resolving this general problem.

Experimental research, however, must be supplemented with theoretical and critical analysis. First, we must analyze the empirical data which have been accumulated and attempt to assess their more general implications. Through an analysis of available information on phylogenesis and ontogenesis, we must attempt to identify the most useful point of departure for the resolution of the problem; we must attempt to develop a general theory of the genetic roots of thinking and speech. Second, to develop preliminary working hypotheses and contrast our own theoretical perspectives with those of others, we must conduct a critical analysis of the best contemporary theories of thinking and speech. In our view, current theories are in need of serious reassessment and improvement.

Theoretical analysis is necessary in two other contexts. First, the problem of thinking and speech has been addressed by scholars in several closely related fields. We must compare these differing perspectives on various aspects of the problem. In this book, we have compared data on the psychology of speech with related work in linguistics. We have also compared our own data on concept formation with current educational theory on the development of concepts. In general, we found it most useful to address these problems in theoretical terms, without attempting a detailed analysis of empirical data. Thus, in describing our studies on the development of scientific concepts, we have presented a working hypothesis on the relationship of instruction and development. This hypothesis was developed in a separate work and is based on empirical data that we do not review in detail here. We also relied on a theoretical mode of analysis in our attempt to construct a theoretical perspective that would incorporate all our experimental data.

The content and structure of our research have been varied and complex. Nonetheless, each task we have faced in our work has been subordinated to our gen-

eral goal and connected to the work that preceded and followed it. Though we have broken the problem down into several components, it is our hope that our studies constitute a unified whole. All our work has focused on a single basic problem, on the genetic analysis of the relationship between thought and word.

This single basic task has defined the structure of our general research program and defines that of the present book as well. We begin this book with an attempt to formulate a clear statement of the problem and identify appropriate research methods. This is followed by a critical analysis of the two most powerful and complete contemporary theories of the development of speech and thinking, those advanced by Jean Piaget and William Stern. The purpose of this analysis was to contrast our statement of the problem and our research methods with more traditional perspectives and methodologies. Then, as a preface to the discussion of our experimental research, we were forced to address theoretical issues concerning the genetic roots of thinking and speech. This was necessary in order to identify a point of departure for research on the genesis of verbal thinking[2]. Two empirical studies constitute the core of the book. The first is a study of the development of word meaning in childhood; the second a comparison of the nature and development of scientific and spontaneous concepts in ontogenesis. The final chapter represents an attempt to integrate our findings, to present the process of verbal thinking in a connected and unified form.

In any innovative research effort, an attempt must be made to identify novel aspects of the research, since these require particularly careful analysis and experimental validation. If, for the moment, we ignore the new approach inherent in our statement of the problem and what is, in effect, a new research method, we can summarize the contributions of our research effort in the following way: (1) we have provided experimental evidence indicating that word meaning develops in childhood and identified the basic stages of this process; (2) we have identified the process involved in the development of scientific concepts and demonstrated how this process differs from the development of spontaneous concepts; (3) we have clarified the psychological nature of written speech as a distinct speech function and explored its relationship to thinking; and (4) we have made a contribution to the experimental study of inner speech and the relationship between inner speech and thinking. These represent contributions to the general theory of thinking and speech, contributions that derive from new experimental data and from the working hypotheses and theories that inevitably arose in the process of interpreting, explaining, and analyzing these data.

Of course, it is neither the right nor the obligation of the author to evaluate the significance or validity of these theories and data. We leave this task to our readers and critics.

This book is the product of nearly ten years work. Many of the questions that emerged in the investigation were not apparent to us when we began. We were frequently forced to reconsider our positions during the investigation. Consequently, the results of a great deal of hard work had to be discarded. Much of the remainder had to be redone, restructured, redefined, or rewritten. Nevertheless, the overall direction of our research developed steadily, on a foundation that was basic to our work from the outset. In this book, we have attempted to make explicit much that remained implicit in previous work. Still, there is a great deal that we once believed to be correct that has been excluded from this book because it represented simple delusion on our part.

Several sections of the book were taken from earlier works published in manuscript form as the basis for a university course (Chapter 5). Others were published as introductions to the works of the authors on which they focus (Chapter 2 and

Chapter 4). The remaining chapters, and the book as a whole, are published here for the first time.

We are only too aware of the limitations of this first step we have taken in developing a new approach to the study of the relationship between thinking and speech. In our view, our effort has been justified in that it has improved our understanding of the problem, demonstrated the importance of the problem to the whole of human psychology, and provided us with a new theory of the psychology of consciousness. This latter issue, however, is addressed only briefly in the concluding words of the book. The investigation is broken off at its threshold.

Chapter 1

THE PROBLEM AND THE METHOD OF INVESTIGATION

The first issue that must be faced in the analysis of thinking and speech concerns the relationship among the various mental functions, the relationship among the various forms of the activity of consciousness. This issue is fundamental to many problems in psychology. In the analysis of thinking and speech, the central problem is that of *the relationship of thought to word.* All other issues are secondary and logically subordinate; they cannot even be stated properly until this more basic issue has been resolved. Remarkably, the issue of the relationships among the various mental functions has remained almost entirely unexplored. In effect, it is a new problem for contemporary psychology.

In contrast, the problem of thinking and speech is as old as psychology itself. However, the issue of the relationship of thought to word remains the most confused and least developed aspect of the problem. The atomistic and functional forms of analysis that dominated psychology during past decade led to the analysis of the mental functions in isolation from one another. Psychological methods and research strategies have developed and matured in accordance with this tendency to study separate, isolated, abstracted processes. The problem of the connections among the various mental functions -- the problem of their organization in the integrated structure of consciousness -- has not been included within the scope of the research.

There is, of course, nothing novel in the notion that consciousness is a unified whole, that the separate functions are linked with one another in activity. Traditionally, however, the unified nature of consciousness -- the connections among the mental functions -- have simply been accepted as given. They have not been the object of empirical research. The reason for this becomes apparent only when we become aware of an important tacit assumption, an assumption that has become part of the foundation of psychological research. This assumption (one that was never clearly formulated and is entirely false) is that the links or connections among the mental functions are constant and unvarying, that the relationships between perception and attention, memory and perception, and thought and memory are unchanging. This assumption implies that the relationships among functions can be treated as constants and that these constants do not have to be considered in studies that focus on the functions themselves. As we mentioned earlier, the result has been that the problem of inter-

functional relationships has remained largely unexplored in modern psychology.

Inevitably, this had a serious impact on the approach to the problem of thinking and speech. Any review of the history of this problem in psychology makes it immediately apparent that the central issue, the issue of the relationship of thought to word, has been consistently overlooked.

Attempts to resolve the problem of thinking and speech have always oscillated between two extreme poles, between an *identification* or complete *fusion* of *thought and word* and an equally metaphysical, absolute, and complete *separation* of the two, a *severing* of their relationship. Theories of thinking and speech have always remained trapped in one and the same enchanted circle. These theories have either expressed a pure form of one of these extreme views or attempted to unify them by occupying some intermediate point, by moving constantly back and forth between them.

If we begin with the claim made in antiquity that thought is "speech minus sound," we can trace the development of the first tendency -- the tendency to identify thinking and speech -- through to the contemporary American psychologist or the reflexologist. These psychologists view thought as a reflex in which the motor component has been inhibited. Not only the resolution of the problem of the relationship of thought to word but the very statement of the issue itself is impossible within these perspectives. If thought and word coincide, if they are one and the same thing, there can be no investigation of the relationship between them. One cannot study the relationship of a thing to itself. From the outset, then, the problem is irresolvable. The basic issue is simply avoided.

Perspectives that represent the other extreme, perspectives that begin with the concept that thinking and speech are independent of one another, are obviously in a better position to resolve the problem. Representatives of the Wurzburg school[2], for example, attempt to free thought from all sensory factors, including the word. The link between thought and word is seen as a purely external relationship. Speech is represented as the external expression of thought, as its vestment. Within this framework, it is indeed possible to pose the question of the relationship between thought and word and to attempt a resolution. However, this approach, an approach that is shared by several disparate traditions in psychology, consistently results in a failure to resolve the problem. Indeed, it ultimately fails to produce a proper statement of the problem. While these traditions do not ignore the problem, they do attempt to cut the knot rather than unravel it. Verbal thinking is partitioned into its elements; it is partitioned into the elements of thought and word and these are then represented as entities that are foreign to one another. Having studied the characteristics of thinking as such (i.e., thinking independent of speech) and then of speech isolated from thinking, an attempt is made to reconstruct a connection between the two, to reconstruct an external, mechanical interaction between two different processes.

For example, a recent study of the relationship between these functions resulted in the conclusion that the motor processes associated with speech play an important role in facilitating the thinking process[3], in particular, in improving the subject's understanding of difficult verbal material. The conclusion of this study was that inner speech facilitates the consolidation of the material and creates an impression of what must be understood. When inner speech was included in the processes involved in understanding, it helped the subject to sense, grasp, and isolate the important from the unimportant in the movement of thought. It was also found that inner speech plays a role as a facilitating factor in the transition from thought to overt speech.

As this example illustrates, once the researcher has decomposed the unified psychological formation of verbal thinking into its component elements, he is forced to es-

tablish a purely external form of interaction between these elements. It is as if he were dealing with two entirely heterogeneous forms of activity, with forms of activity that have no internal connections. Those who represent this second tradition have an advantage over those who represent the first in that they are at least able to pose the question of the relationship of thinking to speech. The weakness of this approach is that its statement of the problem is false and precludes any potential for its correct resolution. This failure to state the problem correctly is a direct function of the method of decomposing the whole into its elements, a method that precludes studying the internal relationship of thought to word. The critical issue, then, is method. If we are to deal with the problem successfully, we must begin by clarifying the issue of what methods are to be used in studying it.

The investigation of any mental formation presupposes analysis, but this analysis can take either of two fundamentally different forms. All the failures that researchers have experienced in their attempts to resolve the problem of thinking and speech can be attributed to their reliance on the first of these two forms of analysis. In our view, the second represents the only means available for moving toward a true resolution of this problem.

The first of these forms of analysis begins with the decomposition of the complex mental whole into its elements. This mode of analysis can be compared with a chemical analysis of water in which water is decomposed into hydrogen and oxygen. The essential feature of this form of analysis is that its products are of a different nature than the whole from which they were derived. The elements lack the characteristics inherent in the whole and they possess properties that it did not possess. When one approaches the problem of thinking and speech by decomposing it into its elements, one adopts the strategy of the man who resorts to the decomposition of water into hydrogen and oxygen in his search for a scientific explanation of the characteristics of water, its capacity to extinguish fire or its conformity to Archimedes law for example. This man will discover, to his chagrin, that hydrogen burns and oxygen sustains combustion. He will never succeed in explaining the characteristics of the whole by analyzing the characteristics of its elements. Similarly, a psychology that decomposes verbal thinking into its elements in an attempt to explain its characteristics will search in vain for the unity that is characteristic of the whole. These characteristics are inherent in the phenomenon only as a unified whole. When the whole is analyzed into its elements, these characteristics evaporate. In his attempt to reconstruct these characteristics, the investigator is left with no alternative but to search for external, mechanical forms of interaction between the elements.

Since it results in products that have lost the characteristics of the whole, this process is not a form of analysis in the true sense of that word. At any rate, it is not "analysis" *vis a vis* the problem to which it was meant to be applied. In fact, with some justification, it can be considered the antithesis of true analysis. The chemical formula for water has a consistent relationship to all the characteristics of water. It applies to water in all its forms. It helps us to understand the characteristics of water as manifested in the great oceans or as manifested in a drop of rain. The decomposition of water into its elements cannot lead to an explanation of these characteristics. This approach is better understood as a means of moving to a more general level than as a means of analysis as such, as a means of partitioning in the true sense of the word. This approach is incapable of shedding light on the details and concrete diversity of the relationship between thought and word that we encounter in our daily lives; it is incapable of following the phenomenon from its initial development in childhood through its subsequent diversification.

The contradictory nature of this form of analysis is clearly manifested in its applications in psychological research. Rather than providing an explanation of the concrete characteristics of the whole that we are interested in, it subordinates this whole to the dictates of more general phenomena. That is, the integral whole is subordinated to the dictates of laws which would allow us to explain that which is common to all speech phenomena or all manifestations of thinking, to speech and thinking as abstract generalities. Because it causes the researcher to ignore the unified and integral nature of the process being studied, this form of analysis leads to profound delusion. The internal relationships of the unified whole are replaced with external mechanical relationships between two heterogeneous processes.

Nowhere are the negative results of this form of analysis more apparent than in the investigation of thinking and speech. The word is comparable to the living cell in that it is a unit of sound and meaning that contains -- in simple form -- all the basic characteristics of the integral phenomenon of verbal thinking. The form of analysis that breaks the whole into its elements effectively smashes the word into two parts. The researcher concerned with the phenomenon of verbal thinking is then faced with the task of establishing some external mechanical associative connection between these two parts of the integral whole.

According to one of the most important spokesmen of contemporary linguistics, sound and meaning lie unconnected in the word. They are united in the sign, but coexist in complete isolation from one another. It is no surprise that this perspective has produced only the most pathetic results in the investigation of sound and meaning in language. Divorced from thought, sound loses all the unique features that are characteristic of it as the sound of human speech, the characteristics that distinguish it from the other types of sound that exist in nature. As a result of the application of this form of analysis to the domain of verbal thinking, only the physical and mental characteristics of this meaningless sound have been studied, only that which is common to all sounds in nature. That which is specific to this particular form of sound has remained unexplored. As a consequence, this research has not been able to explain why sound possessing certain physical and mental characteristics is present in human speech or how it functions as a component of speech. In a similar manner, the study of meaning has been defined as the study of the concept, of the concept existing and developing in complete isolation from its material carrier. To a large extent, the failure of classic semantics and phonetics has been a direct result of this tendency to divorce meaning from sound, of this decomposition of the word into its separate elements.

This decomposition of speech into sound and meaning has also provided the basis for the study of the development of the child's speech. However, even the most complete analysis of the history of phonetics in childhood is powerless to unite these phenomena. Similarly, the study of the development of word meaning in childhood led researchers to an autonomous and independent history of the child's thought, a history of the child's thought that had no connection with the phonetic development of the child's language.

In our view, an entirely different form of analysis is fundamental to further development of theories of thinking and speech. This form of analysis relies on the partitioning of the complex whole into *units*. In contrast to the term "element," the term "unit" designates a product of analysis that possesses *all the basic characteristics of the whole*. The unit is a vital and irreducible part of the whole. The key to the explanation of the characteristics of water lies not in the investigation of its chemical formula but in the investigation of its molecule and its molecular movements. In precisely the same sense, the living cell is the real unit of biological analysis because it preserves the basic characteristics of life that are inherent in the living organism.

A psychology concerned with the study of the complex whole must comprehend this. It must replace the method of decomposing the whole into its elements with that of partitioning the whole into its units.[3] Psychology must identify those units in which the characteristics of the whole are present, even though they may be manifested in altered form. Using this mode of analysis, it must attempt to resolve the concrete problems that face us.

What then is a unit that possesses the characteristics inherent to the integral phenomenon of verbal thinking and that cannot be further decomposed? In our view, such a unit can be found in the inner aspect of the word, in its meaning.

There has been very little research on this aspect of the word. In most research, word meaning has been merged with a set of phenomena that includes all conscious representations or acts of thought. There is a very close parallel between this process and the process through which sound, divorced from meaning, was merged with the set of phenomena containing all sounds existing in nature. Therefore, just as contemporary psychology has nothing to say about the characteristics of sound that are unique to the sounds of human speech, it has nothing to say about verbal meaning except that which is applicable to all forms of thought and representation.

This is as true of modern structural psychology as it was of associative psychology.[4] We have known only the external aspect of the word, the aspect of the word that immediately faces us. Its inner aspect, its meaning, remains as unexplored and unknown as the other side of the moon. However, it is in this inner aspect of the word that we find the potential for resolving the problem of the relationship of thinking to speech. The knot that represents the phenomenon that we call *verbal thinking* is tied in word meaning.

A brief theoretical discussion of the psychological nature of word meaning is necessary for clarifying this point. Neither associative nor structural psychology provides a satisfactory perspective on the nature of word meaning. As our own experimental studies and theoretical analyses will show, the essence of word meaning -- the inner nature that defines it -- does not lie where it has traditionally been sought.

The word does not relate to a single object, but to an *entire group or class of objects*. Therefore, every word is a concealed *generalization*. From a psychological perspective, word meaning is first and foremost a generalization. It is not difficult to see that generalization is a *verbal act of thought*; its reflection of reality differs radically from that of immediate sensation or perception.

It has been said that the dialectical leap[4] is not only a transition from matter that is incapable of sensation to matter that is capable of sensation, but a transition from sensation to thought. This implies that reality is reflected in consciousness in a qualitatively different way in thinking than it is in immediate sensation. This qualitative difference is primarily a function of a *generalized reflection of reality*. Therefore, generalization in word meaning is an act of thinking in the true sense of the word. At the same time, however, meaning is an inseparable part of the word; it belongs not only to the domain of thought but to the domain of speech. A word without meaning is not a word, but an empty sound. A word without meaning no longer belongs to the domain of speech. One cannot say of word meaning what we said earlier of the elements of the word taken separately. Is word meaning speech or is it thought? It is both at one and the same time; it is a *unit of verbal thinking*. It is obvious, then, that our method must be that of semantic analysis. Our method must rely on the analysis of the meaningful aspect of speech; it must be a *method for studying verbal meaning*.

We can reasonably anticipate that this method will produce answers to our questions concerning the relationship between thinking and speech because this relationship is already contained in the unit of analysis. In studying the function, structure,

and development of this unit, we will come to understand a great deal that is of direct relevance to the problem of the relationship of thinking to speech and to the nature of verbal thinking.

The methods we intend to apply in our investigation of the relationship between thinking and speech permit a synthetic analysis of the complex whole. The significance of this approach is illustrated by yet another aspect of the problem, one that has remained in the background in previous research. Specifically, the initial and the primary function of speech is communicative. Speech is *a means of social interaction*, a means of expression and understanding. The mode of analysis that decomposes the whole into its elements divorces the communicative function of speech from its intellectual function. Of course, it is generally accepted that speech combines the function of social interaction and the function of thinking, but these functions have been conceptualized as existing in isolation from one another, they have been conceptualized as operating in parallel with no mutual interdependence. It has always been understood that both functions are somehow combined in speech. But traditional psychology left entirely unexplored issues such as the relationship between these functions, the reason that both are present in speech, the nature of their development, and the nature of their structural relationship. This is largely true of contemporary psychology as well.

However, in the same sense that word meaning is a *unit of thinking*, it is also a unit of both these speech functions. The idea that some form of mediation is necessary for social interaction can be considered an axiom of modern psychology. Moreover, social interaction mediated by anything other than speech or another sign system -- social interaction of the kind that occurs frequently in non-human animals for example -- is extremely primitive and limited. Indeed, strictly speaking, social interaction through the kinds of expressive movements utilized by non-human animals should not be called social interaction. It would be more accurate to refer to it as *contamination*. The frightened goose, sighting danger and rousing the flock with its cry, does not so much communicate to the flock what it has seen as contaminate the flock with its fear.

Social interaction based on rational understanding, on the intentional transmission of experience and thought, requires some *system of means*. *Human speech*, a system that emerged with the need to interact socially in the labor process, has always been and will always be the prototype of this kind of means. Until very recently, however, this issue has been seriously oversimplified. In particular, it has been assumed that sign, word, and sound are the means of social interaction. As one might expect, this mistaken conception is a direct result of the inappropriate application of the mode of analysis that begins with the decomposition of the whole into its elements. It is the product of the application of this mode of analysis to the entire range of problems related to the nature of speech.

It has been assumed that the word, as it is manifested in social interaction, is only the external aspect of speech. This implied that sound itself can become associated with any experience, with any content of mental life, and consequently, that it can be used to transmit or impart this experience or content to another human being.

A more sophisticated analysis of this problem and of related issues concerning the processes of understanding and their development in childhood has led to an entirely different understanding of the situation. It turns out that just as social interaction is impossible without signs, it is also impossible without meaning. To communicate an experience or some other content of consciousness to another person, it must be related to a class or group of phenomena. As we have pointed out, this requires *generalization. Social interaction presupposes generalization and the development of verbal meaning*; generalization becomes possible only with the development of social interaction. The higher forms of mental social interaction that are such an important charac-

teristic of man are possible only because -- by thinking -- man reflects reality in a generalized way.

Virtually any example would demonstrate this link between these two basic functions of speech, between social interaction and generalization. For example, I want to communicate to someone the fact that I am cold. I can, of course, communicate this through expressive movements. However, true understanding and communication occur only when I am able to generalize and name what I am experiencing, only when I am able to relate my experience to a specific class of experiences that are known to my partner.

Children who do not possess the appropriate generalization are often unable to communicate their experience. The problem is not the lack of the appropriate words or sounds, but the absence of the appropriate concept or generalization. Without the latter, understanding is impossible. As Tolstoy points out, it is generally not the word itself that the child fails to understand but the concept that the word expresses (1903, p.143). The word is almost always ready when the concept is. Therefore, it may be appropriate to view word meaning not only as *a unity of thinking and speech* but as *a unity of generalization and social interaction, a unity of thinking and communication.*

This statement of the problem has tremendous significance for all issues related to the genesis of thinking and speech. First, it reveals the true potential for *a causal-genetic analysis of thinking and speech.* Only when we learn to see the unity of generalization and social interaction do we begin to understand the actual connection that exists between the child's cognitive and social development. Our research is concerned with resolving both these fundamental problems, the problem of the relationship of thought to word and the problem of the relationship of generalization to social interaction.

However, in order to broaden our perspective on these problems, we would like to mention several issues that we were not able to address directly in our research, issues that became apparent to us only as we were carrying it out. In a very real sense, our recognition of the significance of these issues is the most important result of our work.

First, we would like to raise the issue of *the relationship between sound and meaning in the word.* We have not dealt with this issue extensively in our own research. Nonetheless, recent progress on this issue in linguistics seems to relate directly to the problem of analytic methods that we discussed earlier.

As we have suggested, traditional linguistics conceptualized sound as independent of meaning in speech; it conceptualized speech as a combination of these two isolated elements. The result was that the individual sound was considered to be the basic unit of analysis in the study of sound in speech. We have seen, however, that when sound is divorced from human thought it loses the characteristics that makes it unique as a sound of human speech; it is placed within the ranks of all other sounds existing in nature. This is why traditional phonetics has been primarily concerned not with the psychology of language but with the acoustics and physiology of language. This, in turn, is why the psychology of language has been so helpless in its attempts to understand the relationship between sound and meaning in the word.

What is it, then, that is the most essential characteristic of the sounds of human speech?

The work of the contemporary phonological tradition in linguistics[5] -- a tradition that has been well received in psychology -- makes it apparent that the basic characteristic of sound in human speech is that it functions as a sign that is linked with *meaning.* Sound as such, sound without meaning, is not the unit in which the various aspects of speech are connected. It is not the individual sound but the *phoneme* that is

the basic unit of speech. Phonemes are units that cannot be further decomposed and that preserve the characteristics of the whole, the characteristics of the signifying function of sound in speech. When sound is not meaningful sound, when it is divorced from the meaningful aspect of speech, it loses these characteristics of human speech. In linguistics, as in psychology, the only productive approach to the study of sound in speech is one that relies on the partitioning of the whole into its units, units that preserve the characteristics of both sound and meaning in speech.

This is not an appropriate place for a detailed discussion of the achievements that have been attained through the application of this mode of analysis in linguistics and psychology. In our view, however, these achievements are the most effective demonstration of its value. We have used this method in our own work.

The value of this method could be illustrated by applying it to a wide variety of issues related to the problem of thinking and speech. At this point, however, we can only mention a few of these issues. This will allow us to indicate the potential for future research utilizing this method and to clarify the significance of the method for this whole system of problems.

As we suggested earlier, the problem of the relationships and connections among the various mental functions was inaccessible to traditional psychology. It is our contention that it is accessible to an investigator who is willing to apply the method of units.

The first issue that emerges when we consider the relationship of thinking and speech to the other aspects of the life of consciousness concerns the connection between *intellect and affect*. Among the most basic defects of traditional approaches to the study of psychology has been the isolation of the intellectual from the volitional and affective aspects of consciousness. The inevitable consequence of the isolation of these functions has been the transformation of thinking into an autonomous stream. Thinking itself became the thinker of thoughts. Thinking was divorced from the full vitality of life, from the motives, interests, and inclinations of the thinking individual. Thinking was transformed either into a useless epiphenomenon, a process that can change nothing in the individual's life and behavior, or into an independent and autonomous primeval force that influences the life of consciousness and the life of the personality through its intervention.

By isolating thinking from affect at the outset, we effectively cut ourselves off from any potential for a causal explanation of thinking. A deterministic analysis of thinking presupposes that we identify its motive force, that we identify the needs, interests, incentives and tendencies that direct the movement of thought in one direction or another. In much the same way, when thinking is isolated from affect, investigating its influences on the affective or purposive aspects of mental life is effectively precluded. A deterministic analysis of mental life cannot begin by ascribing to thought a magical power to determine human behavior, a power to determine behavior through one of the individual's own inner systems. Equally incompatible with a deterministic analysis, is the transformation of thought into a superfluous appendage of behavior, into its feeble and useless shadow.

The direction we must move in our attempt to resolve this vital problem is indicated by the method that relies on the analysis of the complex whole into its units. There exists a dynamic meaningful system that constitutes *a unity of affective and intellectual processes*. Every idea contains some remnant of the individual's affective relationship to that aspect of reality which it represents. In this way, analysis into units makes it possible to see the relationship between the individual's needs or inclinations and his thinking. It also allows us to see the opposite relationship, the relationship

that links his thought to the dynamics of behavior, to the concrete activity of the personality.

We will postpone the discussion of several related problems. These problems have not been the direct object of our research in the present volume. We will discuss them briefly in the concluding chapter of this work as part of our discussion of the prospects that lie before us. At this point, we will simply restate the claim that the method that we are applying in this work not only permits us to see the internal unity of thinking and speech, but allows us to do more effective research on the relationship of verbal thinking to the whole of the life of consciousness.

As our final task in this first chapter, we will outline the book's general organization. As we have said, our goal has been to develop an integrated approach to an extremely complex problem. The book itself is composed of several studies that focus on distinct though interrelated issues. Several experimental studies are included, as are others of a critical or theoretical nature. We begin with a critical analysis of a theory of speech and thinking that represents the best thought on the problem in contemporary psychology. It is, nonetheless, the polar opposite of our own perspective. In this analysis, we touch on all issues basic to the general question of the relationship between thinking and speech and attempt to analyze these issues in the context of our current empirical knowledge. In contemporary psychology, the study of a problem such as the relationship of thinking to speech demands that we engage in a conceptual struggle with general theoretical perspectives and specific ideas that conflict with our own.

The second portion of our study is a theoretical analysis of data related to the development (both phylogenetic and ontogenetic) of thinking and speech. From the outset, we attempt to identify the genetic roots of thinking and speech. Failure in this task has been the underlying cause of all false perspectives on the problem. An experimental study of the development of concepts in childhood, a study that is composed of two parts, provides the focus for this second part of the investigation. In the first part of this study, we consider the development of what we call "artificial concepts," concepts that are formed under experimental conditions. In the second, we attempt to study the development of the child's real concepts.

In the concluding portion of our work, we attempt to analyze the function and structure of the general process of verbal thinking. Theory and empirical data are both included in this discussion.

What unifies all these investigations is *the idea of development*, an idea that we attempt to apply in our analysis of word meaning as the unity of speech and thinking.

Chapter 2

THE PROBLEM OF SPEECH AND THINKING IN PIAGET'S THEORY

1

The research of Jean Piaget[6] represents a new stage in the development of theory concerning the speech and thinking of the child; a new stage in the development of theory concerning the child's logic and world view. His work is of substantial historical significance. Beginning with a new perspective on the problem, and using the clinical method he developed, Piaget has carried out profoundly insightful investigations of the child's logic. Piaget himself, in concluding the second of his works, clearly and precisely noted the significance of his approach in the study of this old problem.

While Piaget's studies have created new directions and potentials for the study of the child's thinking and speech, however, this is not the context for a detailed consideration of his perspective. In his introduction to the French edition of *The Thought and Language of the Child*, Claparede[7] did an excellent job of characterizing Piaget's contribution.

> Whereas, if I am not mistaken, the problem of child mentality has been thought of as one of quantity, M. Piaget has restated it as a problem of quality. Formerly, any progress made in the child's intelligence was regarded as the result of a certain number of additions and subtractions, such as increase of new experience and elimination of certain errors -- all of them phenomena which it was the business of science to explain. Now, this progress is seen to depend first and foremost upon the fact that this intelligence undergoes a gradual change of character (1932, p. xiii).

Comparing Piaget's perspectives on the child's thinking to those that had previously dominated psychological research, it becomes clear that his statement of the problem in qualitative rather than quantitative terms resulted in a more positive characterization of the child's mind. Traditional psychology tended to characterize the child's thinking in negative terms. Research involved the enumeration of the flaws, inadequacies, and limitations that differentiate the child's thinking from the adult's. The primary focus was on *what the child does not have*. The child's thinking was character-

ized in terms of his incapacity for abstract thinking, concept formation, connected judgement, and deduction. In contrast, Piaget attempted to identify what is qualitatively unique in the child's thinking; he attempted to characterize the child's thinking in positive terms. With Piaget, the focus was shifted to the question of *what the child is*, to the question of the distinctive features and characteristics of his thinking.

What was new and remarkable in Piaget's work is in essence simple and commonplace. However, many great things can be expressed or characterized in terms of Rousseau's old and banal position that the child in not a small adult, that the child's mind is not a small adult mind. Piaget clarified this idea and provided an empirical foundation for it. Yet for Piaget, another simple idea lies behind this truth, the idea of development. The varied and fascinating pages of his work greatly illuminate this simple idea.

However, the profound crisis in contemporary psychology inevitably had its influence on this new approach to the study of the child's logic. As with all outstanding research in the current era -- all research that has attempted to blaze new trails -- this crisis placed its stamp of dualism on Piaget's research. Piaget's work can be compared with that of Freud, Blondel[8], and Levi-Bruhl[9] in this sense. Each of these perspectives is the offspring of a crisis that grips the very foundations of our science. This crisis, which signifies the transformation of psychology into a true science, stems from the sharp contradiction that exists between the empirical data that have been accumulated through psychological research and the methodological[5] foundations of our science.

The crisis in psychology is primarily a methodological crisis. It is firmly rooted in history, with the struggle between the materialist and idealist traditions lying at its core. The conflict between these traditions currently seems to be much stronger and sharper in psychology than in other fields.

In Brentano's[10] words, the historical condition of our science is such that there exist many psychologies, but no unified psychology. One could argue, indeed, that the development of this multitude of psychologies is a direct function of the absence of a general, unified psychology. The absence of a unified scientific system that incorporates the whole of contemporary psychological knowledge has produced a situation in which each discovery of significant empirical data *requires* the creation of a new theory; a new system for explaining and understanding newly acquired *data* and or newly identified *relationships*. New data require the creation of a new psychology, a psychology that is one among many.

This is how Freud, Levi-Bruhl, and Blondel created their psychologies. The contradiction between the empirical foundations of their theories and the theoretical constructs raised on these foundations, the idealistic character of these systems (expressed differently in each), and the metaphysical flavor of many of their theoretical constructs, are all the inevitable and fatal reflection of the dualism which we earlier identified as the stamp of the current crisis in psychology. This dualism reflects the fact that when psychology takes a step forward in the accumulation of empirical data it consistently takes two steps back in its theoretical interpretation of this material. At almost every step, contemporary psychology demonstrates most pathetically how new and important discoveries -- the ultimate achievement and pride of a science -- can become bemired in prescientific concepts which shroud them in *ad hoc*, semi-metaphysical systems and theories.

Piaget strives to avoid this fatal dualism by isolating himself in the narrow domain of empirical data. He wants to know of nothing but the facts. He consciously avoids generalizations, and is even more concerned about moving beyond the problems of psychology to those of related fields such as logic, epistemology, and the history of philosophy. In his view, the best foundation is pure empiricism. In his preface to *The*

Thought and Language of the Child (Piaget, 1932), Piaget writes that "this means that the essays before us are first and foremost a collection of facts and documents, and that the bond between the various chapters is not that of systematic exposition, but of unity of method applied to a diversity of material (1932, p. xiii)."

This is indeed the most valuable aspect of Piaget's work. His ability to gather new empirical material, his sophistication in handling psychological data, his careful analytic approach, his skillful classification of material, and -- in the words of Claparede -- his capacity to "hear the material speak for itself" is unquestionably the strongest characteristic of his work. In Piaget's work, we find facts of great and lesser significance, facts of first and second order magnitude, facts discovered for the first time by Piaget and facts that supplement the findings of others. A virtual sea of facts gush from these pages.

Piaget owes this gold mine of empirical data to his *clinical method*, a method whose power and unique character has advanced him to the front ranks of contributors to the development of research methods in psychology. Piaget's clinical method is a necessary tool for studying the complex, unified formations of the child's thought in transition and development. It provides a unity to his varied studies, bringing them together into a connected and vital clinical picture of the child's thinking.

New data, and the new methods necessary for their acquisition and analysis, inevitably generate a multitude of new problems. Sometimes psychology faces these problems for the first time. Sometimes it merely faces them in a new form. Of particular significance in the present context are problems involving grammar and logic in the child's speech, the development of the child's capacity for introspection, the functional significance of this capacity in the development of logical operations, and the child's understanding of verbal thought.

In spite of his attempts, Piaget did not succeed in avoiding the fatal dualism to which the crisis in contemporary psychology has doomed even the best representatives of the science. Piaget attempted to hide behind a high wall of reliable fact. But the facts betrayed him. They led him to problems. They led him to theory, implicit and undeveloped theory to be sure, but nonetheless to theory of the kind that he had tried so hard to avoid. Yes, there is theory in his books. This is inevitable. It is fate.

Piaget writes:

> All I have attempted has been to follow step by step the facts as given in the experiments. We know well enough that experiment is always influenced by the hypothesis that occasioned it, but I have for the time being confined myself strictly to the discussion of the facts (1932, p. xix).

However, he who *considers facts, inevitably considers them in the light of one theory or another.*

Fact and philosophy are directly interrelated. This is particularly true of facts such as those that Piaget has discovered, reported, and analyzed because they concern the development of the child's thinking. If we want to find the key to this rich collection of new fact, we must first clarify the *philosophy of the fact*, the philosophy of its acquisition and interpretation. Otherwise, the facts will remain silent and dead.

Therefore, our primary concern in this chapter on Piaget's research will not be the specific issues he addressed. We must attempt to pull these issues and problems together into some kind of unity, to generalize what we find in his treatment of these more specific problems concerning the child's thought. We must seek their common core. We must attempt to isolate what is basic, what defines them. This means that we must attempt a critique of the theory and the methodological systems that provide

the foundation for Piaget's studies. Within this framework, the empirical data will concern us only to the extent that they are basic to theory or concretize methodology.

This is the path we must take in our critical analysis of Piaget's treatment of the problem of the child's speech and thinking.

If one wishes to gain some unified perspective on the complex structure underlying Piaget's numerous and productive studies, Piaget's approach of outlining the procedure and results of each individual study is useless. Piaget intentionally avoids systems. He does not fear a critique of his inadequate integration of material. He is concerned with the unadulterated study of fact. He warns against premature attempts to bring the concrete characteristics of the child's thinking within a unified theoretical framework. As a matter of principle, he resists excessively systematic accounts of his studies or generalizations that extend beyond the psychology of the child. He is convinced that for the educator, and for others whose activity demands a precise knowledge of the child, the analysis of facts is more important than theory. Piaget promises a synthesis of his work only with the completion of an entire series of studies. He believes that such a synthesis would otherwise constantly interfere with the discussion of data and lead to their distortion.

A distinctive characteristic of Piaget's approach, then, is his attempt maintain a strict differentiation between theory and the analysis of fact; to separate the synthesis of the materials as a whole from his account of specific studies. His goal is to follow the facts as they emerge in his research.

As we have said, we cannot follow Piaget in this approach if we want to gain a unified perspective on the entire structure of his work, if we want to unearth the foundations of that structure. We must try to find the central link in this chain of facts, the central principle from which unifying links extend to the remainder of the system and provide support for the entire structure. Piaget himself helps in this regard. In the brief summary of the *Judgment and Reasoning in the Child* (Piaget, 1928) that forms the conclusion to that volume, Piaget does make an attempt to outline his studies and integrate them into a definite system. Here, he attempts to identify connections among his various findings and bring them together into some kind of unity.

The first question to arise concerns the existence of an *objective link between all the characteristics of the child's thinking* that are discussed in Piaget's studies. The question is whether these characteristics are isolated, independent phenomena -- phenomena unrelated to a common cause -- or whether they represent some structure, some connected whole, at the foundation of which lie several central facts that define the unity of all these characteristics. Piaget's studies touch on a many phenomena that characterize the child's thinking, phenomena that include the child's egocentric speech and thinking, his intellectual realism, his syncretism, his inability to understand relations, his problems with conscious realization, and his lack of capacity for self observation. The question is whether "these phenomena form an incoherent whole, that is, are they due to a series of accidental and fragmentary causes unrelated to each other, or do they form a coherent whole, and thus constitute a logic of their own (1928, p. 200)?" Piaget's answer to this question, in which he affirms the coherence of the whole, forces him to move beyond the analysis of fact into the theoretical arena. It also demonstrates the extent to which theory determined Piaget's initial analysis of the facts, in spite of the way that he ordered the discussion of fact and theory in his exposition.

What then is this central link that allows us to see the various characteristics of the child's thinking in a unified manner? Within Piaget's theoretical framework, it is the egocentric nature of the child's thinking. This is the cornerstone of the entire structure. Piaget writes that "we have sought to trace most of the characteristics of

child logic to egocentrism (1928, p. 201)." These characteristics form a complex that determines the child's logic. Underlying this complex is the egocentric character of the child's thinking and activity. All characteristics of the child's thinking flow from it. Whether the remaining threads -- threads that allow us to use this theoretical generalization to interpret, understand, and connect the various features of the child's logic in a unified whole -- are strengthened or broken, depends on our initial acceptance or rejection of this central concept. For example, the author claims that syncretism (a central characteristic of the child's thinking) is the direct result of the child's egocentrism.

Our first task, then, is to consider the egocentric character of the child's thinking and its link with the other aspects of the qualitatively unique nature of the child's thought. Piaget defines egocentric thought as a transitional or intermediate form of thinking, a form that in genetic, functional, and structural terms lies between autistic thought and directed rational thought. In the history of the development of thinking, egocentric thought is a transitional stage, a genetic link.

Piaget's distinction between undirected thought (what Bleuler[11] called autistic thought) and rational or directed thought is borrowed from psychoanalytic theory.[12] Piaget wrote:

> Directed thought is conscious, i.e., it pursues an aim which is present to the mind of the thinker; it is intelligent, which means that it is adapted to reality and tries to influence it; it admits of being true or false (empirically or logically true) and it can be communicated by language. Autistic thought is subconscious, which means that the aims it pursues and the problems it tries to solve are not present in consciousness; it is not adapted to reality, but creates for itself a dream world of imagination; it tends, not to establish truths, but to satisfy desires, and it remains strictly individual and incommunicable as such by means of language. On the contrary, it works chiefly by images, and in order to express itself, has recourse to indirect methods, evoking by means of symbols and myths the feeling by which it is led (1932, p. 43).

Rational or directed thinking is social. As it develops, it is increasingly subordinated to the laws of experience and pure logic. Autistic thought, as its name implies, is individual and is subordinated to a set of special laws that need not be precisely defined here.

Between these two extreme forms of thought,

> there are many degrees, varying with their capacity for being communicated. These intermediate varieties must therefore be subject to a special logic, intermediate between the logic of autism and that of intelligence. The chief of those intermediate forms, i.e., the type of thought which like that exhibited by our children seeks to adapt itself to reality, but does not communicate itself as such, we propose to call *egocentric thought* (1932, p. 45).

Piaget formulates this position on the intermediate character of the child's egocentric thought still more clearly, saying, "all egocentrism is designed by its structure to stand half-way between autistic thought which is 'undirected,' i.e., which as in day-dreaming hovers about at the mercy of every whim, and 'directed' intelligence (1932, p. 238)." It is not only the structure but the function of this form of thinking that locates it between autistic thinking and real thinking in a genetic series. As noted above, the function of this thinking is not so much in the individual's adaptation to reality as in the satisfaction of his needs.

This thinking is not directed toward reality but toward the satisfaction of wishes. This links egocentric thought with autistic thought. But there is, at the same time, an important difference between the two. Specifically, there are functional features that link egocentric thought with the real thought of the adult, features that advance it beyond the logic of the dream or fantasy.

> We have therefore given it the name of egocentric, which indicates that this type of thought is still autistic in its structure but that its interests tend not merely towards organic or 'ludistic' satisfaction as in pure autism, but towards intellectual adaptation as in adult thought (1928, p. 204).

Thus, in functional terms, Piaget identifies features that both link and distinguish egocentric thought from each of the other two forms of thinking. A consideration of these features leads once again to the conclusion that constitutes Piaget's basic hypothesis, the conclusion that "the thought of the child is more egocentric than ours and that it is half-way between 'autism' proper, and socialized thought (1928, p. 208)."

It is perhaps worth noting at the outset that while Piaget discusses the dual nature of egocentric thought he consistently places more emphasis on what links egocentric to autistic thought than on what distinguishes these forms of thinking. In a concluding section of his book, he reminds us decisively that "for egocentric thought the supreme law is play (1928, p. 244)."

Of particular significance in connection with Piaget's tendency to emphasize the features that link these two forms of thinking rather than those that distinguish them is his treatment of syncretism, a basic manifestation of egocentric thought. For Piaget, syncretism and other features of the child's logic are the direct product of the child's egocentrism. Of this important characteristic of the child's logic he writes that:

> Our readers will perhaps be inclined to take the view that egocentric thought, which gives rise to all these phenomena of syncretism, is closer to autistic or dream thought than to logical thought. The facts that we have been describing are in several of their aspects related to dreaming or day-dreaming (1932, pp. 157-158).

Even here, however, Piaget is inclined to view the mechanism of syncretic thought as a feature intermediate between logical thought and the thought that the psychoanalists have boldly called the 'symbolism' of dreams. As is well known, Freud demonstrated that two basic functions operate in directing the emergence of images in the dream. These are condensation (which leads to the fusion of several different images into a single image) and transference (which involves the transmission a feature of one object to another).

Following K.D. Larson, Piaget argues that:

> As we have suggested elsewhere (1) there must be every kind of intermediate type between these two functions [i.e., between condensation and transference] and the processes of generalization (which is a sort of condensation) and abstraction (which is a sort of transference). Now syncretism is precisely the most important of these intermediate links (1932, p. 158).

It is apparent then, that not only egocentrism but syncretism (i.e., the primary manifestation of egocentrism) is seen by Piaget as an intermediate or transitional form between the logic of the dream and the logic of thinking.

Piaget argues elsewhere that syncretism is by its very mechanism an intermediate link between autistic thought and logic. We should, therefore, consider syncretism in

some detail, since Piaget generalizes what he says of syncretism to all other characteristics or manifestations of the child's egocentric thought.

However, we must outline a third basic issue if we are to clarify the central concept in Piaget's system (i.e., the concept of the egocentric character of the child's thinking). Specifically, we must deal with the genetic relationships between the logic of the dream (i.e., pure autism) and egocentric thought and the genetic relationships between egocentric thought and the logic of rational thinking. As we have seen, in both structural and functional terms Piaget sees egocentric thought as an intermediate and unifying link between the two extreme stages in the development of thinking. He resolves the question of the genetic connections and relationships among these three forms of thought in precisely the same way.

The initial and the basic idea underlying this entire conception of the development of thinking -- and the source of Piaget's genetic definition of the child's egocentrism -- is the concept that autistic thinking is the first form of thinking (i.e., that which determines the child's psychological nature). Piaget borrowed this idea directly from psychoanalytic theory. Realistic thinking is seen as a later development, one imposed on the child from the outside through a long and systematic process of coercion by the surrounding social environment.

Beginning with this basic perspective, Piaget concludes that "logical activity is not the whole of intelligence. One can be intelligent without being particularly logical (1928, pp. 201-202)." The different functions of the mind are not linked with one another such that one cannot be found without the other or prior to the other.

> The main functions of intelligence, that of inventing solutions, and that of verifying them, do not necessarily involve one another; the first partakes of imagination, the second alone is properly logical. Demonstration, the search for truth, is therefore the true function of logic.
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> But on what occasions do we experience the need to verify our thought? This need does not arise spontaneously in us. On the contrary, it appears very late.... (1928, p. 202).

Piaget argues that the explanation for this delay is to be found in two causes.

> The first is that thought puts itself at the service of the immediate satisfaction of desire long before forcing itself to seek for truth. Thought's most spontaneous manifestation is play, or at any rate that quasi-hallucinatory form of imagination which allows us to regard desires as realized as soon as they are born. All the writers who have concerned themselves with the play, the testimony, and the lives of children, have realized this. Freud has restated it with vigor by showing that the 'Lustprinzip' [i.e., the pleasure principle] is prior to the 'Realitatsprinzip' [i.e., the reality principle]. Now the child's mind is full of these 'ludistic' tendencies up to the age of 7-8, which means that before this age it is extremely difficult for him to distinguish between fabulation and truth (1928, p. 202).

Genetically, then, autistic thinking is the first form of thinking. Logic arises comparatively late. Egocentric thought occupies a position between them, constituting a transitional stage in the development of thinking from autism to logic.

To clarify this conception of the child's egocentric thought we must consider one more issue. This is the question of the origin of the egocentric nature of the child's thinking and -- if we may express it in this way -- the question of its volume or range, that is, the question of the limits or extent of egocentric thinking in the various domains of the child's thought. From Piaget's perspective, the essence of egocentrism is

reflected in two factors; first (following psychoanalytic theory) in the child's asociality, and, second, in the unique character of his practical activity.

Piaget often says that his position on the intermediate nature of egocentric thought is hypothetical. However, this hypothesis is so close to common sense and so obvious that the child's egocentrism hardly seems debatable to him. The entire theoretical portion of Piaget's book is concerned with the question of whether the difficulties of expression and logic that he identified are entailed by egocentrism or whether the relationship is, in fact, the reverse.

In Piaget's view, it is clear that:

> From the genetic point of view, we must start from the child's activity if we want to explain his thought. Now, this activity is unquestionably egocentric and egotistical. The social instinct is late in developing. The first critical stage occurs at the age of 7-8 (1928, p. 209).

It is to this age that Piaget relates the first period of logical reflection as well as the child's first efforts to escape the consequences of egocentrism.

In essence, this attempt to derive egocentrism from the later development of the social instinct and the biological egoism of the child's nature is inherent in Piaget's definition of egocentric thought. Egocentric thought is represented as individual rather than socialized thought, and for Piaget, socialized thought means rational or realistic thought.

With reference to the second issue, the issue of the relative volume or range of the influence of egocentrism on the child's thinking, Piaget is inclined to attribute a universal significance to egocentrism, to treat the phenomenon as an absolute. Piaget regards egocentrism not only as the basic, first, and essential characteristic of the child's thinking and behavior, but as its universal characteristic. The tremendously rich and varied manifestations of the child's logic are all perceived by Piaget as the direct or indirect manifestation of egocentrism. Even this, however, understates the importance of the concept of egocentrism for Piaget. The influence of the concept of egocentrism is extended not only to its consequences, but to the factors which determine its emergence. As we said, Piaget links the egocentric character of thinking with the egoistic character of the child's activity. This, in turn, is linked to the asocial character of the entire development of the child before the age of 8.

With respect to the most important manifestations of the child's egocentrism (e.g., syncretism), Piaget directly and unequivocally states that they are characteristic not of a specific sphere but of the whole of the child's thinking. "Syncretism therefore permeates the entire thought of the child (1928, p. 228)." Elsewhere, Piaget writes:

> Now childish egocentrism seems to us considerable only up till about 7 or 8, the age at which the habits of social thought are beginning to be formed. Up till about 7 1/2, therefore, all the child's thought, whether it be purely verbal (verbal intelligence) or whether it bear on direct observation (perceptive intelligence), will be tainted with the consequences of egocentrism, and of syncretism in particular. After the age of 7 to 8, these consequences of egocentrism do not disappear immediately, but remain crystallized in the most abstract and inaccessible part of the mind, we mean the realm of purely verbal thought (1932, pp. 127-128).

This leaves no doubt on the question of Piaget's views concerning the range of influence of egocentrism before the age of 8. Egocentrism influences the whole of the

child's thinking and perception. With the sudden change that the child's thinking undergoes after the age of 8, egocentric thought is preserved in only a limited aspect of the child's thinking, only in that sphere which is segregated from reasoning. Between 8 and 12, then, the influence of egocentrism is limited to a single sphere or portion of thought, while before the age of 8 it occupies the entire range of the child's thought.

Such are the basic features of Piaget's conception of egocentric thought, a conception which -- as we said earlier -- is fundamental to all his research, a conception which is the key to understanding all the empirical data discussed in his work.

The natural conclusion to draw from this perspective on egocentrism is Piaget's contention that the egocentric character of thought is so closely linked to the child's psychological nature that it is manifested lawfully, inevitably, and consistently irrespective of the child's experience. Piaget writes:

> It must be remembered, moreover, that experience itself does not undeceive minds oriented in this fashion. Things are in the wrong, not they.
>
> The savage who calls down rain by a magic rite explains his failure as the work of an evil spirit. He is, according to a famous saying, 'impervious to experience.' Experience undeceives him only on very special technical points (cultivation, hunting or manufacture); but even this momentary and partial contact with facts does not react in any way upon the orientation of his thought. This applies even more strongly to the child whose every material want is anticipated by his parents' care. Only in his manual games does the child learn to understand the resistance of objects (1928, p. 203).

For Piaget, the child's 'imperviousness' to experience is closely linked to his basic concept, the idea that:

> Child thought cannot be isolated from the factors of education, and all the various influences which the adult exercises upon the child. But these influences do not imprint themselves upon the child as on a photographic plate; they are 'assimilated,' i.e., deformed by the living being who comes under their sway, and they are incorporated into his own substance. It is this psychological substance (psychologically speaking) of the child's, or rather this structure and functioning peculiar to his thought that we have tried to describe, and in a certain measure, to explain (1928, p. 256).

In these words, the methodological foundation of Piaget's research is revealed. Piaget strives to study the psychological substance of the child, a substance that assimilates the influences of the social environment and deforms them in accordance with its own laws. Piaget perceives the egocentrism of the child's thought as the result of a deformation of social forms of thinking that are instilled in the child's psychological substance. This deformation occurs in accordance with the laws governing the life and development of this substance.

This seemingly casual formulation brings us directly to the hidden philosophy of the whole of Piaget's research. It brings us to the problem of the social and the biological in the child's mental development, to the question of the nature of the child's development.

The methodologically more complex aspect of this problem, an aspect of the problem that Piaget has not addressed, will be discussed in more detail later. First, we will conduct a critical analysis of the essence of Piaget's conception of the child's egocentrism, focusing on the empirical as well as the theoretical state of this conception.

2

Autistic thinking is not, however, the first stage in the mental development of either the human species or the child. It is not a primitive function, not the point of departure for the whole of development. It is not the basic or initial form from which all others take their beginning.

Not even for biological evolution or the biological analysis of infant behavior does autistic thinking warrant the status suggested by Freud and accepted by Piaget. As we have seen, both Freud and Piaget maintain that autism is the first and basic stage in the development of thinking, a stage that provides the framework on which all subsequent stages are constructed. In Piaget's words, this earliest stage in the development of thinking is a kind of illusory imagination. The pleasure principle, which directs autistic thinking, precedes the reality principle, which directs logical or rational thinking. It is of particular interest that biologically oriented theories, in particular that of Bleuler who developed the theory of autistic thinking, have reached this same conclusion.

Recently, Bleuler has pointed out that the phrase "autistic thinking" has led to several misunderstandings. Specifically, he cites the tendency to merge the concept of autistic thinking with the concepts of schizophrenic autism and egoistic thinking. He therefore proposes that autistic thinking should be called "unrealistic thinking" in order to contrast it directly with realistic or rational thinking. However, this change in the designation of autistic thinking, though perhaps necessary, masks an important change in the content of the concept itself.

Bleuler (1927) clearly expressed the nature of this change in a study that focused on autistic thinking. He gives precise expression to the issue of the genetic relationship between autistic and rational thinking, noting that autistic thinking is usually placed at a genetically earlier stage than rational thinking.

> Realistic thinking, thinking that satisfies the complex needs of reality (i.e., "the reality function"), is much more easily crippled under the influence of illness than is autistic thinking. In fact, autistic thinking advances to the forefront as a consequence of the disease process. As a result, French psychologists, Janet[13] in particular, suggest that the reality function is the higher and more complex of the two forms of thinking. However, only Freud takes a clear position on this issue, stating that the mechanism of pleasure is primary in the developmental process. Freud accepts the notion that the human infant whose real needs are fully satisfied by his mother, or the chick in the egg that is separated from the external world by its shell, live autistic lives. In Freud's view, the child "hallucinates' about the satisfaction of his inner needs and shows his dissatisfaction by expressing his intensifying irritation or through motor reactions such as cries and movement, subsequently experiencing an hallucinatory form of satisfaction (ibid, p. 55-56).

In this way, Bleuler formulates the basic position of the psychoanalytic theory of child development on which Piaget relied. He defines egocentric child thinking as a transitional stage between this initial, primary autism (which in another work on infant psychology Piaget justifiably refers to as egocentrism) -- which taken to its logical limit is solipsism -- and rational thinking.

In opposition to this perspective, Bleuler develops what seems to us, in developmental terms, an invincible argument.

> I cannot agree with this. I do not see any hallucinatory satisfaction in the infant. I see satisfaction only after the infant has actually received food;

> and I must say the chick in the egg breaks out not with the aid of representations, but with the benefit of physically and chemically perceivable food.
>
> In my observations of the older child, I also fail to see his preference for an imaginary apple over a real one. And the imbecile as well as the savage are both real politicians. The latter, in precisely the same manner as we who stand at the pinnacle of the development of the capacity for thought, demonstrates his autistic stupidity only in situations where his reason and experience turn out to be insufficient, that is, in his concepts of the cosmos and natural phenomena, in his understanding of disease and other misfortunes, and in the measures he takes to protect himself from the latter.
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> In the imbecile, it is not only realistic thinking but autistic thinking as well that is simplified. I have not been able to find a being capable of life, however limited its development, that does not react to reality before all else. I cannot, indeed, imagine such a being. Moreover, I cannot imagine an autistic function that could exist below a given level of organization, since the autistic function requires extremely complex capacities of memory. Thus, except for a few observations of the more highly developed animals, comparative psychology knows only the reality function.
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> The apparent contradiction is easily resolved: *the autistic function is not as primitive as the more simple forms of the reality function. It is, however, more primitive in several respects than the higher forms of the reality function as it has developed in man.* The lower animals possess only the reality function. No being thinks exclusively in an autistic manner. At a certain stage of development, however, the autistic function is combined with the reality function. From this point on it develops together with it (ibid, pp. 57-58).

One need only consider the development of thinking within the general framework of biological evolution to be convinced that the first form of intellectual activity is active, practical thinking. This is thinking that is directed toward reality. It is a basic form of adapting to new or changing conditions in the external environment.

From a biological perspective, it is nonsense to assume that the fantasy function or the logic of the dream is biologically or evolutionarily primary; to assume that thinking emerged and developed from lower to higher animal forms and from the higher animal forms to man as a function of self-satisfaction (i.e., in subordination to the pleasure principle). In biological terms, the assumption of the primacy of the pleasure principle in the development of thought precludes any explanation of the origin of the mental function that we call intellect or thinking.

Even in ontogenesis, however, to assume that the hallucinatory satisfaction of need is the primary form of the child's thinking is to ignore the indisputable fact emphasized by Bleuler, the fact that satisfaction ensues only after the actual reception of food. It is to ignore the fact that the child prefers the real apple to the imaginary one.

As we will attempt to demonstrate later, Bleuler's formula does not fully resolve the issue of the genetic links that do exist between autistic and realistic thinking. However, with respect to the comparatively late development of the autistic function and the biological inadequacy of the assumption of the primacy of autism, Bleuler's arguments seem to us to be indisputable.

Bleuler attempts to outline the most important stages in the emergence of these two forms of thinking and identify the links between them. At this point, however, we will not discuss his scheme of phylogenetic development in detail. We will say only that he relates the emergence of the autistic function to a fourth stage in the development of thinking, a stage in which concepts begin to be combined independently of the immediate stimuli of the external world. This stage is associated with the accumulation of experience through logical functions and deductions, processes that extend experience from what has been experienced to what is still unknown, from the past to the

future. It is in this stage that a potential develops for evaluating specific incidents and acting voluntarily. It is also in this stage that connected thinking develops, thinking that consists entirely of memory images with no direct link to the random stimulation of the sense organs or of needs.

Bleuler writes:

> Only here can the autistic function emerge. *Only here can representations exist which, when combined with an intensive feeling of pleasure or satisfaction, create wishes that can be satisfied by their realization in fantasy. It is these wishes that have the capacity to transform the external world in man's representations because he does not think about that which is unpleasant, he strips it away and integrates pleasant images of his own invention with his representation of the external world.* Consequently, the ir-real function cannot be more primitive than the rudiments of realistic thinking, but must develop in parallel with it.*
>
> On the one hand, the more complex and differentiated the formation of concepts and logical thinking, the more precise their adaptation and the greater the potential for freedom from the influence of affect. On the other hand (and to the same degree), there is an increase in the potential for significant influence of emotionally colored engrams from the past and for emotional representations related to the future.
>
> At the same time that the individual is compelled to fantasy by the existence of countless emotionally laden memories from the past and representations of the future that are no less determined by affective factors, the limitless linking of concepts provides the potential for infinite variety in fantasy.
>
> As they develop, the difference between these two forms of thinking becomes more and more marked. Ultimately, this difference can lead to contradictions that produce increasingly serious conflicts. On the one hand, there arises the dreamer, the individual who is exclusively occupied with fantasy and fails to reckon with reality or engage in activity. On the other, there arises the serious type, the realistic man, who as the result of clear and realistic thinking lives only in the present, not looking ahead. However, despite parallelism in phylogenetic development, realistic thinking is for a variety of reasons the more developed of these two forms of thinking and is therefore more seriously stricken with a general mental disturbance (ibid, 60-62).

Bleuler poses the question of how autistic thinking, a function that in phylogenetic terms is so recent, can be so widely distributed and so powerful that it directs the greater part of the mental life of many children after the age of two (e.g., in fantasy, daydreams, and play).

Bleuler's answer to this question is that: (1) the development of speech creates favorable conditions for autistic thinking, and (2) autism provides a receptive field for the exercise of the child's developing intellectual capacities. In the child's fantasies, his capacities to combine concepts increase in parallel with his physical dexterity in active play. "The child playing soldier or mother exercises a necessary complex of representations and emotions much like the kitten preparing itself for the hunt (ibid, p. 76)."

While this new understanding of the phenomenon clarifies the function, structure, and genesis of the autistic function, it suggests that we need to reconsider its nature. In our view, the unconscious nature of autistic thinking is the central problem. "Autistic thought is unconscious." Freud and Piaget both begin with this definition.

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* In our view, the designation of these two processes as processes that flow parallel to one another is incorrect. It does not correspond with the real complexity of the processes involved in the development of these two forms of thinking.

Even egocentric thought, argues Piaget, is still not fully conscious. In this respect, it occupies an position intermediate between the conscious reasoning of the adult and the unconscious activity of dreaming.

Piaget writes that "in so far as he is thinking only for himself, the child has no need to be aware of the mechanism of his reasoning (1928, p. 213)." Piaget rightly avoids the expression "unconscious reasoning" because it is extremely slippery. He prefers to refer to the idea that the logic of the action rather than the logic of thought governs the child's thinking. But this is a function of the fact that egocentric thought is unconscious. "Most of the phenomena of child logic can be traced back to general causes. The roots of this logic and of its shortcomings are to be found in the egocentrism of child thought up to the age of 7-8, and in the unconsciousness that this egocentrism entails (1928, p. 215)." Piaget discusses the child's limited capacity for introspection -- his difficulties with conscious reflection -- in some detail. He demonstrates the fallacy of the commonly held view that people who are egocentric in their thinking are better able to reflect consciously on themselves, the fallacy of the assumption that egocentrism leads to correct self observation. "The concept of autism in psychoanalysis -- he says -- throws full light upon the fact that the incommunicable character of thought involves a certain degree of unconsciousness (1928, pp. 209-210)."

Therefore, the child's egocentrism is accompanied by a certain unconsciousness. This, in turn, clarifies several characteristics of the child's logic. It was Piaget's experimental work on the child's capacity for introspection that led him to take this position.

The notion that autistic and egocentric thought are unconscious is indeed fundamental to Piaget's general conception of the phenomenon. His basic definition of egocentric thought is that it is thought which is not conscious of its task and its goal, that it is thought which satisfies an unconscious urge. But even the concept of the unconscious nature of autistic thinking is shaken by Bleuler's arguments. Bleuler writes that "with Freud autistic thinking is so closely related to unconscious thinking that an inexperienced man might easily fuse the two concepts (1927, p. 43)." It is Bleuler's conclusion, however, that these concepts must be strictly distinguished. Bleuler argues that "autistic thinking can, in principle, be conscious as well as unconscious" and provides several concrete examples of how autistic thinking takes both forms (ibid).

The notion that autistic and egocentric thinking are not directed toward reality is also attacked in Bleuler's studies.

> In accordance with the field on which autistic thinking is expressed, we find two forms that differ primarily in the degree to which they depart from reality. These two forms are not sharply distinct from one another, but in their prototypical forms significant differences do emerge (ibid, p. 26-27).

One form differs from the other in the extent to which it approximates reality. "The autism of the normal man in a waking state is closely linked with reality and operates almost exclusively with normal representations and firmly established concepts (ibid, p. 27)."

Anticipating the discussion of our own studies, we would argue that this is particularly true of the child. His autistic thinking is intimately and integrally connected with reality. It operates almost exclusively on what surrounds the child, on what he directly encounters in his own experience. Because of its isolation from reality, the second form of autistic thinking (i.e., that which is manifested primarily in the dream) can create absolute absurdities. However, if they distort reality in this way, dreaming and illness must be precisely that, that is, dreaming and illness.

Whether our concern is genetic, functional, or structural, then, autistic thinking is neither the first stage of all subsequent forms of thinking nor their foundation. This implies that we must reconsider the notion that the child's egocentrism is an intermediate or transitional stage between autistic thinking and other higher forms of thought.

3

In Piaget's theory, the concept of the child's egocentrism is a focal point where the threads that constitute the theory cross and gather. This single concept allowed Piaget to unify the many distinct features that are characteristic of the child's logic. By using it, he transformed these characteristics from an unconnected, unordered, chaotic collection into a tightly connected structural complex conditioned by a single cause. Correspondingly, when one questions the validity of Piaget's perspective on egocentrism (i.e., the concept that provides the foundation for his entire theoretical system) one questions the validity of the theoretical structure as a whole.

However, to assess the strength and reliability of this concept, we must evaluate its empirical foundation. We must ask what kind of data impelled Piaget to accept it as an hypothesis which he is inclined to view as almost beyond argument. Earlier, we attempted a theoretical analysis of this conception relying on data from evolutionary psychology and the historical psychology of man. However, a final assessment of this conception requires an analysis of its empirical foundations.

This requires empirical research. The theoretician must now cede his position to the experimenter. The battle of arguments and objections, motives and countermotives, must give way to a battle involving a disciplined formation of new empirical data strategically posed against the system of data that provides the foundation for the disputed theory.

Our first step will be to clarify Piaget's own ideas, to define as precisely as possible what it is that he sees as the empirical foundation for his theory. This foundation appears in his research on the functions of the child's speech. Piaget classifies all the child's conversation as either egocentric or social speech. When he speaks of egocentric speech, Piaget is concerned with a speech form that is distinguished primarily by its function. Piaget writes that "this talk is egocentric partly because the child speaks only about himself, but chiefly because he does not attempt to place himself at the point of view of his hearer (1932, p. 9)." The child is not interested in whether anyone is listening to him; he does not expect an answer; he does not wish to influence his partner or to inform him of something. This is monologue, reminiscent of monologue in drama. Its essence can be expressed in a single formula: "The child talks to himself as though he were thinking aloud. He does not address anyone (1932, p. 9)." When he is occupied with something, the child accompanies his action with a variety of utterances. It is this verbal accompaniment of activity that Piaget designates with the term "egocentric speech." The child's socialized speech has an entirely different function. In this speech, the child actually exchanges thoughts with others; he requests, orders, threatens, informs, criticises, or asks questions.

In his careful clinical isolation and description of the child's egocentric speech, in his extensive survey of the phenomenon, and in his efforts to trace its fate, Piaget has unquestionably performed a valuable service. In the egocentric nature of the child's speech, Piaget sees the first, basic, and most direct proof of egocentrism in the child's thought. His survey of the phenomenon demonstrated that the coefficient of egocentric speech was extremely high with young children. Before the age of 6 or 7, more than half of the child's utterances were egocentric. Concluding his discussion of his

first study, Piaget writes that "if it be granted that the first three categories of child language as we have laid them down are egocentric, then the thought of the six-and-a-half year old child in its spoken manifestation is egocentric in the proportion of 44 to 47% (1932, p. 48)." However, this figure increases significantly for the younger child (and indeed even for the 6 or 7 year old) if we consider the fact that egocentric thinking is manifested not only in the child's egocentric speech but in his socialized speech as well.

In the simplest terms, Piaget contends that while the adult tends to think in a socialized manner even when he is alone, the child of under 7 years of age thinks and speaks egocentrically even when he is in a social context. If we also remember that along with the thoughts the child expresses in speech he has a large quantity of egocentric thoughts that remain unexpressed, it is clear that the coefficient of egocentric thinking exceeds the coefficient of egocentric speech by a substantial margin.

> In the first place (L.T., Chap. I), after making verbatim reports at the *Maison des Petits* (attached to the *Institute J. J. Rousseau* at Geneva) of the language of several children over a period of about one month each, we discovered that between the ages of 5-7, 44-47 percent of their spontaneous remarks were still egocentric, although these children were free to work, play, and talk exactly as they chose. Between the ages of 3 and 5, the proportions were 54-60 percent....The chief function of this egocentric language is, therefore, to serve as an accompaniment to the thought or action of the individual. We have here something of a remnant of that 'cry accompanying action,' that Janet has spoken of in his studies on language. At any rate, we are very far removed from any genuine interchange of ideas. This characteristic of a large portion of childish talk points to a certain egocentrism of thought itself, the more so as in addition to the words with which he marks the rhythm of his own action, there must be an enormous number of thoughts that the child keeps to himself, because he is unable to express them. And these thoughts are inexpressible precisely because they lack the means which are fostered only by the desire to communicate with others, and to enter into their point of view (1928, p. 206).

According to Piaget, then, the coefficient of egocentric thought significantly exceeds the coefficient of egocentric speech. Nevertheless, the child's egocentric speech provides the basic empirical evidence for the whole conception of the child's egocentrism.

In summarizing his first study, the study in which he isolated the phenomenon of egocentric speech, Piaget posed the following question: "What are the conclusions we can draw from these facts? It would seem that up to a certain age we may safely admit that children think and act more egocentrically than adults, that they share each other's intellectual life less than we do (1932, p. 38)." In Piaget's view, there are two reasons for this.

> It is due, in the first place, to the absence of any sustained social intercourse between the children of less than 7 or 8, and in the second place to the fact that the language used in the fundamental activity of the child - play - is one of gestures, movement and mimicry as much as of words (1932, p. 40).

He continues: "There is, as we have said, no real social life between children of less than 7 or 8 years (1932, p. 40)."

Piaget's observations of social life in a children's home in Geneva indicate that only between 7 and 8 years of age do children manifest the need to work together. Piaget writes:

> Now it is in our opinion that it is just at this age that egocentric talk loses some of its importance (1932, p. 41)....If language in the child of about six-and-a-half is still so far from being socialized, and if the part played in it by the egocentric forms is so considerable in comparison to information and dialogue etc., the reason for this lies in the fact that childish language includes two distinct varieties, one made up of gestures, movements, mimicry etc., which accompany or even completely supplant the use of words, and the other consisting solely of the spoken word (1932, p. 42).

It was on the foundation of this research, on the foundation of his findings of the predominance of egocentric speech in early childhood, that Piaget constructed his basic working hypothesis, the hypotheses that the child's egocentric thought can be viewed as a transitional form in the development from autistic to realistic thinking.

The fact that Piaget's theory is based on his observations of egocentric speech is critical to any understanding of the internal structure of his theoretical system, to any understanding of the logical dependencies and interconnections among its components. The centrality of the findings on egocentric speech was dictated not by technical considerations concerning the composition of the material or by considerations of consistency in presentation. The centrality of these findings is fundamental to the internal logic of the entire system. The direct link between the empirical observations of egocentric speech in childhood and Piaget's hypothesis of childhood egocentrism is fundamental. Thus, if we want to understand the foundation of the theory we must consider its empirical premise, the concept of egocentric speech in childhood.

In this chapter, we are not interested in Piaget's studies as such. We cannot outline all the studies discussed in Piaget's books, not even the most important of them. Ours is a different task. Our goal is to attain a unified perspective on the entire system, to identify and critically interpret the threads (threads that are not always immediately apparent) that link these separate studies in a unified theoretical whole. Our goal is to identify the philosophy that underlies Piaget's research.

With respect to the empirical foundations of this philosophy and the importance of the concept of egocentric speech in binding the whole system together, we must give special, careful consideration to Piaget's concept of egocentric speech. This implies an empirical analysis, an analysis focusing on clinical and experimental research.

4

Leaving issues of fact aside for the moment, the basic outline of Piaget's theory of egocentric speech is sufficiently clear. It is his contention that the majority of the young child's speech is egocentric. It is not a means of social interaction. It does not have a communicative function. It provides a rhythm for the child's activity and experience, accompanying it in the sense that an accompaniment is provided for a basic melody in music. Egocentric speech contributes nothing essential to the child's activity or experience, any more than the course or structure of a basic melody is influenced by its accompaniment. There is agreement but no internal connection.

For Piaget, the child's egocentric speech is an accessory of the activity, a reflection of the egocentric nature of the child's thinking. The highest law for the child is play. His thinking is primarily an illusory imagination, a form of imagination expressed in egocentric speech.

Thus, the first postulate of Piaget's views on egocentric speech is that it has no necessary, objective, or useful function in the child's behavior. This concept will play an important role in our analysis of Piaget's work. For Piaget, egocentric speech is

speech for itself, for the sake of its own satisfaction. It is speech that cannot and does not change anything significant in the child's activity. Egocentric speech is completely subordinated to egocentric motives and nearly incomprehensible to others. It is the child's verbal dream, a product of his mind that stands closer to the logic of dream and fantasy than to the logic of realistic thinking.

The second postulate of Piaget's theory of egocentric speech is a direct extension of his perspective on its function. If egocentric speech is the expression of the child's "dream thought," if he does not need it because it has no function in his behavior, it is natural enough to see it as a mere symptom of the weakness or immaturity of his thinking. It is also natural to expect that this symptom with disappear in the course of the child's development. Functionally useless and having no direct links to the child's structural reality, this accompaniment will gradually become more and more restricted, though not disappearing entirely from the child's practice.

Piaget's empirical studies do in fact demonstrate that the coefficient of egocentric speech decreases as the child's age increases. In the seventh or eighth year, this coefficient approaches zero, reflecting the fact that egocentric speech is not characteristic of the school-age child. Piaget does not assume that the disappearance of egocentric speech is associated with the complete disappearance of egocentrism as a critical factor in the child's thinking. In his view, egocentrism is displaced; it moves to another level and begins to govern abstract verbal thinking, manifesting itself in symptoms that are not directly comparable to the younger child's egocentric utterances. In accordance with the idea that the child's egocentric speech has no function, Piaget maintains that it simply evaporates, that it simply disappears from the behavior of the school-age child. This issue of the function and fate of egocentric speech constitutes the vital nerve of Piaget's entire perspective on this phenomenon.

We have conducted our own empirical studies of the fate and function of egocentric speech in early childhood.* These studies led to several important insights concerning the nature of egocentric speech and to a general understanding of the phenomenon that differs somewhat from Piaget's. We will not present a detailed outline of the procedures, content, or results of this research in the present context. That has been done elsewhere and this research is not our primary concern here. We will consider only that which is significant in the context of this discussion of Piaget's perspectives on egocentric speech.

First, in contrast to Piaget, our studies indicate that egocentric speech begins to play a unique and important role in the child's activity at a very early age. Our experiments were similar to those conducted by Piaget. In them, we attempted to identify what it is that elicits egocentric speech in the child, to clarify what gives rise to it. With this in mind, we organized the behavior of the child in a manner nearly identical to that characteristic of Piaget's studies. The essential difference was that we introduced several factors that tended to increase the difficulty of the child's task. For example, in a unrestricted drawing task, we introduced an impediment or obstacle to the child's activity. The task was arranged such that the child did not have the colored pencil, paper, or paint that he needed. In short, we introduced some form of disturbance or difficulty into the child's activity.

These studies demonstrated that the coefficient of egocentric speech nearly doubled when some difficulty or impediment was included in the task. This was true whether we compared these finding with the coefficients of egocentric speech identified by Piaget or with coefficients derived from the performance of the children in our

* This work was conducted in close cooperation with A. R. Luria[14], A.N. Leont'ev[15], R.E. Levina[16], and others. See a short outline in the papers of the IX International Congress of Psychology in New York (1929).

own studies in situations with no experimentally induced difficulties or impediments. Our children showed an increase in average levels of egocentric speech in any situation where some difficulty was encountered. When the child encountered a problem, he attempted to assess the situation: "Where is the pencil? I need a blue pencil now. Nothing. Instead of that I will color it red and put water on it -- that will make it darker and more like blue." The child conducted this entire discourse with himself.

In those cases where we introduced no experimental impediment, we found a coefficient of egocentric speech that was actually somewhat lower than what Piaget found. It would seem, then, that difficulties or impediments appearing in otherwise undisturbed activity can be a major factor in the production of egocentric speech.

The reader of Piaget's works will see that these data can be fruitfully considered in connection with two thoughts or theoretical positions frequently developed by Piaget in his work. The first is the law of conscious reflection, initially formulated by Claparede. This law states that difficulties or impediments encountered in automatic activity lead to conscious reflection on that activity. The second is the claim that the appearance of speech signifies this process of conscious reflection. We see something like this happening in the behavior of the children in our studies. Egocentric speech is the attempt to make sense of the situation in words, to find a solution to a problem or plan the next action. It emerges in response to the more complex situation.

Older children acted somewhat differently. They looked over the situation, thought (as evidenced by long pauses), and then found the solution. When asked what they had thought about, these older children gave answers that indicated a similarity between their covert behavior and the overt verbal thinking of the preschooler. Our assumption, then, is that the same operations that the preschooler carries out in overt speech are carried out by the school-age child in soundless, inner speech. We will return to this issue later.

It is apparent, then, that besides the purely expressive function of egocentric speech, besides its function as a form of discharge or accompaniment of the child's activity, it can become a means of thinking in the true sense of the term. It functions in the formation of a plan for solving the task that is encountered in behavior. Consider, for example, the following episode. In one of our experiments, a child of five-and-a-half was drawing a picture of a tram. While drawing a line that would represent a wheel, the child put too much pressure on the pencil and the lead broke. The child attempted, nonetheless, to complete the circle by pressing the pencil to the paper. But nothing appeared on the paper other than the imprint of the broken pencil. As if to himself, the child quietly said, "Broken." Laying the pencil aside, he took a paintbrush and began to draw a broken tram car that was in the process of being repaired after an accident, continuing to talk to himself from time to time about the new subject of his drawing. This egocentric utterance is clearly linked to the whole course of the child's activity. It constitutes a turning point in his drawing and clearly indicates his conscious reflection on the situation and its attendant difficulties. It is so clearly fused with the normal process of thinking that it is impossible to view it as a simple accompaniment of that thinking.

We do not want to suggest that this is the only function of the child's egocentric speech nor that this intellectual function arises suddenly. In our experiments, we were able to trace in some detail extremely complex structural changes in egocentric speech and changes in the relationship between egocentric speech and the child's activity.

In the egocentric utterances that accompanied the child's practical activity, we were able to observe how the child mirrored or focused on the major transition points or the final results of his practical activity. In accordance with the degree of the development of the child's activity, we were able to observe how egocentric speech initially

occurs toward the middle of the action and subsequently begins to occur toward the beginning, where it assumes a planning and directing function. We were able to observe how the word (which expresses the sum of the action) is interwoven with the action itself; how, as a result, the most important structural features of the practical intellectual operation are imprinted and reflected in it, and; how it guides and directs the child's action from the outset, subordinating it to intention and plan and raising it to the level of a unique form of activity.

What happens here is reminiscent of the empirical observations made some time ago on the changes that occur in the relationship of word and illustration in the early drawing of the child. Taking a pencil in his hand for the first time, the child begins to draw and only later names the product of his drawing. Gradually, in accordance with the level of the development of his activity, naming the drawing moves first toward the mid-point and eventually to the beginning of the action. At this point, it begins to define the whole action and the purpose that it realizes. Something similar occurs with the child's egocentric speech. We are inclined to see the change in the function of naming that has been observed in the development of the child's drawing as a particular case of this more general law.

Our task in the present context, however, is not to further define the importance of this particular function of egocentric speech vis-a-vis its other functions nor consider the structural and functional changes that occur in egocentric speech in the course of the child's development. These issues will be addressed elsewhere. Of interest to us here is a fundamentally different question, the question of the function and fate of egocentric speech. Our interpretation of the fact that egocentric speech disappears in the school-age child is dependent on our analysis of its function. It is extremely difficult to address the roots of this question experimentally. The data that we gather in the experiment can serve only indirectly as a foundation for building our hypothesis that egocentric speech is a transitional stage in the development of speech from external to inner.

Piaget, of course, does not provide us with a foundation for this concept. He does not indicate that egocentric speech should be considered a transitional stage of this kind. On the contrary, it is Piaget's view that the fate of egocentric speech is to atrophy. In Piaget's work, the question of the development of the child's inner speech remains the least clarified of all issues concerning the child's speech. In fact, one gets the impression that inner speech -- understood as speech that is psychologically inner and that functions in a manner analogous to external egocentric speech -- precedes external or socialized speech.

Though from a genetic perspective this position may be ludicrous, Piaget must reach precisely this kind of conclusion if he consistently develops his thesis that socialized speech arises after egocentric speech, that socialized speech asserts itself only after egocentric speech has atrophied.

However, in spite of Piaget's theoretical views, there is a good deal of empirical data in his research (as there is in our own) which support our assumption concerning the function and fate of egocentric speech. Of course, at this point, this assumption is only an hypothesis. However, this hypothesis is more consistent with what we know of the development of the child's speech than is Piaget's.

One only need compare the quantity of egocentric speech in the child and adult to realize that the egocentric speech of the latter is much richer. In functional terms, what we think silently is egocentric rather than social speech. As Watson[17] would say, it is speech that serves individual rather than social adaptation. Thus, the first similarity between the adult's inner speech and the preschooler's egocentric speech is functional. Both are speech for oneself. They are divorced from social speech which func-

tions to inform, to link the individual with others. One need only consider psychological experiments such as those carried out by Watson where the individual is asked to solve some intellectual task while verbalizing and displaying his inner speech to see the profound similarity between the adult's overt verbal thinking and the child's egocentric speech.

The second similarity between the inner speech of the adult and the egocentric speech of the child is structural. Piaget demonstrated that an important characteristic of egocentric speech is that others cannot understand it if it is divorced from the concrete action or situation in which it emerges; if, for example, it is recorded as an experimental protocol. Egocentric speech is comprehensible only to oneself. It is condensed, having a marked tendency to omit or abbreviate what is before the eyes. As a result, it undergoes complex structural transformations.

It is not difficult to demonstrate the similarity between these structural changes and those that are basic to inner speech. The tendency for abbreviation, in particular, is fundamental to both. This suggests that the rapid disappearance of egocentric speech that Piaget observed in school-age children reflects not the atrophy of egocentric speech but its transformation into inner speech, its movement to the inner sphere. To these theoretical considerations, we would add another based on our experimental research. Specifically, in contexts where we observe egocentric speech in the preschooler we tend to see evidence of silent contemplation or processes of inner speech in the school-age child. This research indicates that a critical comparison of identical experimental situations involving subjects at the age where egocentric speech is being transformed will establish that the processes of silent contemplation or thinking are functionally equivalent to the processes of egocentric speech. If further research does provide some justification for this proposition, we could then conclude that the processes of inner speech develop and form in the early school years. This would help explain the rapid drop in the coefficient of egocentric speech that is so characteristic of this period.

Observations of inner speech in school-age children by Lemaitre and others provide some support for this perspective. These observations indicate that the inner speech of the school-age child is more labile and less firmly established than the adult's. This would suggest that we are dealing with a new and insufficiently formed or defined process.

To summarize, the general conclusion of our empirical investigation is that whether we are referring to the function or the fate of egocentric speech we find little empirical support for Piaget's position that the child's egocentric speech is a direct or simple expression of the egocentric nature of his thought.

What we have had to say in this connection, however, does not have any direct implications for the issue of whether children think and act more egocentrically than adults before the age of six to seven years of age. The phenomenon of egocentric speech, as we conceptualize it, cannot provide support for an argument concerning levels of egocentric thought. The intellectual function of egocentric speech, which appears to be directly linked with the development of inner speech and its functional characteristics, is not a direct reflection of egocentrism in the child's thought. On the contrary, it demonstrates that under appropriate conditions egocentric speech can be utilized as a means of realistic thinking at a very early age.

Once again, Piaget's basic conclusion -- the conclusion which allows him to move from the presence of egocentric speech in childhood to the hypothesis of the egocentric nature of the child's thinking -- fails to be supported by the empirical data. Piaget makes the assumption that if the child's speech at six-and-a-half years is 44-47 percent egocentric, his thinking must also be egocentric at least to this extent. But our experi-

ments indicate that there may be no necessary link between egocentric speech and the egocentric character of thought.

This is the major implication of our empirical studies in this domain for the present discussion. We are faced with an indisputable, experimentally established fact that will retain its force whether the hypothesis that we attach to it is well founded or not. To repeat, then, it may be that the child's egocentric speech is not the expression of egocentric thinking. Egocentric speech may, in fact, function as a component of realistic thinking. Egocentric speech may be fused not with the logic of dream or fantasy but with the logic of rational, goal-directed action and thinking.

Thus, we find no support in our critical analysis of the experimental data for any direct link between the presence of egocentric speech in the child and the hypothesis of the child's egocentric thinking that has be derived from it. This is our major point. However, with the severing of this link between egocentric speech and egocentric thinking, the empirical foundation for the conception of childhood egocentrism is lost. In the previous section, we attempted to demonstrate that this conception lacks any foundation in a general theory of the development of thinking.

Throughout his work, and particularly in his summary, Piaget points out that his theory of the egocentric character of the child's thought is based not only on the study we have considered here, but on three separate studies. As we have pointed out, however, this first study of egocentric speech is the most basic and direct of all the empirical demonstrations offered by Piaget. It was this study that allowed him to move directly from research results to the formulation of his major hypothesis. The other two studies functioned primarily to verify the first. They served more as means of extending the force of proof inherent in it than as new empirical foundations for Piaget's central conception. In the second study, it was shown that egocentric forms of speech can be found even in the socialized aspects of the child's language. The third, as Piaget himself was aware, served primarily as a means of substantiating the previous two and permitting a more precise identification of the source of the child's egocentrism.

Of course, these two studies must be carefully followed up in future research concerned with the problems that Piaget's theory has attempted to address. But given the goal of our present chapter, we are forced to postpone this effort, since these studies introduce nothing fundamentally new to the structure of reasoning and proof offered by Piaget in developing his theory of childhood egocentrism.

5

We must now consider the more important positive conclusions that can be derived from our experimental critique of this first of Piaget's three studies. These conclusions are not without some significance for a correct evaluation of Piaget's theory. They will return us once again to a theoretical consideration of the problem and to several of the ideas we mentioned earlier but did not have the opportunity to formulate fully.

Our decision to discuss some of our own modest empirical research efforts and to formulate an hypothesis based on our findings was motivated not only by our concern with severing the link between the empirical foundations and theoretical conclusions that constitute Piaget's theory of childhood egocentrism, but by our conviction that these studies would allow us to develop a more useful approach to the study of the development of the child's thinking. We were convinced that these studies would allow us to identify the basic tendencies and relationships in the development of the child's thinking and speech.

In Piaget's view, the development of the child's thinking moves from autism to socialized speech, from illusory imagination to logical relations. As Piaget would express it, he strives to observe the process through which the psychological substance of the child assimilates (i.e., deforms) the social influences originating in the speech and thinking of the adults who interact with him. For Piaget, the history of the child's thought is a history of a gradual socialization of the profoundly intimate, inner, personal, and autistic characteristics that define the child's mind. Social [thought] lies at the end of the developmental process. Even social speech is said to emerge later than egocentric forms of speech. Our hypothesis suggests that the development of the child's thinking has a fundamentally different organization. As we have said, it is our view that Piaget's perspective presents the most important genetic relationships in this developmental process. He presents them in distorted form however. Although we have offered comparatively little empirical data in support of our position, the preponderance of what we know of the still inadequately studied development of the child's speech seems to support our general position.

To facilitate clarity and continuity of thought, we will begin with a discussion of the hypothesis we developed earlier. If we are not mistaken, Piaget has incorrectly represented the developmental process which leads to the point where the researcher observes flourishing egocentric speech in the child. In fact, in a certain sense, the process that leads to the emergence of egocentric speech is the mirror image of that suggested by Piaget. If for the moment we can limit our analysis to that segment of the developmental process which begins with the overt appearance of egocentric speech and ends with its atrophy, we will be able to assess the validity of our perspective in terms of our general knowledge of the developmental process. In other words, we will be able to evaluate our perspective on this limited segment of the process once we have placed it in the context of what is known of the laws that govern the whole course of development. This will constitute our method of verification.

Our first task, then, will be to outline the developmental process as it relates to the limited portion of that process that is of particular interest to us. Our hypothesis obligates us to represent the overall process of development in the following way. The initial function of speech is social, that of social interaction or social linkage. Speech effects those in the immediate environment and may be initiated by either the adult or the child. The first form of speech in the child, then, is purely social. The notion that speech is socialized is incorrect in that this implies that speech was originally non-social, that it becomes social only through development and change.

The social speech of the child is a phenomenon with multiple functions, a phenomenon that develops in accordance with the law of functional differentiation. It is only after an initial stage where the child's speech is a purely social phenomenon, only in subsequent growth and development, that we begin to see a sharp differentiation of social speech into egocentric and communicative speech. We prefer the term "communicative" rather than "socialized" speech partly because of the considerations discussed above. In addition, our hypothesis indicates that egocentric and communicative speech are equally social; they simply have different functions. In accordance with this hypothesis, egocentric speech develops in a social process that involves the transmission of social forms of behavior to the child. Egocentric speech develops through a movement of social forms of collaboration into the sphere of individual mental functions.

Piaget is very familiar with the child's tendency to apply what were previously social forms of behavior to himself. For example, he used this concept in explaining the development of the child's reflective thinking in social argumentation. Piaget demonstrated that reflective thinking appears in the child only after argument appears in the

child's social collective, that reflective thinking develops only when -- in argument and discussion -- the child encounters the functional characteristics which provide its beginnings. In our view, something similar happens when the child begins to converse with himself as he previously conversed with others, when, speaking to himself, he begins to think aloud in situations that require it.

It is on the basis of this egocentric speech, a form of speech derived directly from social speech, that the child's inner speech begins to develop. And it should be emphasized, that the phenomenon of inner speech is fundamental to both autistic and logical forms of thinking. It is our view, then, that the most important point in the transition from external to inner speech is the egocentric speech of the child as described by Piaget. Though not himself aware of it, a careful analysis of Piaget's empirical data indicates that he has provided a graphic demonstration of how external speech is transformed into inner speech.

Piaget showed that egocentric speech is inner in its mental function but external in its physiological nature. In this sense, speech becomes mentally "inner" earlier than physically "inner." This allows us to clarify the dynamics involved in the formation of inner speech. Briefly, the process occurs through a differentiation of speech functions. It involves the isolation of egocentric speech from social speech through a gradual process of abbreviation and the subsequent transformation of egocentric speech into inner speech.

Egocentric speech is a form critical to the transition from external to inner speech. This is why it is of such tremendous theoretical interest. Our entire scheme can be represented in the following way:

social speech - egocentric speech - inner speech

This scheme can be usefully contrasted with that assumed by the traditional theory of inner speech development and with that inherent in Piaget's proposals. Traditional theory assumed the following sequence:

external speech - whispered speech - inner speech

Piaget's scheme assumes a different sequence, one related to the development of logical verbal thinking:

inner autistic thinking
|
egocentric speech
and egocentric thinking
|
socialized speech and logical thinking

We include the traditional schema here to demonstrate that despite the great differences between its empirical content and the content of Piaget's schema, the two are methodologically similar. Watson assumes that the transition from external speech to inner speech requires an intervening stage such as whispered speech. In the same way, Piaget identifies the egocentric stage of speech and thinking as the transitional stage in the development from autistic to logical forms of thinking.

One and the same point in the development of the child's thinking, that is, the phenomenon of egocentric speech, is placed in entirely different developmental sequences by Piaget and ourselves. For Piaget, egocentric speech acts as a transitional

stage in the development from autism to logic, in the development from the intimately individual to the social. For us, egocentric speech acts as a transitional form in the movement from external to inner speech, in the movement from social to individual speech. We would include autistic verbal thought as an aspect of the latter.

Thus, our perspective on the developmental process is very different from Piaget's. This is a consequence of the difference in our understanding of the phenomenon of egocentric speech because it is on this basis that we proceed to reconstruct the whole.

Our discussion, then, brings us to a single basic question: What course does the development of the child's thinking take? Does it move from autism, illusory imagination, or the logic of the dream to socialized speech and logical thinking, passing through the stage of egocentric speech at a critical point in the process? Or does the process take the opposite course, beginning with the child's social speech and moving through egocentric speech to inner speech and thinking, with both autistic and logical forms of thinking included in the latter?

When we express the question in this way, it immediately becomes apparent that we have returned to the same question that we attempted to address earlier from a theoretical perspective. At that point, we were concerned with the theoretical value of Piaget's argument that autistic thinking is the initial stage in the development of thought.

Having now come full circle in our consideration of the empirical foundation for the idea that autistic thinking is the initial stage in the development of thought, we have been brought to the same conclusion. This conception does not correctly represent the basic dynamics of the developmental process nor does it properly represent the prospects for development.

The actual movement in the development of the child's thinking occurs not from the individual to some state of socialization but from the social to the individual. This was the basic conclusion of our theoretical discussion. It is also the basic conclusion of our empirical work.

6

It might be useful, at this point, to summarize what has become a somewhat extended analysis of Piaget's conception of childhood egocentrism. We first attempted to show that, whether we consider this conception from a phylogenetic or ontogenetic perspective, we find at its very foundation the false assumption that there is a kind of genetic polarity between autistic and realistic forms of thought. In particular, we attempted to develop the idea that, from the biological point of view, it is untenable to hold that autistic thinking is initial and primary in the history of mental development.

We then attempted to analyze the empirical foundations of the claim that egocentric speech is the direct reflection or manifestation of the child's egocentric thought. Based on our analysis of the child's speech, we were forced to conclude that this perspective does not seem to be empirically confirmed, whether we consider functional or structural issues. We also found that the link Piaget assumes between egocentrism in thought and the phenomenon of "speech for oneself" is neither a constant, necessary, nor defining characteristic of the child's speech.

Finally, we attempted to show that the child's egocentric speech is not a simple by-product of his activity, that it is not simply an external manifestation of an inner egocentrism which atrophies at seven or eight years of age. On the contrary, it appears that egocentric speech is a transitional stage in the developmental process through

which speech moves from the external to the inner plane. Thus, the empirical foundation of Piaget's general conception is shaken and the conception as a whole falls with it.

At this point, we must attempt to state our findings in more general terms. Our first and basic position -- the central idea of our entire critique -- is that Piaget and the psychoanalysts have framed the problem incorrectly. We cannot place the satisfaction of needs and the process of adaptation to external reality in opposition to one another. We cannot ask: "What is the motive force of the child's thinking? Is it a striving to satisfy inner needs or a striving to adapt to objective reality?" Considered from the perspective of developmental theory, the very concept of needs includes the idea that these needs must be satisfied through some adaptation to reality. In our view, Bleuler has demonstrated that the infant's needs are satisfied not when he hallucinates about pleasure or satisfaction but when he actually receives food. In the same sense, the older child's preference for the real over the imaginary apple indicates that his thinking and activity are propelled by his needs, not that he has forgotten his needs for the sake of adaptation or accommodation to external reality.

The fact is that adaptation to objective reality simply for the sake of adaptation, adaptation independent of the needs of the organism or personality, simply does not occur. All adaptation is directed by needs. This is a rather banal notion, even a truism, but it has somehow been overlooked in the development of the theoretical perspectives that we have considered here.

If the basic needs for food, warmth, and movement are the motive and directive forces that define the whole of the organism's adaptation to reality, the inherent meaninglessness of the practice of opposing one form of thinking which functions to satisfy inner needs with another which functions to adapt the organism to reality becomes apparent. Need and adaptation must be considered in their unity. In developed forms of autistic thinking, one can observe an isolation from reality that strives to obtain in imagination a satisfaction of needs which have not been satisfied in life. But this phenomenon is the product of a late development. The development of autistic thinking requires the development of realistic thinking, in particular, the development of the capacity to think in concepts. When Piaget borrows Freud's concept that the pleasure principle precedes the reality principle (Piaget, 1928, p. 202), he adopts the whole metaphysic associated with the concept of the pleasure principle. Here the principle is transformed from an auxiliary or biologically subordinant characteristic into a kind of independent vital force, into the prime mover of the whole process of mental development. Piaget writes that:

> It is one of the merits of psychoanalysis to have shown that autism knows of no adaptation to reality, because pleasure is its only spring of action. Thus the sole function of autistic thought is to give immediate and unlimited satisfaction to desires and interests by deforming reality so as to adapt it to the ego (1928, p. 244).

Having divorced satisfaction and needs from the process of adaptation to reality, having given satisfaction and needs the status of an independent metaphysical beginning, Piaget is forced by logical necessity to represent realistic thinking as a phenomenon completely severed from the real needs, interests, and wishes of the organism, that is, as *pure thought*. But thought of this kind does not exist in nature. Needs do not exist independently of adaptation. That is why one cannot sever needs from the process of adaptation or oppose the organism's needs to this process. In the child, there exists no form of thinking that operates for the sake of pure truth, no form of thinking divorced from the earth, from needs, wishes, and interests.

In distinguishing autistic from realistic thought, Piaget writes that "it tends not to establish truths, but to satisfy desires (1932, p. 43)." But do wishes really exist that consistently exclude reality? Is there really a form of thought that is absolutely independent of practical needs, a form of thought that would strive toward the establishment of truth for the sake of truth itself? Remember, we are concerned here with the thought of the child. Only empty abstractions devoid of any real content, only logical functions or metaphysical hypostases can be differentiated in this manner. The actual, vital process of the child's thinking cannot.

In comments on the Aristotelian critique of the Pythagorean theory of numbers and the Platonic theory of ideas existing in isolation from sensual things, Lenin said the following:

> In essential idealism: the general (the concept or the idea) is a *distinct entity*. This seems a wild, foreign, or, more accurately, a childish absurdity. But isn't the contemporary idealism of Kant, Hegel, and the idea of god really *entirely* of the same type? Tables, chairs, and the *idea* of the table and the chair; the world and the idea of the world (god); the thing and "numen," the unknowable "thing in itself"; the connection of earth and sun, of nature in general and law, (Logos), god. The bifurcation of man's knowledge and the *potential* for idealism (=religion) is already *given* in **the first, elementary** abstraction....
>
> The approach of the mind (of man) to the isolated thing, the removal of a copy (=concept) from it, *is not* a simple, immediate, mirroring act. It is a complex, bifurcated, zigzagging process that *includes in itself* the potential for a flight of fantasy from life; it includes a potential for the *transformation* (and this a transformation unnoticed by man, unconscious) of the abstract concept, the idea into a *fantasy* (*in letzter Instanz* = God). For even in the simplest abstraction, the most elementary general idea (the "table" in general) there *is* a certain element of **fantasy** (vol. 29, pp. 329-330).

One cannot more clearly or profoundly express the idea that -- in the process of their development -- imagination and thinking are opposites whose unity is inherent in the very first generalization, in the very first concept that people form.

This identification of the unity of opposites and of their bifurcation -- of the zigzagging development of thinking and fantasy that is reflected in the fact that any abstraction is at one and the same time a flight from life and a more profound and accurate reflection of life -- creates a real potential for studying realistic and autistic thinking. Taking this approach, it becomes clear that we cannot place autism at the beginning of the development of thought in the child. Autism is a later formation. It becomes polarized as one of the opposites that are included in the development of thought.

In our experiments, we were able to isolate one other important factor new to the general problem with which we are concerned. We saw that the child's egocentric speech is not divorced from reality, activity, or adaptation. It is not speech that is "hanging in air." We saw that this speech constitutes a necessary feature of the child's rational activity. It is intellectualized, occupying the mind in the first goal-directed actions. We saw that in the child's more complex activity it begins to serve as a means for forming intentions and plans. Activity and practice -- these are the new concepts that have allowed us to consider the function of egocentric speech from a new perspective, to consider it in its completeness. They have enabled us to identify new factors in the development of the child's thinking, factors which -- like the other side of the moon -- have generally remained outside the observer's field of vision.

Piaget argues that things do not influence the mind of the child. But we have seen that where the child's egocentric speech is linked to his practical activity, where it is linked to his thinking, things really do operate on his mind and influence it. By the word "things," we mean reality. However, what we have in mind is not reality as it is passively reflected in perception or abstractly cognized. We mean reality as it is encountered in practice. This new concept, this problem of reality and practice and their role in the development of the child's thinking, fundamentally changes the whole picture. But we will return to this issue later in our analysis and methodological critique of the basic characteristics of Piaget's theory.

7

If we turn now to contemporary psychology in general -- and child psychology in particular -- a tendency fundamental to all current psychology becomes apparent. This tendency was expressed beautifully by a subject in one of Ach's[18] experiments who spontaneously offered his impression of the contemporary psychological experiment. To the experimenter's delight, the subject said: "You know, this is experimental philosophy."

The movement of research toward philosophical problems permeates the whole of contemporary psychology. Attempts are made in empirical psychological research to address issues of direct and fundamental significance to philosophy. Correspondingly, this research has become dependent on philosophical perspectives for its approach to the statement and resolution of problems.

We will not take the time here to illustrate this situation. We note only that Piaget's research constantly moves along this boundary between the philosophical and the psychological. Piaget himself has said that the logic of the child is a field of such infinite complexity that at every step one runs up against submerged reefs, against problems of logical and (even more frequently) epistemological theory. In this maze, the task of preserving clear direction and avoiding problems that are foreign to psychology itself is not always easy.

In Piaget's view, the greatest dangers are those of making premature generalizations of experimental results or finding oneself under the power of preconceived notions, under the power of prejudicial logical systems. As we have pointed out, Piaget therefore resists giving an excessively systematic account of his experiments and findings. Even more vigorously, he resists generalizations that would take him beyond the boundaries of the field of child psychology. His intention is to limit himself exclusively to the analysis of facts and to resist extending these facts into philosophical domains. However, Piaget must recognize that logic, the history of philosophy, and epistemological theory are fields with inherent links to the study of the development of logic in the child. Willingly or unwillingly, he touches on a whole series of problems from these complex fields. With surprising consistency, every time he approaches the boundaries of these philosophical fields, they tear at the very fabric of his thought.

In his preface to, *The Language and Thought of the Child*, Claparede notes that the author happily combines in himself a born biologist-naturalist, one who has abandoned his hunt for mollusks in a search for psychological facts, a man possessing the capacity to force his material to speak, or more properly, a man with the capacity to hear what it is saying, and a scholar among the best informed on philosophical issues.

> He knows every nook and cranny and is familiar with every pitfall of the old logic -- the logic of the textbooks; he shares the hopes of the new logic, and is acquainted with the delicate problems of epistemology. But this thor-

> ough mastery of other spheres of knowledge, far from luring him into doubtful speculation, has on the contrary enabled him to draw the line very clearly between psychology and philosophy, and to remain rigorously on the side of the first. His work is purely scientific (1932, pp. xv-xvi).

We cannot agree with this last proposition. We will try to show that Piaget did not succeed in avoiding philosophical constructions. Indeed, by the nature of things, he could not have succeeded. The absence of a philosophy is itself a very definite philosophy. Piaget's research is characterized by the attempt to remain entirely within the bounds of pure empiricism. His fear of attaching himself to any preconceived philosophical system is itself a symptom of a definite philosophical world-view, a world-view which we will attempt to outline. We have discussed Piaget's conception of childhood egocentrism, a conception that he constructed on the foundation of his theory of egocentric speech and to which he reduced all characteristics of the child's logic. This discussion led us to conclude that Piaget's basic conception is theoretically and empirically unfounded. It led us to conclude that his theory distorts the process of the child's development.

We cannot discuss all the consequences of childhood egocentrism in the present chapter. This would force us to consider each phase of Piaget's research in turn, repeating his themes from a different perspective. This would transform this chapter into an entirely different work. This is not our task. Our goal is to facilitate the reader's critical mastery of the extremely rich material and the basic generalizations contained in Piaget's books. This requires that we focus on Piaget's research from a methodological perspective and that we attempt a critical assessment of it.

We can begin with what is for Piaget a central and basic problem, that of causality. The problem of causality is definitive for the logic of Piaget's scientific thinking. Piaget concludes his work, *The Judgement and Reasoning of the Child*, with a concise and expressive chapter on the problem of precausality. Piaget ultimately concludes that the concept of causality is foreign to the child. Those stages where the child's thinking is focused on this problem might best be called stages of precausality. The problem of causality assumed such a prominent position in Piaget's general theoretical framework that he devoted a special, fourth volume to the concept of physical causality in the child. Once again, this new social research led Piaget to the conclusion that causality, in the true sense of the word, is not present in the child's representation of the world, in his explanation of movement, in his understanding of machines, or in any other aspect of his thinking about external reality.

Nonetheless, strange as it seems, Piaget himself consciously strives to keep his thought at the stage of precausality in this sense. He notes that there exists a parallel in this respect between the child and scientific tradition (1928, p. 197). Of course, Piaget views his rejection of causality as an indication of a supra-causal stage in the development of thought, as an expression of a form of scientific thinking that has passed the stage at which the concept of causality is utilized. The fact remains, however, that whatever his intentions, anyone who rejects the concept of causality has reverted to the precausal stage that Piaget has so well described in his analysis of the thinking of the child.

What is it that Piaget offers as an alternative to the principle of causality? Piaget relies on genetic rather than causal analysis. The principle of causality is exchanged for the higher principle of development.

> But what do we mean by explaining psychological phenomena? As Baldwin[19] has shown in his subtle analyses, without the genetic method in psychology, we can never be sure of not taking effects for causes, nor even of

> having formulated problems of explanation aright. The relation of cause to effect must, therefore, be superseded by that of genetic progression, which adds the notion of functional dependence, in the mathematical sense of the word, to that of antecedent and consequent.
>
> This will give us the right to say of two phenomena, A and B, that A is a function of B, as B is a function of A, and yet leave us the possibility of taking the earliest phenomenon, i.e., genetically speaking, the most explicative, as the starting-point of our description (1928, pp. 200-201).

In this way, Piaget substitutes relationships of development and functional dependency for relationships of causality. He overlooks the principle so well formulated by Goethe. This principle holds that the ascent from action to cause is simple historical epistemology. He forgets Bacon's familiar argument that true knowledge is knowledge which traces a process back to its cause.[20] Piaget attempts to replace a causal understanding of development with a functional understanding of it. Though he does not notice it, he deprives the concept of development of any real content in the process. In this view of development, everything is conditional. Phenomenon A can be viewed as a function of phenomenon B, but B can also be viewed as a function of A. The result is that the issue of cause, the issue of the factors that promote development, disappears. We are left with nothing more than the right to select the phenomenon first observed as more explanatory in the genetic sense.

Consequently, Piaget's resolution of the question of what factors promote the development of the child's thinking is identical to his resolution of the problem of causality.

> "What, then, are these explicative phenomena?" The psychology of thought is always faced at this point with two fundamental factors, whose connection it is its task to explain: the biological factor, and the social factor....Describe the evolution of thought from the purely biological point of view, or as threatens to be the fashion, from the purely sociological point of view, and you risk leaving half the real process in the shade. These two poles must both be kept in view, and nothing must be sacrificed; but in order to make a beginning, we must needs choose one language at the expense of the others. We have chosen the language of sociology, but wish to emphasize the point that there need be nothing exclusive in the choice. We reserve the right to revert to the biological explanation of child thought and to bring our present description into accordance with it. All we have attempted to do as a beginning, was to order our description from the point of view of social psychology, taking the most characteristic phenomenon as our starting-point, namely, ego-centrism of child thought. We have sought to trace most of the characteristics of child logic to ego-centrism (1928, p. 201).

Here, Piaget comes to the paradoxical conclusion that a description that is given in the language of sociology in one situation may -- with equal success -- be reduced to the language of biology in another. Organizing of the description from a social psychological perspective is a matter of an author's preference. An author may simply select the descriptive language which pleases him. This position is methodologically decisive for Piaget and sheds some light on Piaget's perspective on the significance of the social factor in the development of the child's thinking.

As is well known, *The Language and Thought of the Child* (Piaget, 1932), and, *Judgement and Reasoning in the Child* (Piaget, 1928), are permeated with the idea that the influence of social factors on the structure and function of thought is fundamental to the history of the child's thinking.

In his preface to the Russian edition of these books, Piaget directly states that this idea is basic to his work.

> In my view, the idea that dominates this work is the idea that the thinking of the child cannot be derived only from innate psychobiological factors or from the influence of the physical environment. It must also be understood, and perhaps primarily so, as a function of those relationships which are established between the child and the social environment that surrounds him. I do not wish to say by this simply that the child reflects the opinions and ideals of those who surround him; this would be a truism. The very structure of the individual's thinking depends on the social environment. When the individual thinks only for himself, he is thinking egocentrically. This is a circumstance so typical for the child that his thought is constantly under the influence of his fantasies, wishes, and his personality. In this context, he presents several capacities completely different from the capacities that characterize rational thinking. When the individual experiences systematic influence from a given social environment (as, for example, when the child experiences the influence of adult authority) his thought is constructed in accordance with specific external rules....To the extent that individuals cooperate with each other, even the rules of this cooperation develop. This subordinates thinking to a discipline which forms reason in all its aspects, both theoretical and practical.
>
> Egocentrism, external constraint, and cooperation -- these are the three notions among which the thinking of the child is constantly oscillating in its development. To one extent or another even, the thinking of the adult is linked to each of these, depending on the extent to which he remains autistic or has been raised in one or another type of social organization (ibid).

Such is the dominant idea of Piaget's work. In this scheme, and in these books as a whole, there seems to be an extremely clear recognition of the social factor as a determining force in the development of the child's thinking. Nonetheless, we have just seen that this recognition of the importance of the social factor is linked to the author's selection of the language of sociology for his description. Within this framework, the very same facts could be subjected to a biological explanation with equal success. Our immediate task, then, is to analyze how social and biological factors are related in Piaget's theory of the development of the child's thinking.

Fundamental to any analysis of this issue in Piaget's theory is a recognition of the gap he assumes to exist between the biological and the social. Piaget thinks of the biological as primal, initial, and self-contained within the child. He views the biological as forming the child's substance. In contrast, the social acts through compulsion or constraint as an external force which is foreign to the child himself. The social replaces the child's own characteristics, the modes of thinking that correspond to his own inner nature. The social implants schemes of thought that are foreign to the child and dictated from without. It is not surprising, therefore, that even in his newer perspective, Piaget unites the two extreme poles -- egocentrism and cooperation -- by a third component of force or compulsion. These words clearly express Piaget's actual conception of the mechanism through which the social environment directs the development of the child's thinking.

Piaget shares this conception with psychoanalytic theory. Here too, the environment is perceived as something external to the personality. The social environment exerts pressure on the personality, forcing it to restrict its own inclinations or impulses, to change them, to pursue its needs indirectly. Compulsion and pressure -- these two words are essential for expressing Piaget's view of the influence of the social environment on the child's development.

As we have seen, Piaget compares the processes through which social influences occur to the processes of assimilation. He studies how these influences are assimilated, that is, how they are deformed by the living being and instilled in its substance. But the child's own mental substance, the structure and mode of functioning that is characteristic of his thought, is qualitatively different from the thinking of the adult. It is defined by autism, by the biological characteristics of the child's nature. The child is not seen as a part of the social whole, as a subject of social relationships. He is not seen as a being who participates in the societal life of the social whole to which he belongs from the outset. The social is viewed as something standing outside the child, foreign force which exerts pressure and ultimately supplants his characteristic modes of thinking.

In his preface to, *The Language and Thought of the Child*, Claparede clearly expresses this idea, an idea of fundamental importance to Piaget. He says that Piaget's research presents the mind of the child in an entirely new manner.

> Our author shows us in fact that the child's mind is woven on two different looms, which are as it were placed one above the other. By far the most important during the first years is the work accomplished on the lower plane. This is the work done by the child himself, which attracts to him pell-mell and crystallizes round his wants all that is likely to satisfy these wants. It is the plane of subjectivity, of desires, games, and whims, of the *Lustprinzip*, as Freud would say. The upper plane, on the contrary, is built up little by little by the social environment, which presses more and more upon the child as time goes on. It is the plane of objectivity, speech, and logical ideas, in a word the plane of reality. As soon as one overloads it, it bends, creaks and collapses, and the elements of which it is composed fall on the lower plane, and become mixed up with those that properly belong there. Other pieces remain half-way suspended between Heaven and Earth. One can imagine that an observer whose point of view was such that he did not observe this duality of planes, and supposed the whole transition to be taking place on one plane, would have an impression of extreme confusion because each of these planes has a logic of its own which protests loudly at being coupled with that of the other (Piaget, 1932, pp. xii-xiii).

According to Piaget, then, the child's thinking is unique in that his mind is woven on two looms. The first, woven on a plane of subjectivity, wishes, and caprice, is the more important because it is a function of the child himself. Had Piaget and Claparede not cited Freud and his pleasure principle, there still would have been no doubt that we are dealing here with a purely biological conception of the child, a conception that attempts to derive the characteristics of the child's thinking from his biological nature. In his analysis of the child's development, Piaget in fact represents the biological and social as two forces entirely external to one another, two forces acting on one another externally and mechanically. This is clearly demonstrated in the conclusions to which his research leads.

The central conclusion of Piaget's subsequent two volumes of research is that the child lives in a bifurcated reality. One of these worlds is constructed on the foundation of his own thinking, on the foundation of the thinking that is characteristic of his own nature. The second is constructed on the basis of the logical thinking dictated to him by the people with whom he interacts.

In Piaget's view, the bifurcation of the child's thinking logically implies the child's development of a bifurcated perception of reality. Two different looms -- two different fabrics. Two modes of thinking -- two realities. This bifurcation will be reflected all the more sharply and strongly in each of the two planes on which the child's

thought is woven. Each must have its own logic and, in the words of an authoritative witness, *protest loudly* when united with the logic of the other. Thus, it is the fate of the child's thought not only to dwell in a bifurcated, split reality, but to be constructed of two irreducible, absolutely heterogeneous, and fundamentally hostile fabrics. In Piaget's view, autistic thought creates an imaginary reality, a reality of dreams.

With the same logical necessity, there arises the question of which of these two looms is the more important. To which of these two fabrics should primacy be given? The first part of this question, as we have seen, is answered clearly by Claparede. That which is produced on the lower plane is the more important in the first years of life. As we shall see, Piaget answers the second question no less categorically when he asserts that reality is much less real for the child than it is for us. Following the logic of this irresistible argument, we must recognize that the child's thought exists (in the words of the mystic poet) on the threshold of a dual existence; his soul dwells in two worlds.

Piaget then raises another issue in connection with that of childhood egocentrism.

> Does there exist for the child only one reality, that is to say one supreme reality which is a touchstone of all others (as is the world of the senses for the adult, the world constructed by science, or even the invisible world of the mystic for another)? Or does the child, finding himself as he is in an egocentric or a socialized state of being, in the presence of two worlds which are equally real, and neither of which succeeds in supplanting the other? It is obvious that the second hypothesis is the more probable (1928, p. 245).

Piaget suggests that it is unclear whether the child suffers from this bipolar reality. He raises the possibility that the child may have two or more realities which, in contrast to the hierarchically organized reality of the adult, are truly alternative realities.

In particular, in the first stage of the child's development (two to three years of age according to Piaget), the real is simply that which is wished: "Freud's 'pleasure principle' deforms and refashions the world to its liking. The second stage marks the appearance of two heterogeneous but equal realities -- the world of play and the world of observation" (1928, p. 246). And further: "Childish play may therefore be said to constitute an autonomous reality, by which we mean that the 'true' reality to which it stands in contrast is far less true for the child than for us" (1928, p. 248).

This thought is not unique to Piaget. All theories of child psychology that start from this set of fundamental assumptions are permeated with this idea. The child lives in two worlds. All that is social is foreign to the child, dictated to him from the outside. V. Eliasberg recently expressed the idea very clearly in a discussion of the child's autonomous speech. Speaking of the representation of the world that the child masters through speech, he concludes that it does not correspond with the nature of the child, that it is contradictory to that integral whole which we see in the child's play and drawings. With the adult's speech, he writes, the child masters the categorical forms, the division of the subjective and the objective, the I and the you, the here and the there, the now and the later -- *das Alles voellig unkindgemaess*. Repeating Goethe's famous lines, he writes that two spirits dwell in the child. The first is fully connected with the child's spirit. The second arises under adult influence; this is the experience of the world in categories. Two spirits - two worlds - two realities. This conclusion is the inevitable consequence of the proposition that the social and the biological act as two forces entirely external to one another, as two fundamentally foreign beginnings.

8

The result of this is a unique understanding of the process of socialization, an understanding of socialization central to Piaget's theory. Earlier, we attempted to show that this conception can be criticized from the perspective of developmental theory. What, in Piaget's view, is the nature of the process through which the child's thought is socialized? We have seen that the process is perceived as external and foreign to the child himself. A second feature, however, is basic to this process. In Piaget's view, socialization is the only source of the development of logical thinking. What, however, is the actual content of the socialization process? It is a process of overcoming the child's egocentrism. Rather than thinking only for himself, the child begins to accommodate his thinking to the thought of others. Left to himself, the child would never attain logical thinking, because he acts exclusively in fantasy. In Piaget's view, "things are not sufficient in themselves to make the mind feel any need for verification, since things themselves have been made by the mind" (1928, p. 203).

To say this is to suggest that things (i.e., objective external reality) play no decisive role in the development of the child's thinking. Only a clash between our thought and thinking that is foreign to it elicits doubt and the need for proof.

> If there were not other people, the disappointments of experience would lead to overcompensation and dementia. We are constantly hatching an enormous number of false ideas, conceits, Utopias, mystical explanations, suspicions, and megalomaniacal fantasies, that disappear when brought into contact with other people. The social need to share the thought of others and to communicate our own with success is at the root of our need for verification. Proof is the outcome of argument. All this, moreover, is common knowledge for contemporary psychology (1928, p. 204).

One could not more clearly express the concept that the need for logical thought, or the need for the knowledge of truth itself, emerges in the interaction between the consciousness of the child and the consciousness of others. Philosophically, this argument is reminiscent of the perspective of Durkheim[21] and other sociologists who derive space, time, and objective reality as a whole from the social life of man! It is similar to A. A. Bogdanov's[22] argument that objective, physical reality is shared-meaning, the argument that the objective nature of the physical entity that we encounter in our experience is, ultimately, established by mutual agreement or assessment in people's utterances. It is similar to the general concept that the physical world is a function of social agreement, that it is socially harmonious and socially organized experience.

If we remember Piaget's conception of causality, his affinities here with E. Mach[23] become obvious. Piaget establishes an extraordinary fact in his discussion of the development of the concept of causality in the child. Relying on Claparede's law of consciousness, he shows that conscious awareness is a function of action, that it arises when some difficulty is encountered in the performance of an automatic adaptive action. If we ask ourselves how the concept of cause or goal arises, Piaget suggests, we will find that the:

> Problem of origins is the same as that of knowing how the individual gradually comes to interest himself in the cause, the aim, and the place of things, etc. And there is good reason for believing that his interest was only directed to these 'categories' when his action was unadapted to one of them. *Need creates consciousness*, and the consciousness of cause (or of aim, or place, etc.), only arose in the mind when the need was felt for adaptation in relation to the cause (or the aim, etc.) (1932, p. 228).

With an automatic, instinctive adaptation, the mind does not become aware of the categories. Performing an automatic act presents the mind with no problem. The absence of difficulty means the absence of need and, therefore, no consciousness.

In his discussion of Claparede's hypothesis, Piaget suggests that in a certain respect he moves even further toward a functional psychology in his argument that consciousness of the category transforms its nature: "Therefore, we accept the formula: 'the child is cause long before having any idea of cause'" (1932, p. 229).

It would be difficult to give clearer expression to the thought that objective causality exists in the child's activity independent of consciousness and prior to his acquisition of the concept of causality. Understanding, however, that this implies a materialistic as opposed to an idealistic conception of causality, Piaget adds the stipulation that:

> It is only as a concession to language (and one which if we are not careful will involve us in a thoroughly realistic theory of knowledge entirely outside the scope of psychology) that we can talk of 'causality' as a relation entirely independent of the consciousness which may be had of it. As a matter of fact, there are as many types of causality as there are types and degrees of becoming conscious of it. When the child "is cause," or acts as though he knew one thing was cause of another, this, even though he has not consciously realized causality, is an early type of causality, and, if one wishes, the functional equivalent of causality. Then, when the same child becomes conscious of the relation in question, this realization, just because it depends upon the needs and interests of the moment, is capable of assuming a number of different types -- animistic causality, artificialistic, finalistic, mechanistic (by contact), or dynamic (force), etc. The list of types can never be considered complete, and the types of relation used nowadays by adults and scientists are probably only as provisional as those which have been used by the child and the savage (1932, p. 229-230).

Piaget generalizes these assertions concerning causality, including his rejection of its objective nature, to all categories. He takes the idealistic perspective of psychologism, asserting that, "the genetician will therefore have to note the appearance and use of these categories at every stage of intelligence traversed by the child, and to bring these facts under the functional laws of thought" (1932, pp. 230-231).

Rejecting scholastic realism and Kantian apriorism with respect to the issue of the logical categories, Piaget takes the perspective of pragmatic empiricism which "without exaggeration one can characterize as concerned with psychology, because as a theory it presented itself the task of defining the categories through their genesis in the history of thought and their gradual development in their application in the history of science" (1932, p. 231). It is clear, then, that Piaget not only assumes the position of a subjective idealist, but directly contradicts the empirical data he obtained. Piaget himself suggests that these data could lead to a realistic epistemological theory.

Therefore, it is not surprising that in his third volume (Piaget, 1926), which he devoted to the child's conception of the world, Piaget concludes that realism, animism, and artificialism in thinking are the three dominating features of the child's world view. This conclusion is basic for any researcher who takes Mach's position as his point of departure. Mach attempted to show that the differentiation of the inner mental world and of the external physical world is not inborn. "But these views are still theoretical. Mach's hypothesis is not based on a true genetic psychology and 'the genetic logic' of Baldwin is constructive rather than experimental" (ibid, p. 73). Piaget seems to set the goal of proving Mach's initial position with respect to the development of logic in the child. But he contradicts himself once again, since he depicted the

initial nature of the child's thought as realistic. The naive realism that he ascribes to the child obviously indicates that consciousness is, from the outset, conditioned by the fact that it reflects objective reality.

Developing this idea further in his attempt to draw conclusions from his entire series of investigations, Piaget raises the general issue of the relationship between reality and logic.

> Experience fashions reason, and reason fashions experience. Thus between the real and the rational there is a mutual dependence....This question belongs primarily to the Theory of Knowledge, but there exists from the genetic point of view a problem that is a very near neighbor to it, and concerning which we must add a few words....Do the logical relations condition the real categories, or is the converse the truth? (1966, p. 301).

Piaget limits himself to the suggestion that there is a similarity, even a certain parallel, between the development of real categories and the categories of formal logic. In his view, there is not only a logical egocentrism, but an ontological egocentrism. In the child, the logical and ontological categories evolve in parallel. We will not attempt to outline the nature of these perceived parallels. Rather, we turn directly to Piaget's final conclusion:

> Having established the fact of this parallelism, the question remains as to the mechanism of the various factors involved. Is it the real content of thought that fashions the logical form, or is the converse the truth? Put in this vague manner, it is obvious that the problem has no meaning. But if we are careful to distinguish logical form from what may be called psychological form (i.e., the factors of assimilation in the sense in which we defined the word), the problem may perhaps admit of a positive solution. For the moment, we must abstain from anticipating the answer (1966, p. 305).

Thus, Piaget consciously maintains a position on the boundary between idealism and materialism. While actually rejecting the objective significance of logical categories and sharing Mach's basic perspective, Piaget attempts to preserve the position of an agnostic.

9

In concluding, we must pose the question of what is central and basic to Piaget's overall conception one last time. We would suggest that the absence of two factors is fundamental to Piaget's conception. One senses the absence of these factors with Piaget's first discussion of the narrow issue of egocentric speech. What is missing, then, in Piaget's perspective is reality and the child's relationship to that reality. What is missing is the child's practical activity. This is fundamental. Even the socialization of the child's thinking is analyzed by Piaget outside the context of practice. It is isolated from reality and treated as the pure interaction or communication of minds. It is this kind of socialization which in Piaget's view leads to the development of thought. The apprehension of truth, and the logical forms that make this knowledge possible, arise not in the practical mastery of reality but in the accommodation of the ideas of one individual to those of another. To a great extent, Piaget repeats Bogdanov's position that truth is socially organized experience. It is not things or reality that push the child's mind along the path of development. Reality is itself processed and trans-

formed by the mind. Left to itself, the child would achieve the development of nothing but gibberish. Reality would never teach him logic.

This attempt to derive the child's logical thinking and his development from a pure interaction of consciousnesses -- an interaction that occurs in complete isolation from reality or any consideration of the child's social practice directed toward the mastery of reality -- is the central element of Piaget's entire construction.

In his notes on Hegel's *"Logic"*, Lenin discusses an analogous perspective, a perspective widely distributed in idealistic philosophy and psychology.

> When Hegel strives to subordinate the unique activity of man to the category of logic -- arguing that this activity is the "conclusion" (*Schluss*), that the subject (man) plays the role of a "component" of the logical "figure" "conclusion" -- THIS IS NOT ONLY STRETCHING THE POINT, IT IS A GAME. THERE IS A PROFOUND POINT HERE, A PURELY MATERIALISTIC ONE. WE MUST REVERSE IT: MAN'S PRACTICAL ACTIVITY MUST BRING THE REPETITION OF VARIOUS LOGICAL FIGURES A BILLION TIMES IN ORDER FOR THESE FIGURES TO BECOME AXIOMS....(vol. 29, p. 172).)

And further: "Man's practice, repeated a billion times, anchors the figures of logic in his consciousness. These figures have the strength of prejudice, their axiomatic character, precisely (and only) because of this repetition" (ibid, p. 198).

It is not surprising, then, that Piaget finds isolated verbal thought incomprehensible to the child. Conversation without action is incomprehensible. Piaget concludes that children do not understand each other.

> Naturally, when children are playing together, or are all handling the same material, they understand each other, because, however elliptical their language may be, it is accompanied by gesture and mimicry which is a beginning of action and serves as as example to the interlocutor. But it can be questioned whether verbal thought and language itself are really understood among children, whether, in other words, children understand each other when they speak without acting. This problem is of fundamental importance, since it is on the verbal plane that the child makes the chief effort of adaptation to adult thought and to the acquisition of logical habits (1928, pp. 207-208).

Piaget answers this question in the negative. On the basis of a study he conducted, he argues that children do not understand each other's verbal thought, that they do not understand each other's language.

This notion that the education of logical thought arises in the pure understanding of verbal thought which is independent of action lies at the foundation of the child's failure to understand which Piaget has discovered. It would seem that Piaget himself has eloquently shown in his work that the logic of action precedes the logic of thinking. However, Piaget sees thinking as entirely divorced from reality and activity. The function of thinking, however, is knowledge and reflection of reality. As a result, when thinking is conceptualized outside concrete reality, it naturally becomes a movement of phantoms, a parade of dead delirious figures, a dance of shades. This is not the actual, substantive thinking of the child.

This is why, when Piaget attempts to substitute the laws of development for the laws of causality in his research, the very concept of development disappears. Piaget does not posit a connection between the characteristics of the child's thinking and the characteristics of logical thinking that would make it apparent how logical thought

arises and develops from the thought of the child. On the contrary, Piaget shows how logical thought supplants the characteristics of the child's thinking. He shows how it takes root in the child's mental substance from the outside and how it is in turn deformed by that substance. Piaget's response to the question of whether the characteristics of the child's thinking form an unconnected whole or whether each of these characteristics has its own special logic is not, therefore, surprising: "The truth would seem to lie between the two. The child's mind shows signs of having a structure of its own, but its development is subject to contingent circumstances" (1928, p. 200). One cannot more simply or directly express the thought that the unique character of the child's intellectual organization is inherent in its essence. It does not emerge in development. Conceptualized in this way, development is not self-movement but a logic of arbitrary circumstance. And where there is no self-movement, there is no place for development in the true sense of the word. Here, one phenomenon replaces the other, but it does not emerge from the other.

An example may help clarify this point. In his analysis of the child's thinking, Piaget strives to show that, compared to the thinking of the adult, the thinking of the child is weak, unfounded, irrational, and alogical. The same question arises, here, that has emerged in critiques of Levy-Bruhl's theory of primitive thinking. If the child's thinking is exclusively syncretic, if syncretism permeates all the child's thought, how is the child's adaptation or accommodation possible.

We must introduce two important corrections to Piaget's positions on empirical issues. First, the sphere of influence of those characteristics of the child's thinking that Piaget discusses must be restricted. In our view, the child thinks syncretically where he is not yet capable of thinking in a connected and logical manner. We see substantial support for this position in our experimental data. When the child is asked why the sun does not fall, he naturally gives a syncretic answer. Clearly, these answers are important symptoms of the tendencies that guide the child's thought in situations that have no links to his experience. However, if we ask the child about things that are accessible to his experience (the specific content of this class of things being determined of course by the education and upbringing of the particular child), we will probably not receive a syncretic answer. If a child is asked why he fell when he has stumbled on a rock and fallen, not even the youngest child will answer in the way that Piaget's children answered when they were asked why the moon doesn't fall to the earth.

In this sense, the range of the child's syncretism is strictly defined by the range of his experience. Recognizing this, we should begin to understand that syncretism is itself the prototype or embryo of future causal connections, something that Piaget himself mentions.

We must be careful not to underestimate thinking that is organized on the basis of syncretic schemas. In spite of difficulties, these schemas lead the child to gradual adaptation. Sooner or later, they undergo a process of strict selection and mutual abbreviation, a process that sharpens them and makes them a remarkable instrument for investigation in those realms of activity where hypotheses are useful.

With this restriction in the sphere of influence of syncretic thought, we must make one other correction to Piaget's empirical assumptions. For Piaget, the notion that the child is impervious to experience is a basic dogma. An important insight into Piaget's thinking emerges here. According to Piaget, primitive man learns from experience only in isolated and specialized technical contexts. As examples of such rare situations, Piaget names agriculture, hunting, and production. Of these he writes: "Even this momentary and partial contact with facts does not react in any way upon the orientation of his thought. This applies even more strongly to the child" (1928, p. 203). Production, hunting, and agriculture, however, do not constitute a passing contact with

reality for primitive man. They are the basis of his existence. As concerns the child, Piaget himself clearly identifies the roots and source of the characteristics that he establishes in his research: "On the contrary, the child never really comes into contact with things because he does not work. He plays with them, or simply believes them without trying to find the truth" (1928, p. 203). Here, in reality, is the centerpiece of Piaget's theory, the consideration of which will conclude our discussion.

The laws that Piaget established, and the facts that he found, are of limited rather than universal significance. They are actually *hinc et nunc*-- here and now -- in a given, specific social environment. He describes not the development of the thinking of the child in general, but only the development of the thinking of the children that he studied. The laws that he discovered are not the eternal laws of nature, but historical and social laws. Stern[24] has already pointed this out. In Stern's view, Piaget goes too far when he argues that the child's speech is more frequently egocentric than social over the entire course of his development up to the age of seven, when he argues that it is only after the age of seven that the child begins to acquire the social function of speech. Piaget's mistake here is a function of his failure to give sufficient consideration to the significance of the social situation. Whether the child speaks egocentrically or socially depends not only on his age but on the conditions in which he finds himself. Piaget observed children playing alongside each other in a kindergarten. The laws and the coefficients that Piaget derived from this research apply only to this special environment. They cannot be generalized. Where children are involved exclusively in the activity of play, widespread monologic accompaniment of activity is to be expected. Even in this context, however, Mukhovna (in research conducted in Hamburg) has found that the particular organization of the kindergarten is very important. In Geneva, where children in Montessori[25] kindergartens play individually alongside one another, the coefficient of egocentric speech is higher than in the German kindergarten where there is closer social interaction between groups of playing children.

The child's behavior in the home environment differs even more markedly from what Piaget observed. Here, the process through which the child learns speech is social from start to finish. Stern has clearly established the primacy of the social function of speech in this context. The social function appears at the beginning of language mastery. The child has many practical and spiritual needs. He must frequently ask for things, inquire about things, listen carefully to something that he is striving to understand, or make attempts to be understood. Social speech begins to play a major role in the first years of the child's life (Stern & Stern, 1928, pp. 148-149). Stern provides substantial empirical support for this position in his books characterizing the development of the speech of the child in the early years.

Our primary concern here, however, is not with corrections of fact of the type made by Stern. The critical issue is not the quantity of egocentric speech, but the nature of the laws Piaget established. As we have said, these laws can be applied only to that social environment which Piaget studied. The comparatively small differences between this social environment and that observed in Germany produced a significantly different pattern of regularities. Even greater differences could be expected if we were to compare these processes and phenomena to those emerging in the very different social environment of the child that is found in our own country. In his preface to the Russian edition of his book, Piaget states forthrightly that:

> When one works, as I have been forced to work, within a single social environment such as that of the children in Geneva, it is impossible to establish with any precision the relative roles of the individual and the social in the development of the child's thinking. In order to make this distinction, we must study children in the most varied social environments (1932, p. 56).

This leads Piaget to point to the potential for cooperative work with Soviet psychologists who have the opportunity to study children in a very different social environment from that in which he worked: "Nothing could be more useful for science than this movement of Soviet psychologists toward the work done in other countries" (ibid).

We also assume that studying the development of the child's thinking in different social environments will lead to the establishment of extremely important laws. This may be particularly true in social environments where -- in contrast to those studied by Piaget -- children work. Such studies will create a potential for establishing laws relevant not only to the *here and now* but to the development of the child generally. This will require, however, that child psychology fundamentally transform its basic methodological traditions.

In the conclusion of Goethe's *Faust*, the choir rejoiced in the eternal femininity that draws us to the heights. In recent times, through the mouth of Folkelt, child psychology has rejoiced in the "primitive unity that distinguishes the normal mental life of the child, that constitutes the essence and value of the eternal child" (1930, p. 138). Folkelt expressed here not his own thought but the fundamental aspiration of the whole of modern child psychology, that is, the wish to reveal the eternal child. The task of psychology, however, is not the discovery of the eternal child. The task of psychology is the discovery of the historical child, of what Goethe called the transitory child. The stone that the builders have disdained must become the foundation stone.

Chapter 3

STERN'S THEORY OF SPEECH DEVELOPMENT

Stern's *purely intellectualistic perspective on the child's speech and its development* has changed less over the years than any other aspect of his theoretical system. In fact, it has been reinforced, consolidated, and further developed in the course of his work. Nowhere does the restricted nature, the internal inconsistency, and the scientific inadequacy of Stern's philosophical and psychological personalism or his idealism emerge more self-evidently than in his perspective on the child's speech.

Stern refers to his perspective as *personalistic-genetic*. Later, we will review the concepts basic to personalism.[26] We must first clarify, however, how a genetic perspective is realized within the framework of Stern's theory. At the outset, however, we can say that like all intellectualistic theories this perspective is inherently anti-genetic.

Stern distinguishes three roots (*Wurzeln*) of speech: the expressive tendency, the social tendency to communicate, and the "*intentional*" tendency. The first two are present in the rudiments of "speech" found in animals. They are not a distinguishing feature of human speech. The third, however, is not found in the "speech" of animals. It is unique to human speech. As defined by Stern, "intention" implies that speech is directed toward a specific *sense or meaning*. He writes that: "At a specific stage in his mental development, man acquires the capacity to pronounce sounds while "having something in mind" ("etwas zu meinen"), while designating "something objective" (Stern & Stern, 1928, p. 126). The latter may be a named thing, or it may be some content, fact, or problem. In essence, these intentional acts are acts of thought (Denkleistungen). Therefore, the phenomenon of intention signifies the intellectualization and objectification of speech. This is why modern scholars concerned with the psychology of thinking, scholars such as Buhler[27] and, especially, Reimut (relying on Husserl[28]), emphasize the significance of the logical factor in the child's speech. It is true, of course, that Stern suggests that these scholars have gone too far in attributing logical characteristics to the child's speech. Nonetheless, the underlying idea finds a supporter in Stern. He is in complete correspondence with this idea when he identifies the precise moment in the development of speech when this intentional factor breaks through and gives speech its specifically human character (ibid, p. 127).

It would seem impossible to object to the notion that developed forms of human speech are meaningful and possess objective significance, that they therefore presuppose a certain degree of development in thinking, or that we must consistently take this connection between speech and logical thinking into account. However, Stern re-

places a genetic explanation with an intellectualistic one when he claims that the *roots* and motive force of speech development lie in these characteristics of developed human speech. An explanation of these characteristics themselves, an explanation of how they emerge in the developmental process, is required. Stern, however, sees them as a primary tendency, almost an innate tendency, something *primordial.* With respect to genetic function, they are ranked alongside the expressive and communicative tendencies. These tendencies are actually present from the very *beginning* of speech development. This is what Stern calls *die "intentionale" Triebfeder*[6] *des Sprachdranges* (ibid, p. 126).

This is the fundamental error of any intellectualistic theory. In its attempt to explain, it begins with that which requires explanation. It is in this sense that Stern's theory is anti-genetic. The features that distinguish the higher forms of speech development are associated with the very beginning of the process. This is the basic source of the inadequacy, the emptiness, and the lack of content of Stern's theory. It explains nothing; it moves in an eternal logical circle. In attempting to address the issue of the roots of the meaningful character of human speech, in attempting to address the issue of its development, Stern suggests that we look to the intentional tendency of speech, that is, to its tendency toward meaningfulness. This form of explanation is reminiscent of the classic explanation of the soporific effect of opium by Moliere's physician, who explained this effect in terms of opium's soporific properties. Stern writes:

> At a specific stage in his mental maturation, man acquires the capacity (Fahigkeit) to have something in mind, to signify something objective when pronouncing sounds (ibid).

How does this differ from the explanation of Moliere's physician? The transition from Latin terminology to German makes the purely verbal character of this explanation all the more apparent. It is the simple substitution of one word for another. The explanation expresses precisely that which requires explanation.

The result of this logicalization of the child's speech is easily seen in Stern's now classic description of the extraordinary discovery made by the child between the ages of one-and-a-half to two years. According to Stern, the child discovers that "each object corresponds in a consistent manner with the sound complex that symbolizes it, permitting designation and communication; that is, the child discovers that *each thing has its name*" (ibid, p. 190). Thus, Stern ascribes to the child in the second year of life an "awakening of his consciousness of symbols and his need for them" (ibid). Stern develops this idea with complete consistency in another book, arguing that this discovery of the symbolic function of the word represents thinking activity in the true sense of the word. He argues that this understanding of the relationship between sign and meaning is fundamentally different from the simple use of sound forms, the simple use of representations of objects and their associations. The requirement that *every* object (whatever its type) has a name can be considered a real *general concept in the child,* perhaps the child's first.

To accept Stern's perspective on this issue is to accept his assumption that the child of one-and-a-half to two years of age has an understanding of the relationship between sign and meaning, that he has conscious awareness of the symbolic function of speech. It is an acceptance of the assumption that the young child has a "consciousness of the significance of language and the will to conquer it" (Stern & Stern, 1928, p. 150). Finally, there is here the assumption that there is "a consciousness of the general rule available in the general thought." That is, there is an understanding of the general

which Stern previously called the "general thought." In our view, the development of this problem over the past twenty years suggests that this assumption is without empirical or theoretical foundation.

Nothing of what we know of the mental characteristics of the one-and-a-half to two year old child corresponds well with this assumption that he possesses such advanced intellectual operations, that he possesses this "consciousness of the significance of language." Moreover, a good deal of experimental and observational data provide us with direct evidence that the understanding of this relationship between sign and meaning or of the functional use of the sign is completely inaccessible to the child at this age. Several experimental studies have demonstrated that the development of the use of signs, the transition to sign operations (i.e., to the signifying functions of speech), is not the product of a sudden discovery or invention by the child. This transition does not occur all at once or only once in the child's life as Stern suggests. The child does not at "one time on a single type of word discover the fundamental essence of the symbol" (ibid, p. 194). On the contrary, this is an extremely complex genetic process. There is a "natural history of signs." Signs have their natural roots and transitional forms in more primitive modes of behavior, in what is referred to as the illusory significance of objects in play and, still earlier, in the indicative gesture. Signs also have a "cultural history" that has its own phases and stages, its own quantitative, qualitative, and functional changes, its own advances and metamorphoses, its own dynamic and its own regularities.

Stern ignores the complex developmental process leading to the maturation of the signifying function. The process of speech development is *infinitely oversimplified.* This is the inevitable fate of any intellectualistic theory that substitutes a logicalized explanation for an account of the actual complex process of development. To the question of how the meaningful nature of the child's speech develops, this theory answers that "the child discovers that speech has meaning." This type of explanation is entirely appropriate for an intellectualistic theory. In this way, Stern's theory takes its place among theories such as the theory of the invention of language or the rationalistic theory of social contract. As we have seen, the greatest problem with these explanations is that they explain nothing.

Even from a purely empirical perspective, Stern's theory has little foundation. Observations of normal children by Wallon[29], Koffka[30], Piaget, and Delacroix[31] and of deaf and mute children by Buhler (observations cited by Stern himself) have shown:

1. That the connection between word and thing that is "discovered" by the child is not the symbolic functional connection characteristic of highly developed forms of verbal thinking, though this is what Stern identifies in his logical analysis and relates to the earliest stage in the genesis of speech. Rather, for a long time, the word is for the child more an attribute (Wallon) or characteristic (Koffka) of the thing (one that exists alongside its other characteristics) than a symbol or a sign. That is, what the child initially masters is more the purely external relationship "thing-word" than the internal relationship "sign-meaning."
2. That there is no "discovery" that can be associated with a particular moment. The turning point in the development of speech is the result of a long series of complex "molecular" changes.

On the whole, Stern's own empirical observations have been consistently supported by empirical research in the twenty years since their publication. Stern correctly identified the decisive turning point in the verbal, cultural, and mental develop-

ment of the child. Yet, he explained this turning point intellectualistically and, therefore, falsely. Stern identified two objective characteristics of this turning point:

1. The queries about the names of things that suddenly appear at this point in the child's development.
2. The explosive increase in the child's vocabulary.

It would be difficult to exaggerate the significance of these characteristics of this critical turning point in the child's development.

This active expansion of vocabulary -- an expansion of vocabulary that is linked to the fact that the *child himself seeks the word* and asks for the names of objects that he does not know -- has no analogy in the "speech" development of animals. It represents an entirely new phase in the child's development. The child moves from the signaling function of speech to the signifying function, from the use of sound signals to the creation and active use of sounds. Several investigators (Wallon, Delacroix, and others) have rejected the notion that this phenomenon has any general significance for the child's development. They have proposed alternative interpretations or attempted to erase the sharp boundary between this "period of questions about names" and a second "age of questions."

But two points stand firm:

1. It is at precisely this point that speech (what Pavlov[32] called "the grandiose signalization of speech") is differentiated for the child from all another types of signaling stimuli. It is here that speech acquires a unique function in behavior, that is, the sign function.
2. There are indisputable objective symptoms of this transition.

Stern's real and substantial contribution was in establishing these two points.

However, the very real value of these insights only makes the gaping holes in Stern's explanation of them all the more striking. As we have seen, Stern's explanation can be reduced to the identification of the "intentional tendency" as an initial root of speech, a kind of capacity. One need only compare this explanation to what we know of the other two roots of speech to be convinced of its intellectualistic nature. When we speak of the expressive tendency, we are referring to an unambiguous system of expressive movements that are extremely ancient in genetic terms. The roots of the expressive function can be found in instincts and in unconditioned reflexes. It is a system that has changed over a long period of time, a system that has been restructured and become more complex in the process of development. The second root of speech, the communicative function, has the same genetic character. Its development can be traced from the most primitive social animals to the higher apes and, ultimately, to man.

The roots of these function, the course of their development, and the factors that condition them are relatively clear and well known. Behind each of these terms stands a real process of development. This is not true of the "intentional tendency." It appears from nowhere, has no history, and is conditioned by nothing. According to Stern, it is primary. It is given at the outset, arising "once and forever" in and of itself. On the basis of this tendency, the child discovers the significance of language through a purely logical operation.

Stern, of course, does not state this directly. On the contrary, he reproaches Reimut for his hopeless logicalizing of speech. He also reproaches Ament[33] in precisely the same manner, stating that his work constitutes an entirely intellectualistic

epoch in the study of the child's speech (1928, p. 5). However, in his battle with anti-intellectualistic theories of speech (Wundt[34], Meumann[35], Idelberg[36], and others), theories that reduce the rudiments of the child's speech to affective-volitional processes and that reject any participation of the intellectual factor in the origin of speech in the child, Stern *in fact* assumes a purely logical, anti-genetic perspective, a perspective identical to that of Ament and Reimut. Though Stern believes his work is a more moderate expression of this tendency, he moves further in this direction than Ament in several respects. Ament's intellectualism has a purely empirical, positivistic character. Stern's, however, develops into a metaphysical and idealistic conception. Ament naively exaggerated the child's capacity to think rationally because he relied on the analogy between child and adult behavior. Stern does not repeat this mistake but does make one that is far worse. He views thinking as an inherent intellectual characteristic of the child. He treats thinking as a root or first principle of meaningful speech.

A paradox emerges here. Specifically, though this would seem to be its proper sphere of application, intellectualism turns out to be weakest and least sound in its theory of thinking. Kohler[37] made this point some time ago and demonstrated it in his own research. Stern's book, however, provides us with an excellent illustration of this principle. The weakest aspect of the book, the greatest source of internal contradiction, is Stern's treatment of the problem of thinking and speech, the problem of their interrelationships. It might be assumed that with Stern's reduction of the central problem of speech (i.e., its meaningfulness) to the "intentional tendency" or the "intentional operation" the connection and interaction of speech and thinking would be fully clarified. However, this approach to the question, an approach which at the outset assumes a fully formed intellect, does not allow one to clarify the extremely complex dialectical interaction between intellect and speech.

Moreover, problems such as that of inner speech, of its origin and its connection with thinking, receive almost no consideration in Stern's book, despite the fact that he sees them as fundamental to the modern science of the child. Stern outlines the results of Piaget's research on egocentric speech but interprets these data entirely in terms of the nature of the child's conversation. He does not consider the function, structure, or genetic significance of this form of speech (ibid, pp. 146-149), a form of speech that as we suggested earlier can be viewed as constituting a bridge between external and inner speech.

Stern does not trace the complex functional and structural changes in thinking that occur in connection with the development of speech. This is particularly apparent in his approach to the translation of the child's first words to adult language, a problem that is the touchstone of any theory of speech development. Without exaggeration, we can say that this translation of the child's first words is fundamental to the development of any theory of the child's speech. This is why it is the focal point at which all the important trends in contemporary theory intersect.

Stern rejects the tendency to interpret the child's first word as either purely intellectual or purely affective. As is well known, in contrast to the intellectualistic interpretation of the child's first words as designators of objects, Meumann has argued that "the child's initial active speech does not *elicit or designate any object or process* in the environment, that the meaning of these words has an *exclusively emotional and volitional character*" (Meumann, 1928, p. 182). In opposition to Meumann, Stern's analysis of the child's first words clearly demonstrates that their predominant function is to "indicate objects" while having a "moderate emotional tone" (Stern & Stern, 1928, p. 183). This is an extremely important point. As Stern himself recognizes, and as the empirical data clearly demonstrate, the indication of objects (*Hindeuten*[7] *auf das Object*) is a function which appears in the earliest "pre-stages" (*Ein primitiver En-*

twicklungsstadien) of the child's speech, prior to the emergence of any intention or act of discovery of the type identified by Stern. This single fact would seem to argue with sufficient clarity against the assumption of an inherent intentional tendency.

A great deal of data, much of which Stern reviews, support this contention. A good example is the mediating role of gestures, the indicative gesture in particular, in establishing the meaning of the first words (ibid, p. 166). In addition, Stern's own experiments demonstrate the direct link between the preponderance of objective over affective significance in the first words and the indicative function of these words ("their indication of something objective") (ibid, p. 166 ff).

However, Stern declines to take the genetic approach to explaining how the meaningful character of speech arises in the process through which "intention" develops. He refuses to take the genetic approach to explaining how "directedness toward a given meaning" arises from the directedness of the indicative sign (i.e., the gesture or the first word) on some object or how -- in the final analysis -- it arises from the affective directedness toward the object. Stern rejects the genetic approach, an approach which is the only possible route to a real scientific explanation of the process. As we have said, he prefers the simplified short cut of the intellectualistic explanation. Rather than the long and complex dialectical path of genetic explanation, he prefers the concept that meaningfulness arises from the tendency for meaningfulness.

Stern takes the following approach to the translation of the child's first words into adult speech: "When translated into developed speech, the child's 'mama' designates not the word 'mother' but sentences such as, 'Mother, come here.,' 'Mother, give it to me.,' 'Mother, sit me on the chair.,' or 'Mother, help me'." (ibid, p. 180). If we look at the data, however, it is obvious that it is not the word *mama* alone that should be translated into adult language in this way, but *the entire behavior of the child at the moment the word is uttered.* For example, the child says "mama" as he stretches toward a chair attempting to grasp it. In this situation, "affective-volitional" directedness toward an object (to use Meumann's language) is still absolutely inseverable from the "intentional directedness" of speech on a particular meaning. The two are fused in a single whole. The correct translation of the child's *mama* and of the child's first words generally must begin with the recognition that the word is an indicative gesture. From the very beginning, it is the equivalent of the indicative gesture, a replacement for it[8].

Our discussion here has focused on a single central issue that underlies the whole of Stern's methodological and theoretical system. We have analyzed his explanations of the development of speech only to illustrate this central point. In the present context, we simply cannot give a complete or detailed consideration to all the rich content of his book. We cannot even discuss the more important issues that are addressed in it. We will say only that this intellectualism, this anti-genetic approach to explanation, is reflected in the way he approaches all important problems. This is true of his discussion of concept development and of his attempt to outline the basic stages in the development of speech and thinking. Having identified this basic characteristic of Stern's thinking, we have identified the foundation of his psychological theory, the center of his whole psychological system. This feature of Stern's approach is not accidental. It is the inevitable product of the philosophical premises of personalism (i.e., Stern's basic methodological system) and is fully determined by those premises.

As is true of his general theory of child development, Stern attempts to avoid the extremes of empiricism and nativism in his theory of the child's speech. On the one hand, he contrasts his perspective with that of Wundt, for whom the child's speech is a product of the "child's environment, an environment with which the child himself has an essentially passive relationship." On the other, he contrasts his perspective with

that of Ament, for whom the initial speech of the child (onomatopoeia and what is referred to as *Ammensprache*) is viewed as an independent invention made by countless generations of children over the course of many thousands of years. Stern attempts to consider both the role of imitation and the role of the child's spontaneous activity.

> In this context, we must apply the concept of convergence. Only the constant interaction of internal dispositions (i.e., the inherent inclination for speech) and the external conditions constituted by the speech of the people around the child can lead to the mastery of speech. The external conditions provide the dispositions with something to be applied to. They provide the material for their realization (ibid, p. 129).

This principle of convergence is for Stern not simply an approach to the explanation of speech development. It is a general principle for the causal explanation of human behavior. The concept of convergence is an example of what Goethe referred to when he said that "the essence is concealed in the words of science." The rich sounding word "convergence," a word that expresses the indisputable methodological principle requiring the study of development as a process conditioned by the interaction of both organism and environment, actually *frees* Stern from the need to analyze social and environmental factors in speech development. Stern declares that the social environment is a major factor in the development of the child's speech (ibid, p. 291). In practice, however, he limits the role of this factor to a purely quantitative influence on the developmental process; he limits it to the acceleration or delay of that process. The actual course of development is subordinated to internal laws, laws inherent to the organism. This leads Stern to a monumental overestimation of the importance of internal factors. We attempted to illustrate this phenomenon using the example of his explanation of the meaningful character of speech. This overestimation of the internal is a function of Stern's most basic assumptions.

The fundamental idea underlying Stern's approach is the idea of personalism, the concept of the personality as a psychophysically neutral entity. Stern writes that "we view the child's speech first and foremost as a process rooted in the integral whole of the personality" (ibid, p. 121). For Stern, the term "personality" indicates " that which actually exists, that which (despite a multitude of parts) forms a real and unique unity which exhibits purposeful independent action in spite of the multitude of functions that compose it" (Stern, 1905, p. 16).

This kind of metaphysical-idealistic, monadic conception of personality inevitably leads Stern to a *personalistic* theory of speech, a theory that derives speech, its sources, and its functions from the "integral, purposefully developing, personality." From this conception only intellectualism and anti-geneticism can emerge. Nowhere is this metaphysical approach to personality reflected more clearly than in Stern's approach to the problem of development. Nowhere does this extreme personalism, a perspective that does not know the social nature of the personality, lead to such absurdities as in his theory of speech (an inherently social mechanism of behavior). This metaphysical conception, which derives the whole developmental process from the internal purposefulness of the personality, stands the actual genetic relationship between personality and speech on its head. *Rather than a history of the development of personality, a history in which speech plays a significant role, a metaphysical personality is created, a personality which through its own purposefulness gives birth to speech.*

Chapter 4

THE GENETIC ROOTS OF THINKING AND SPEECH

1

The basic fact we encounter in a genetic analysis of the *relationship* between thinking and speech is that this relationship is not constant. The quantitative and qualitative significance of this relationship changes in the course of the development of thinking and speech[9]. These functions do not develop in parallel, nor is their relationship constant. The curves that represent their development converge, diverge, and cross one another. At one point in the process, these curves may move smoothly along a parallel course, even merging with one another. At another, they may branch away from each other once again. This is true of the development of speech and thinking in both phylogenesis and ontogenesis.

Later, we will attempt to demonstrate that the *relationship* between thinking and speech is not the same in all instances of disturbance, delay, reverse development, or pathological change. Rather, this relationship assumes a specific form characteristic of particular pathological processes. With respect to the issue of development, we must say first that thinking and speech have entirely different genetic roots, a fact firmly established by a whole series of studies in animal psychology. Moreover, these processes develop along different lines in virtually all animals.

Recent studies of speech and intellect in the higher apes conducted by Kohler (1921a), Yerkes[38] (Yerkes & Learned, 1925), and others have been decisive in establishing this basic fact.

Kohler's experiments demonstrate clearly that the rudiments of intellect or thinking appear in animals independent of the development of speech and are absolutely unconnected with the level of speech development. The "inventions" of the higher apes, their preparation and use of tools, and their use of indirect paths in the solution of problems, clearly constitute an initial *pre-speech* phase in the development of thinking.

In Kohler's view, the basic implication of his research is that the chimpanzee displays rudiments of intellectual behavior of the type characteristic of man (Kohler, 1921a, p. 191). The absence of speech and the limited nature of stimulus traces (i.e., representations) are the basic causes of the large differences between the anthropoid

apes and the most primitive man. Kohler writes that:

> The absence of this infinitely valuable technical auxiliary means (i.e., language) and the limitations in the most important intellectual material (i.e., representations) are why even the most rudimentary forms of cultural development are beyond the capacity of the chimpanzee (ibid, p. 192).

The presence of a human-like intellect combined with the absence of human-like speech -- and the independence of intellectual operations from speech -- are the basic findings of Kohler's research on the anthropoid apes that are relevant to the problem in which we are interested.

Kohler's research has been widely criticized. The number of these critical works and the variety of theoretical perspectives they represent have grown considerably. Psychologists of various traditions and schools do not agree on the theoretical explanation of Kohler's empirical data.

Kohler himself carefully limited the problem he attempted to address. He made no attempt to develop a theory of intellectual behavior (ibid, p. 134). He limited himself to the analysis of empirical observations. He dealt with theoretical explanation only to the extent that this was necessary to demonstrate how intellectual reactions differ from reactions that develop through trial and error processes, through the selection of successful reactions and the mechanical combination of movements.

By rejecting the theory that the development of the chimpanzee's intellectual reactions can be explained in terms of chance, Kohler limited himself to a *purely negative* theoretical position. His rejection of the idealistic biological conceptions underlying Hartman's theory of the unconscious, of Bergson's[39] conception of a "vital impulse" (*elan vital*), and of the neovitalist and psychovitalist assumption of a "purposeful force" in all living matter was equally decisive and equally negative. In Kohler's view, these theories lie beyond the legitimate boundaries of science because either overtly or covertly they revert to supersensual agents or simple miracles in their explanations (ibid, p. 152-153). Kohler writes: "I must emphasize emphatically that the alternatives of chance and supersensual agents simply do not exist (*Agenten jenseits der Erfahrung*)" (ibid, p. 153).

Thus, neither in established psychological traditions nor in Kohler's own writings do we find a complete or scientifically convincing theory of intellect. On the contrary, both biological (Thorndike[40], Wagner[41], and Borovskii[42]) and subjectivist psychologists (Buhler, Lindvorskii, and Jaensch) contest Kohler's basic position. Biological psychologists dispute his position that intellect cannot be reduced to trial and error. Subjectivists criticize his position that the intellect of the human and the chimpanzee are similar, that the anthropoids have thinking that is comparable to that of humans.

In their mutual acceptance of Kohler's empirical observations, those who see nothing more in the chimpanzee's actions than the mechanisms of instinct and trial and error learning, "nothing more than the familiar processes of habit formation" (Borovskii, 1927, p. 179), are in accord with those who fear lowering the roots of intellect even to the level of the more advanced forms of ape behavior. That both groups recognize the accuracy of Kohler's observations and the independence of the chimpanzee's actions from its speech makes the situation yet more interesting.

Buhler is fully justified in writing that "the chimpanzee's action is *completely independent of speech*. Even the most advanced forms of human technical and instrumental thinking (*Werkzeugdenken*) are less closely linked with speech and concepts than are other forms of thinking" (1930, p. 48). We will return to this idea later. At this point, we will say only that what we know of this issue from experimental research and

clinical observation indicates that the relationship between intellect and speech in the adult is in fact neither constant nor identical for the various forms of intellectual and speech activity.

Disputing Hobhouse[43], who ascribed "practical judgement" to animals, and Yerkes, who found processes of "ideation" among the higher apes, Borovskii posed the following question: "Do animals have anything like the speech habits of man?...Given our current knowledge, it seems to me that we must answer that there is no basis on which to ascribe speech habits to the apes or any animal other than man" (1927, p. 189). The matter would be easily resolved if we did not find rudiments of speech in the apes. However, recent studies have shown that developed forms of "speech" are present in the chimpanzee. In several respects, particularly in its phonetic characteristics, the chimpanzee's speech resembles that of man. Of particular interest in the present context, however, is the fact that the chimpanzee's speech and intellect function independently on one another.

Based on years of observation at the research station on Tenerife, Kohler writes that "without exception, these phonetic manifestations express the frustrations and subjective states of the chimpanzee. They are always emotional expressions, never signs representing something objective" (Kohler, 1921a, p. 27).

The large number of sound elements in chimpanzee phonetics (comparable to that of human phonetics) makes it possible to state with conviction that the absence of "human-like" language in the chimpanzee cannot be explained in terms of these kinds of peripheral factors. In full agreement with Kohler's conclusions concerning the language of the chimpanzee, Delacroix is justified in suggesting that the gestures and mimicry of the ape show not the slightest traces of expressing or signifying something objective, that is, of *fulfilling the function of a sign* (Delacroix, 1924, p. 77). In this context, of course, the issue of peripheral causes does not arise.

Chimpanzees are highly social animals and their behavior can be understood only when they are observed in interaction. Kohler described a wide range of "verbal social interaction" in the chimpanzee. Emotional-expressive movements are the most common form. These movements are rich and clear in the chimpanzee (e.g., mimicry, gestures, and sound reactions). Kohler also observed movements that expressed social emotions, gestures of recognition and contact for example. However, Kohler writes that these social gestures and expressive sounds do not signify or describe anything objective.

The chimpanzee understands mimicry and gesture exceedingly well. Using gestures, they express not only their own emotional states but their wishes and impulses, wishes and impulses that may be directed toward other apes or toward objects. The most common mode of communication in this situation is for the chimpanzee to *begin* that movement or action that it wants to carry out or that it wants to prompt another animal to carry out. For example, the chimpanzee may nudge another animal or make initial walking movements when it wants the other animal to accompany it; it may make grasping movements when it wants a banana. Each of these gestures is directly connected with the action itself.

These observations seem to support Wundt's concept that while the indicative gesture (the most primitive stage in the development of human language) is not found in most animals, it is found among the apes in a *transitional stage* that stands between the grasping movement and the indicative movement. In any case, this transitional gesture is an extremely important step in the genetic transition from purely emotional speech to objective speech.

Elsewhere, Kohler has shown that gestures of this kind are used to achieve primitive forms of explanation, that they function as a substitute for verbal instructions.

This type of gesture stands closer to human speech than the ape's fulfillment of orders given by Spanish guards. The latter phenomenon is not essentially different from similar phenomena observed in the behavior of domestic animals such as the dog in responding to calls.

The chimpanzees Kohler observed used colored clay to "paint" during play. Initially they used their lips and tongue, but later they used paintbrushes (Kohler, 1921a, p. 70). Nonetheless, while these animals generally transferred modes of behavior between contexts of play and more serious activity, Kohler never observed the creation of signs through painting. Buhler wrote that "as far as we know, there is no reason to believe that a chimpanzee ever saw a graphic sign in a mark" (1930, p. 320). He argued elsewhere that this fact is critical for the proper evaluation of the chimpanzee's "human-like" behavior.

> There are facts that would caution against the over valuation of the chimpanzee's behavior. No traveler has ever mistaken a gorilla or chimpanzee for a person. None has found traditional tools and techniques varying from one group to the next that indicate the transmission of discoveries from generation to generation. We do not find marks on sandstone or clay that could be taken for a *picture illustrating something* nor, even in play, do we find etched patterns. There is no depictive *language*, no sounds or names of equivalence. There must be some internal basis for all this (ibid, pp. 42-43).

Yerkes seems to be the only contemporary researcher studying the higher apes who believes that the absence of human-like language in the chimpanzee is a function of something other than "internal factors." His research on the intellect of the orangutan produced results very similar to those of Kohler. His interpretation of these results, however, differs significantly from Kohler's. In his view, one finds "higher ideation" in the orangutan, though at a level of development not exceeding that of the three year old child (Yerkes, 1916, p. 132).

However, a critical analysis of Yerkes's theory uncovers a basic flaw in his thinking. Simply stated, there is no objective proof that the orangutan solves problems using processes of "higher ideation," using representations or stimulus traces. Ultimately, it is the external similarity of the behavior of man and that of the orangutan that underlies Yerkes's claim that there is "ideation" in the latter.

Obviously, this is not a convincing basis for a scientific argument. We would not want to suggest that using an analogy of this kind is unacceptable in any research on the behavior of the higher animals. Kohler has clearly demonstrated that such analogies can be used within the limits of scientific objectivity. Later, we will have occasion to use this kind of analogy in our own discussion. However, it is not scientifically acceptable to base a conclusion solely on an analogy of this kind.

Kohler relied on exacting experimental analysis to show that the actual optical situation is decisive for the chimpanzee's behavior. In the early stages of experimentation, in particular, the task of using a stick (as a tool) to obtain a piece of fruit (the goal) was made more difficult or even impossible for the chimpanzee by moving the stick slightly to the side of the fruit so that the two did not lie in the same optical field.

Similarly, when two sticks used to make a lengthened tool by inserting one into an aperture in the other crossed and assumed an "X" form in the hands of one chimpanzee, the operation of lengthening the tool (one that had been frequently repeated before) became impossible.

We could cite scores of other experimental findings relevant to this issue. It is sufficient, however, to note the following:

1. In Kohler's view, the actual optical situation (or the primitive situation) is the general, basic, and consistent methodological condition required for any research on the chimpanzee's intellect. One cannot force the intellect of the chimpanzee to function in isolation from this situation.
2. In Kohler's view, the most basic and general feature of the chimpanzee's intellectual behavior is precisely the limited nature of its representations (i.e., its "ideation").

These two positions are sufficient to cast doubt on the validity of Yerkes's basic conclusion. We would add that Kohler's positions are not merely general convictions developed in some unspecified manner. They are the only logical conclusions that can be drawn from his experiments.

Yerkes's most recent studies on the chimpanzee's language and intellect are linked with this assumption of "ideational behavior" in the higher apes. These studies do not extend, deepen, or delimit earlier findings on the intellect. They simply provide additional support for the findings established in previous research by Yerkes and others. However, his experiments and observations do provide new empirical material on speech, including a bold attempt to explain the absence of human-like speech in the chimpanzee.

Yerkes writes that "vocal reactions are both frequent and varied in the young chimpanzee, but speech in the human sense of the term is absent" (Yerkes & Learned, 1925, p. 53). He argues that the development and function of the chimp's vocal apparatus is comparable to man's, but the tendency to imitate sounds is absent. Imitation is limited almost exclusively to the field of visual stimuli, to actions rather than sounds. The young chimpanzee is not able to do what the parrot does. "If the imitative tendency of the parrot were found in the chimpanzee, the latter would undoubtedly possess speech. The chimpanzee has a vocal mechanism comparable to that of man and an intellect that would be entirely adequate for the use of sounds for speech" (ibid).

Yerkes used four experimental methods in his attempt to teach the chimpanzee the human use of sounds. In each case, the results were negative. Of course, in and of themselves, negative results can never have decisive significance for a fundamental issue of this kind. Kohler has demonstrated, for example, that the negative results obtained by previous experimenters on the question of whether the chimpanzee possesses intellect were a function of the improper organization of their experiments, a function of their misunderstanding of the "zone of difficulty" within which the chimpanzee's intellect can be manifested. Thus, these failures reflected the experimenters' ignorance of the basic characteristics of the chimpanzee's intellect, of its close link to the actual optical situation. Thus, a negative finding is frequently a function not of the phenomenon being studied, but of the researcher's understanding of it. That an animal fails to solve a given task under a specific set of conditions does not imply that it lacks the capacity to solve any such task under any conditions. Kohler correctly states that "research on mental endowment inherently tests not only the subject but the experimenter himself" (1921a, p. 191).

However, while we would not want to rely solely on the results of Yerkes's experiments as the foundation for our perspectives on language in apes, there is good reason to use his findings in combination with other information we have on this issue. In this context, Yerkes's experiments indicate once again that not even the rudiments of human-like speech exist in the chimpanzee. It would seem reasonable to assume that they could not exist in the chimpanzee. (Of course, it is important to distinguish the actual absence of speech from the possibility that speech could be imparted artificially under experimental conditions.)

Experiments by Yerkes's colleague, Learned, indicate that factors such as the underdevelopment of the vocal apparatus or phonetic limitations are insufficient to explain the absence of human-like speech in the chimpanzee. In Yerkes's view, the explanation is to be found in the absence or weakness of the chimpanzee's imitation of sounds. Of course, Yerkes is justified in suggesting that the absence of vocal imitation was the proximal cause of the failure of his own experiments. He is hardly justified, however, in arguing that this is the underlying reason for the absence of speech in apes. None of what we know of the chimpanzee's intellect supports this proposal, a proposal that Yerkes nonetheless advances categorically as an objectively established fact.

What objective basis does Yerkes's have for his assertion that the chimpanzee's intellect is characterized by the type and degree of development necessary for the creation of human-like speech? Yerkes had an excellent experimental means available to him for verifying this thesis. Unfortunately, he failed to make use of it. If the necessary materials were available, we would be eager to use them in the experimental resolution of this question.

The exclusion of the factor of vocal imitation would be fundamental to our approach. Speech is not only encountered in vocal forms. The deaf and mute have created and use a visual form of speech. Deaf and mute children are taught to understand our speech by reading lip movement. As Levy-Bruhl has shown (1922), gestural speech exists alongside vocal speech and plays an important role in the language of primitive peoples. It should also be remembered that speech is not necessarily linked to a specific material carrier. Consider written speech for example. As Yerkes himself points out, it might be possible to teach the chimpanzee to use its fingers in communication in a manner similar to the use of sign language by the deaf and mute.

If the chimpanzee's intellect is indeed capable of acquiring human speech, if the difficulty is merely that it lacks the parrot's tendency for vocal imitation, it should be able to master a conditioned gesture, one that would correspond functionally with a conditioned sound. Rather than sounds such as those used by Yerkes (i.e., "va-va" or "pa-pa"), the chimpanzee's speech reactions would consist of certain hand movements, movements such as those used in the representation of the alphabet by the deaf and mute. The critical issue is not the use of sounds, but the *functional use of signs* in a manner appropriate to human speech.

Since experiments of this kind have not been carried out, we cannot predict with any certainty what the results would be. However, nothing that we know of chimpanzee behavior, including the empirical evidence from Yerkes's experiments, gives us any basis to anticipate that the chimpanzee will actually achieve the functional mastery of speech. We know of no evidence of sign use by chimpanzees. The objective data we have on the chimpanzee's intellect do not indicate the presence of "ideation." They merely indicate that under certain conditions the chimpanzee has the capacity for the preparation and use of the simplest tools and for the use of indirect means of obtaining some end.

We do mean to imply that the presence of "ideation" is a necessary condition for the appearance of speech. This question requires further empirical research. Nonetheless, in Yerkes's thinking, there is a direct link between the assumption of "ideation" as basic to the intellectual activity of the anthropoids and the claim that they are capable of human speech. This link is so obvious and so important that it may be worthwhile to critically examine Yerkes's thesis concerning "ideation" and develop an alternate theory of the chimpanzee's intellectual behavior, since his belief in the chimpanzee's capacity to acquire human-like speech will fall at the same time.

If "ideation" forms the foundation of the chimpanzee's intellectual activity, why can we not assume that, like the human being, the chimpanzee can solve problems presented verbally or through some other type of sign, just as it solves problems with the use of tools? (This would, of course, be nothing more than an assumption, not an established fact.) At this point, we need not evaluate the viability of the analogy between the use of tools and the meaningful use of speech. We will have occasion to address this issue in our discussion of speech development in ontogenesis. It is sufficient to remember what we have said of "ideation" to see the precarious nature of Yerkes's theory of chimpanzee speech and the total absence of any empirical foundation for it.

It is precisely the absence of "ideation," the absence of the capacity to operate on the basis of non-actual or absent stimuli, that is most characteristic of the chimpanzee's intellect. The presence of an actual, optical, and easily visible situation is a condition that is necessary for the ape to attain true tool use. Are there conditions in this type of situation where the chimpanzee would discover the functional use of the sign, that is, the use of speech? (We will intentionally speak only *of one condition*, and that a *purely psychological one*, since we constantly have Yerkes's experimental situation in mind.)

No special analysis is necessary to answer this question in the negative. Moreover, under no situation could the use of speech become a function on the basis of the optical structure of the perceptual field. Speech requires another type of intellectual operation, *not one of the type or degree* that is present in the chimpanzee. Nothing that we know of the chimpanzee's behavior indicates the presence of this type of operation. On the contrary, as we have shown above, the majority of investigators see the absence of this operation as the essential feature distinguishing the intellect of the chimpanzee from that of man.

In any event, two theses can be considered beyond dispute. First, the rational use of speech is an intellectual function that cannot under any condition be determined by the immediate optical structure. Second, in tasks defined by a structure other than the actual optical one (e.g., tasks defined by mechanical structure), the chimpanzee abandons intellectual forms of behavior for trial and error. What for the human is a simple operation such as placing one box on another to balance it or removing a ring from a hook is consequently almost beyond the capacity of the chimpanzee's "naive statics" and mechanics (Kohler, 1921a, pp. 106 and 177). This is true of all non-optical structures. The logical implication of these two theses is that the chimpanzee's potential for mastering human speech is, from a psychological perspective, very limited.

It is interesting that Kohler used the term *Einsicht* (insight) (i.e., "reason" in the common meaning of the word) to designate the chimpanzee's intellectual operations. Kafka correctly points out that Kohler's use of the word in this context implies a purely optical perception in the literal sense (Kafka, 1922, p. 130), and only then the more general perception of relationships which is often contrasted with a blind mode of action. Kohler provided neither a definition nor a theory of "perception." As a result, the term acquired a dual meaning in his descriptions of empirical data. On the one hand, he used the term to designate the characteristics of the operations that the chimpanzee carried out, to designate the structure of the chimpanzee's actions. On the other, he used it to designate the internal psychophysiological processes involved in preparation for these actions. Here, the chimpanzee's actions were portrayed as nothing more than the fulfillment of an internal plan of operation. Buhler, in particular, insists on the internal character of this process (1930, p. 33). In much the same way, Borovskii suggests that if the ape "does not carry out an observable probe or trial (i.e., if it does not extend its arm), it still "tests the action" in its muscles " (1927, p. 184).

We will not address this inherently important issue in the present context. A detailed discussion of the problem would not be appropriate at this point, since empirical data sufficient for its resolution simply do not exist. What one says on this issue inevitably depends more on general theoretical considerations and on analogies between higher and lower forms of behavior (i.e., between thinking in man and the trial and error behavior of animals) than on empirical data.

Kohler's experimental data do not permit a definitive answer to this question. The nature of the mechanism of intellectual reactions cannot be answered even hypothetically on the basis of his experiments. Nonetheless, regardless of how we conceptualize this mechanism (whether we localize it psychophysiologically in the brain or in muscular innervation) the proposition as to the actual determination as opposed to the trace-determination remains in force. In the present context, the critical point is that the intellect of the chimpanzee does not function outside the actual optical situation.

On this issue, Kohler writes that "the best tool easily loses all its significance for the given situation if it cannot be perceived simultaneously, or quasi-simultaneously, in the same visual field as the goal of the action" (Kohler, 1921a, p. 39). By quasi-simultaneous perception, Kohler is referring to those cases where the separate elements of the situation are not perceived by the eye directly and simultaneously with the goal, but have nonetheless been perceived in immediate temporal sequence with it or been frequently associated with the situation in previous experience. Such elements are "simultaneous" in psychological function. In contrast to Yerkes, this somewhat extended analysis brings us time and time again to the conclusion that even if the chimpanzee had the parrot's vocal imitative tendencies and capacities, it would not master speech. Moreover, while the chimpanzee has a rich and in many respects human-like speech, this speech has little direct relationship with its highly developed intellect. This is the most important aspect of the entire problem.

Learned compiled a vocabulary of chimpanzee language based on 32 "words" or elements of "speech." Phonetically, these elements are highly reminiscent of human speech. Moreover, they have definite meanings in the sense that they are characteristic of specific situations. For example, various elements are characteristic of situations or objects that elicit desires or pleasures, dissatisfaction or spite, and attempts to escape danger or an object of fear (Yerkes and Learned, 1925, p. 54). These "words" were collected and recorded while the animals were waiting for food, while they were eating, while they were in the presence of people, and while the animals moved as a group.

This vocabulary is composed of emotional meanings. These are more or less differentiated vocal-emotional reactions that generally appear in conditioned reflex connection with stimuli associated with feeding. In essence, this vocabulary affirms what Kohler said of the chimpanzee's speech; it is emotional speech. Three factors associated with this characteristic of the chimpanzee's speech are of interest in the present context. First, this link between speech and expressive emotional movements (which become particularly marked at times of strong affective arousal) is not unique to the higher apes. This phenomenon is common to many animals with a vocal apparatus and probably underlies the origin and development of human speech. Second, emotional and affective states are an extremely unfavorable behavioral domain for the functioning of intellectual reactions. Kohler noted that emotional, and especially affective reactions, completely destroy the chimpanzee's capacity for intellectual operations.

Third, as is the case with other animals, the chimpanzee's speech is not limited to this emotional function. Chimpanzee speech constitutes not only an expressive-emotional reaction, but a means of psychological contact with other members of the

species. There is, of course, a genetic link between this function of animal speech and the corresponding functions of human speech.* Kohler's apes and Yerkes's chimpanzees clearly manifested this speech function. This function, however, had no link with the animal's intellectual reactions, its thinking. These were emotional reactions constituting a clear and indisputable part of the emotional symptom-complex. There is no similarity between this reaction and intentional, meaningful communication. It is an instinctive reaction, or something very similar to it.

This speech function is a biologically ancient form of behavior. In animal societies, it is linked genetically with the group leader's optical and audio signals. Recently, in his studies of the *language of bees*, Von Frisch[44] has described extremely interesting and theoretically important forms of behavior that promote connection or contact (Von Frisch, 1928). In spite of the unique character of these forms of communication and their clearly instinctive origin, one cannot help recognizing the common heritage between this behavior and the speech of the chimpanzee (cf. Kohler, 1921a, p. 44). Correspondingly, one can hardly doubt the total independence of the chimpanzee's speech from its intellect.

We are can now summarize several key points. Our concern has been the relationship between thinking and speech in their phylogenetic development. To address this issue, we have analyzed experimental studies and observations of the intellect and language of the higher apes. We can summarize our basic conclusions, and the problems that demand further analysis, in the following way:

1. Thinking and speech have different genetic roots.
2. The development of thinking and speech move along different channels, independently of one another.
3. The relationship between thinking and speech is not constant over the course of phylogenetic development.
4. The anthropoids manifest an intellect similar to that of humans in their rudimentary tool use. Their speech is also similar to human speech, but here the similarity is linked with different aspects of the psychological function. It is linked with the phonetics of speech, the emotional function of speech, and the existence of the rudiments of social speech.
5. The anthropoids do not manifest the close link between thinking and speech that is characteristic of man. In the chimpanzee, the two are not connected in any way.
6. In the phylogenesis of thinking and speech, we can almost certainly identify a pre-speech phase in the development of intellect and a pre-intellectual phase in the development of speech.

2

The lines of development representing thinking and speech in ontogenesis are significantly more obscure and intricate than in phylogenesis. Nonetheless, without claiming that there is a parallel between ontogenesis and phylogenesis in this context, we can identify different genetic roots and different lines of development for thinking and speech in ontogenesis as well.

* In animals, Hempelmann recognizes only the expressive function of language, though he does not reject the notion that vocal signals of warning or alarm have an objective communicative function (1926, p. 530).

Recent objective experimental evidence has demonstrated that the development of the child's thinking passes through a pre-speech stage. Kohler's experiments on chimpanzee intellect, with appropriate modifications, were carried out with children who had not yet acquired speech (Kohler had frequently noted the importance of this type of comparative experimentation with children). Buhler has conducted a systematic study of the child along these lines. He writes that the child's actions are:

> Nearly identical to the actions of the chimpanzee. Therefore, it is not unreasonable to call this phase of the child's life the chimpanzoid age. For this child, the period extended from the 10th to the 12th month....During this period, the child makes his first inventions, extremely primitive ones to be sure, but ones that mark an extremely important point in his mental development (1930, p. 97).

As was true of Kohler's experiments with the chimpanzee, the primary theoretical significance of Buhler's experiments is that they demonstrate that rudimentary intellectual reactions occur independently of speech. Buhler makes this point himself:

> It has been said that speech stands at the initial formation of man (*Menschwerden* [humanization]). While this may be true, we must not forget the existence of instrumental thinking (*Werkzeugdenken* [tool thinking]), the understanding of mechanical connections and the invention of mechanical means for mechanical ends. Action is subjectively intelligent and consciously purposeful before the appearance of speech (ibid, p. 48).

In contrast to this pre-speech phase in the development of intellect, the pre-intellectual roots of speech in the child's development have been recognized for some time. Crying and babbling are clearly demarcated phases of speech development. These, as well as the child's first words, are pre-intellectual. They have nothing in common with the development of thinking.

It is generally accepted that the child's speech is primarily an emotional form of behavior in the first year of life. The most recent research -- that of C. Buhler[45] and others on the child's first forms of social behavior and his reactions in the first year of life, and the research of C. Buhler's colleagues (i.e., Gettser and Tuder-Gart) on the child's early reactions to the human voice -- has shown that the social function of speech develops extensively during this pre-intellectual stage.

The child's rich and complex social contact leads to an early development of means of social connection. It has been clearly demonstrated that simple though unique reactions to the human voice are present in the third week of life (i.e., the pre-social reactions) and that the first social reactions appear by the second month (C. Buhler, 1927, p. 124). Laughter, babbling, pointing, and gesture emerge as means of social contact in the first months of the child's life. During the first year, then, we find in the human child both of the speech functions that we encountered in our discussion of speech in phylogenesis.

However, the most important event in the development of the child's thinking and speech occurs at approximately two years of age. It is at this point that the lines representing the development of thinking and speech, lines that up to this point have moved in isolation from one another, cross and begin to coincide. This provides the foundation for an entirely new form of behavior, one that is an essential characteristic of man.

Stern provided the first and best description of this extraordinarily important event in the child's mental life. He demonstrated that a vague consciousness of the significance of language and the will to master it is awakened in the child. The child

makes what is the most significant discovery of his life, the discovery that "each thing has its name" (1922, p. 92). This critical moment, the moment when speech becomes intellectual and thinking verbal, is marked by two clear and objective symptoms. These signs provide a foundation for reliable judgments concerning whether this turning point in speech development has occurred. In cases of abnormal or arrested development, they make it possible to determine the extent to which development has been delayed since these two symptoms are closely linked. First, the child who has attained this level of development begins to *actively expand his vocabulary* by asking the name of each new thing he encounters. Second, these efforts result in an extremely rapid increase in the child's vocabulary.

As is well known, animals can master the words of human speech and use them in appropriate situations. Before the child reaches this critical point in development, he also masters individual words that are for him nothing more than conditioned stimuli or substitutes for objects, people, actions, states, or desires. At this point in his development, however, the child knows words only to the extent that they are given to him by the people around him.

A new situation emerges with the new stage in the child's development mentioned above. On seeing a new object, the child asks what it is called. He finds himself in need of a word and actively strives to master the sign belonging to the object, the sign that permits naming and communication. As Meumann has shown, the first stage in the development of the child's speech is an affective-volitional stage. At this critical point in the child's life, speech begins the intellectual phase of its development. The child "discovers" the symbolic function of speech.

Stern writes:

> Only the process described here can confidently be defined as thinking activity in the true sense of the word. The understanding of the relationship between sign and meaning manifested in the child at this stage is something fundamentally different than the simple use of representations and their associations. The requirement that each object, whatever its nature, has its name, can perhaps be considered the child's first general concept (ibid, p. 93).

It is here, in the intersection of thinking and speech in ontogenesis, that the knot that is called the problem of thinking and speech is first tied. However, we must ask whether Stern correctly interprets this critical moment, this "greatest discovery" in the child's life."

Buhler compares this discovery with the inventions of the chimpanzee: "However this circumstance is viewed or interpreted, the decisive point will always be the psychological parallel with the chimpanzee's inventions" (Buhler, 1923, p. 55). Koffka develops the same idea:

> The naming function (*Namengebung*) is a discovery or invention by the child that fully parallels the chimpanzee's inventions. We have seen that the latter is a structured action. Consequently, we can see that naming is a structured action. We would say that the word enters into the structure of the thing just as the stick enters into the structure of the situation, into the desire to obtain the fruit (Koffka, 1925, p. 243).

It is not clear to what extent this analogy between the child's discovery of the signifying function of the word and the chimpanzee's discovery of the functional significance of the tool is correct. There are clearly important differences between these operations. We will address this issue in our discussion of the functional and structural

relationship between thinking and speech. What should be emphasized at this point is that this "greatest discovery in the child's life" becomes possible only at a rather advanced stage in the development of thinking and speech. To "discover" speech, the child must think.

Our conclusions can be briefly summarized in the following way:

1. As we found in our analysis of the phylogenetic development of thinking and speech, we find that these two processes have different roots in ontogenesis.
2. Just as we can identify a "pre-speech" stage in the development of the child's thinking, we can identify a "pre-intellectual stage" in the development of his speech.
3. Up to a certain point, speech and thinking develop along different lines and independently of one another.
4. At a certain point, the two lines cross: thinking becomes verbal and speech intellectual.

3

However one resolves the complex and still disputed theoretical issue of the relationship between thinking and speech, the significance of the processes of inner speech for the development of thinking must be recognized. Inner speech is so important for all our thinking that many psychologists have identified these two processes with one another, representing thinking as an arrested or soundless form of speech. Nonetheless, the manner in which the transformation from external to inner speech occurs has not yet been clarified. Psychology has not identified the approximate age at which this important transition occurs, how it occurs, what elicits it, or what its general genetic characteristics are.

Watson, who identifies thinking with inner speech, has correctly stated that we do not know "at what point in the organization of the child's speech the transition from overt speech to the whisper, and then to covert speech, is completed." This question has 'received only incidental investigation'" (1926, p. 293). However, given our own experiments and observations and what we know generally of the child's development, it seems to us that Watson has stated the problem incorrectly.

There is no good basis for the assumption that the development of inner speech is a purely mechanical process, that is, a process that consists of a gradual reduction in speech volume. To state the problem more directly, there is no evidence that the transition from external overt speech to inner covert speech moves through the whisper. It is simply not the case that the child gradually begins to speak more and more softly, ultimately achieving soundless speech. Thus, we reject the notion that the development of the child's inner speech is based on the genetic sequence: audible speech - whisper - inner speech.

A second thesis advanced by Watson cannot salvage his position on this issue. Watson suggests that "perhaps all three forms of speech develop together from the outset" (ibid). No objective data support this contention. There are profound functional and structural differences between overt speech and inner speech. This single fact, of which everyone including Watson is aware, contradicts Watson's basic assumptions.

Watson writes that young children "truly think out loud." With good reason, he sees the cause of this phenomenon in the fact that "their environment does not de-

mand a rapid transformation of external speech into covert form (ibid). Developing this thought further, he writes that:

> Even if we were able to open up all the covert processes involved and record them, these processes would be so abbreviated and economical that they would be incomprehensible. This would be true, at least, if we failed to trace the formation of these processes from the outset, where they are completely social in character, through to the final stage where they serve as a form of individual rather than social adaptation (ibid, p. 294).

Functionally, external speech serves social adaptation and inner speech serves individual adaptation. Structurally, through processes of abbreviation and economization, inner speech comes to differ so radically from external speech that it is nearly incomprehensible. What reason do we have to assume that processes so different from each other in functional and structural terms develop in parallel with one another? What reason do we have to think that they move either simultaneously or in some connection with one another through a third transitional process, that is, the whisper? The whisper occupies a position between external and inner speech only in a purely mechanical, formal, and externally quantitative sense (i.e., phenotypically). It is not transitional *vis-a-vis* external and inner speech in either functional or structural terms (i.e., genotypically).

We were able to evaluate this thesis experimentally in a study of the whispered speech of young children. Our research demonstrated that: (1) in structural terms, there are no significant differences between whispered and normal speech and, more importantly, that whispered speech manifests none of the characteristics of inner speech; (2) in functional terms, whispered speech is again profoundly different from inner speech, manifesting not the slightest tendency of convergence with it and, finally; (3) in genetic terms, whispered speech can be elicited very early, but there is no evidence of development or change in its nature from this point through school age. The sole support for Watson's thesis is the fact that under social pressure even the three year old child (with difficulty but in a very short time) develops speech with a reduced volume.

Watson's perspectives are widely known and typical of this general approach to the problem of thinking and speech. In addition, by focusing on Watson's views, we have been able to present a clear contrast between phenotypal and genotypal approaches to this issue. However, these factors were not our primary motivation for focusing on Watson's views in this context. Our primary consideration was of a more positive nature. Specifically, we feel the basis for a correct methodological resolution of the whole problem can be found in Watson's approach.

The methodological resolution of this problem requires that we find a middle link that unites the processes of external and inner speech, a link that is transitional between these two processes. As we have attempted to demonstrate, Watson's belief that this middle link is to be found in the whisper has no objective support. All that we know of the child's whisper contradicts the notion that it is the middle link in the transition between external and inner speech. However, the attempt to find this middle link -- an attempt which is absent from most psychological investigations of this problem -- is correct.

In our view, the transition between external and inner speech is to be found in the child's egocentric speech, a phenomenon that has been described by the Swiss psychologist Piaget (see chap. 2). Observations of the inner speech of school age children by Lemaitre and others support this thesis. These observations have demonstrated that the school child's inner speech is still comparatively labile, that it is not yet fully

established. This indicates, of course, that at this age we are dealing with what is still a genetically new process, one that is not yet sufficiently formed or defined.

Alongside the purely expressive function of egocentric speech, its tendency to simply accompany the child's activity, this process *becomes thinking in the true sense of the term*. It assumes the function of a planning operation or the function of resolving a problem that arises in behavior. If this proposition is supported by further research, we will be able to draw a conclusion of extraordinary theoretical significance. Specifically, we will have evidence that speech becomes inner psychologically before it becomes inner physiologically. Egocentric speech is speech that is inner in function. It is speech for oneself, speech on the threshold of becoming inner. It is already half incomprehensible to others. At the same time, however, it is still external in a physiological sense. There is no evidence which would indicate that it is being transformed into a whisper or any other kind of semi-soundless speech.

This leads us to an answer to another fundamental theoretical question, the question of *why* speech becomes inner. The answer would be that speech becomes inner because its function changes. The sequence underlying the development of speech would then be something different from that suggested by Watson. Rather than the stages of overt speech, the whisper, and soundless speech, we would have the stages of external speech, egocentric speech, and inner speech. At the same time, we would have gained something even more important in methodological terms. We would have gained a mode of studying inner speech, a means of studying its structural and functional characteristics in their living form and in the process of their formation. All the characteristics of inner speech would be observable in a form of external speech, a form of speech which we could experiment on and subject to measurement. Our research will demonstrate that the development of this form of speech is subordinated to the same laws as is the development of all mental operations depending on the use of signs, including mnemonic memory and the processes of calculation.

By studying several operations of this kind experimentally, we have established that this development passes through four basic stages. In the first stage, what can be called the primitive or natural stage, we find the operation in the form in which it has developed on primitive stages of behavior. This stage of development corresponds with the pre-intellectual speech and pre-verbal thinking that we discussed earlier.

The next stage is what we will call the stage of "naive psychology" in analogy with the phenomenon that researchers in the field of practical intellect call "naive physics." The phrase "naive physics" is used to refer to the naive experience of the animal or child with the physical characteristics of its own body and the objects and tools that surround it. It concerns the naive experience that defines the child's basic use of tools and the first operations of his practical mind. The child's naive experience of the characteristics of his more important mental operations is, in a similar manner, formed in his behavior. However, as in the development of practical actions, this naive experience usually turns out to be inadequate, imperfect, and naive in the true sense of the word. It leads, therefore, to inadequate use of the mind's characteristics, including the use of stimuli and reactions. In the domain of speech development, this stage is clearly expressed in the fact that the mastery of grammatical structures and forms precedes the mastery of the corresponding logical structures and operations. The child masters the subordinate clause (forms of speech such as "because," "since," "if," "when," or "but") long before he masters the corresponding causal, temporal, and conditional relationships. The child masters the syntax of speech earlier than he masters the syntax of thought. Piaget's research has demonstrated beyond doubt that grammatical development in the child leads logical development, that the child masters the logical operations corresponding to grammatical structures relatively late.

With the gradual accumulation of naive mental experience, the child reaches the stage of the external sign and external operation. Here, the child solves the internal mental task on the basis of the external sign. This is the familiar stage where the child counts on his fingers in the development of arithmetic skills and where external mnemonic signs are used in remembering. In the development of speech, this stage corresponds with the appearance of egocentric speech in the child.

This stage is followed by a fourth that we will call the stage of "rooting" because it is characterized by the movement of the external operation to the internal plane, by the transformation of the external operation into an internal operation. Of course, in the process, the operation undergoes profound change. In this stage, we find operations such as counting in the mind or mute arithmetic. This is the stage of what is called logical memory, a form of memory that utilizes internal relationships in the form of internal signs.

In the domain of speech, this stage corresponds with inner or soundless speech. In this context, the most significant characteristic of this stage is that there is a constant interaction between external and internal operations, that is, operations constantly move from one form to the other. We see this most clearly with inner speech. As Delacroix has demonstrated, the more closely inner speech is connected with external speech in behavior, the more similar they become. For example, inner speech may take a form identical with external speech when it occurs in the preparation of an upcoming speech or lecture. In this sense, there is no sharp metaphysical boundary between the external and the internal in behavior. One can easily be transformed into the other and each develops under the other's influence.

Moving now from the issue of the genesis of inner speech to the issue of how it functions in the adult, the first question we encounter is one that we have addressed earlier in connection with issues of phylogenesis and ontogenesis: Are thinking and speech necessarily connected in the adult's behavior? That is, can the two processes be identified with one another? All that we know that is relevant to this issue forces us to answer this question in the negative. The relationship of thinking and speech in this context can be schematically represented by two intersecting circles. Only a limited portion of the processes of speech and thinking coincide in what is commonly called verbal thinking. Verbal thinking does not exhaust all the forms of thought nor does it exhaust all the forms of speech. There is a large range of thinking that has no direct relationship to verbal thinking. In this category, we could include the instrumental and technical thinking that has been described by Buhler and what is commonly called practical intellect.

As is well known, the Wurzburg school has established that thinking can occur without any participation of speech images or movements. The most recent experimental work has also shown that activation and inner speech do not stand in any direct objective connection with movements of the tongue or larynx. In the same sense, there is no psychological basis for relating all forms of speech to thinking. For example, when I reproduce a poem that I have learned by heart in inner speech or repeat a phrase assigned in an experimental context, there is no evidence that would relate these operations to the domain of thought. Watson, who makes the mistake of identifying thinking and speech, is forced to consider all speech processes as intellectual. As a result, he associates with thinking even the processes involved in the simple reproduction of a verbal text in memory. We should also note that speech that is emotional-expressive in function or speech with a lyrical coloring can hardly be associated with intellectual activity in the true sense of the word.

In the adult, the fusion of thinking and speech is a limited phenomenon that is of significance only in the domain of verbal thinking. The domains of non-verbal think-

ing and non-intellectual speech are only indirectly influenced by this fusion. They are not linked with it in a direct causal manner.

4

Based on data made available to us by comparative psychology, we have attempted to trace the genetic roots of thinking and speech. We have seen that with the contemporary state of knowledge in this field no complete analysis of the genesis of pre-human thinking and speech is possible. One of the most basic issues, the issue of whether the higher apes possess an intellect of the type found in man, remains in dispute. Kohler answers this question positively but others answer it negatively. Nonetheless, however this dispute is ultimately resolved, one thing is clear even at this point. The *paths* that lead to the emergence of human intellect and human speech do not coincide. The genetic roots of thinking and speech are different.

Even those who are inclined to reject the notion that intellect is present in Kohler's chimpanzees do not and cannot reject the fact that we are dealing here with an important element in the development of human intellect, that we are dealing with the roots of intellect, with a more highly developed form of habit. Even Thorndike found ape behavior to be more advanced than the behavior of other animals (1901).* Others, Borovskii for example, reject the very concept of a higher stage of behavior, a stage of behavior constructed on a foundation of habits but deserving the special name of intellect. These scholars deny the presence of this type of behavior not only in animals but in humans. Of course, in discussions with this group, the very question of a human-like intellect in the apes must be framed somewhat differently.

In our view, whatever one's perspective on the higher behavior of the chimpanzee, this behavior is clearly the root of human behavior in that it is characterized by the use of tools. Kohler's discovery is no surprise for Marxism. Marx wrote that "the use and creation of the means of labor, though found in embryonic form in several animal species, is the characteristic feature of the human labor process" (Marx & Engels, *Collected Works*, v. 23, pp. 190-191). Along the same lines, Plekhanov[46] wrote that "whatever the nature of the underlying process, zoology gave to history a man who already possessed the capacity to invent and use primitive tools" (1956, v. 2, p. 153).

Thus, the most recent developments in zoological psychology are not entirely new *theoretical* developments for Marxism. It is interesting to note that Plekhanov clearly wrote not about instinctive behavior (e.g., the constructions of the beaver) but about the capacity to invent and use tools, about intellectual operations.**

For Marxism, the notion that the roots of human intellect are to be found in the animal world is not novel. In clarifying the meaning of Hegel's distinction between reason and intelligence, Engels wrote that:

> We share with animals all forms of intelligent activity: *induction, deduction* (and, consequently, even *abstraction*) (Didot's species concepts: four-

* In experiments with lower apes (i.e., marmosets), Thorndike observed a *sudden* acquisition of new movements that brought the animal closer to attaining a goal as well as a rapid and often instantaneous cessation of useless movements. He wrote that the speed of this process compared favorably with similar phenomena in man. What Thorndike observed here differed from problem resolution in the cat, dog, or chicken, which are characterized by a gradual elimination of movements that do not contribute to the achievement of the goal.

** In the chimpanzee, of course, we find not the instinctive use of tools, but the rudiments of their rational use. Plekhanov continues: "It is as clear as day that however undeveloped the use of tools, their use presupposes a comparatively advanced development of the mental capacities (1956, v. 2, p. 138).

> legged and two-legged), *analysis* of unfamiliar objects (breaking a nut is already a form of analysis), *synthesis* (in the sly tricks of animals), and, as the unification of both, the *experiment* (where new barriers or difficult positions are encountered). According to their type, all these methods, all the recognized logical means of scientific investigation, are identical in man and animals. It is only as a matter of degree (in accordance with the level of their development) that they differ (Marx and Engels, *Collected Works*, v. 20, p. 537).*

Engels expressed himself with equal decisiveness on the issue of the roots of speech in animals: "Within the limits of its own range of representations, it can learn and understand what it says." Engels provides *objective* criteria for this "understanding": "If you teach a parrot a swear word so that it attains a representation of its meaning (a common diversion of sailors returning from tropical countries) and tease him, you will quickly discover that it can apply its swear word just as well as any merchant in Berlin. The situation does not change when he begs for a tidbit" (ibid, p. 490).**

We would not want to ascribe to Engels the idea that we find human, or even human-like, speech and thinking among animals. We would certainly not want to defend this thesis ourselves. We will attempt to clarify the *proper limits* and true meaning of Engels's assertions on this issue later. At this point, we would simply emphasize that there is no basis for rejecting the presence of the genetic roots of thinking and speech in the animal world. Moreover, the paths along which these forms of behavior develop are distinct.

An advanced capacity for learning speech like that we find in the parrot, is not directly associated with highly developed forms of thinking. Correspondingly, advanced development of the rudiments of thought is not necessarily linked with advanced forms of speech. Each of these processes has its own developmental course. Each develops along separate lines.***

Regardless of one's views on the relationship between ontogenesis and phylogenesis, recent experimental studies have shown that the genetic roots of intellect and speech and the processes involved in their development differ in ontogenesis. That is, up to a certain stage, we can trace the pre-intellectual growth of the child's speech and the pre-verbal growth of his intellect. It is only later that, in Stern's words, *the two lines of development intersect*. Speech *becomes* intellectual and thinking verbal. Stern sees this as the *child's greatest discovery*.

Stern's perspectives on the convergence of speech and intellect are rejected by Delacroix and others who question the universal significance of the distinction between the first age of childhood questions and the second (i.e., the four year old's re-

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* Elsewhere Engels writes: "We would not, however, presume to reject the notion that animals possess the capacity for planned, intentional actions" (i.e., actions of the type that Kohler finds in the chimpanzee). And further: "An image of the action exists in embryonic form wherever protoplasm, living protein, exists and reacts." This capacity "has attained an advanced level in the mammals (Marx and Engels, *Collected Works*, v. 20, p. 495).

** Elsewhere, Engels writes that: The little that the latter, even the most developed, have to communicate to one another can be communicated even without the use of differentiated speech" (ibid, p. 489). In Engels view, domesticated animals may experience the *need* for speech. "Unfortunately, their vocal organs are so specialized that their experienced need is of no use. Where, however, the animal has an organ that approaches that required for speech, the incapacity for speech can disappear to a certain extent" (ibid). The parrot is a good example.

*** Smidt notes that the level of speech development is not a direct indicator of the level of development of mind or behavior in the animal world. Both the elephant and horse fall behind the pig and chicken in their level of speech development (1923, p. 46).

peated question: Why?). In any event, these scholars reject the significance that Stern ascribed to this first stage of childhood questions. They reject his argument that it is a symptom of the child's discovery that "everything has its name" (Delacroix, 1924, p. 286). Wallon suggests that for a certain period of time the "name" is more an attribute of the object than a substitute for it.

> When the one-and-a-half year old asks the name of an object, he observes a connection that he has discovered. However, there is nothing to indicate that he sees in one anything other than a simple attribute of the other. Only a systematic generalization of questions would indicate that what we are seeing here is not an accidental and passive connection, but a tendency of an existing function to seek out the symbolic sign for all real things" (Delacroix, 1924, p. 287).

As we have seen, Koffka takes a position that lies somewhere between these two perspectives. On the one hand, following Buhler, he emphasizes the analogy between the invention or discovery of the nominative function of language in the child and the invention of tools in the chimpanzee. On the other, he limits this analogy by saying that the word enters into the structure of the thing but not necessarily into the functional meaning of the sign. The word enters into the structure of the thing as a part of it, alongside it. For a time, it becomes for the child a characteristic of the thing alongside its other characteristics.

However, this particular characteristic of the thing, its name, is separable from it (*verschiedbar*). Things can be seen when their names are not heard in much the same way that the eyes are a stable but separable aspect of the mother that are not seen when the mother averts her face. "The situation is precisely the same even for us. The blue dress remains blue even when in the dark we cannot see its color. The name is a characteristic of all objects and the child supplements the structure of all objects in accordance with this rule" (Koffka, 1925, p. 244). Buhler points out that any new object presents the child with a situation or task that he resolves in accordance with this general structural scheme, by naming it with the word. Where he does not have a word adequate for designating a new object, he demands it from adults (Buhler, 1923, p. 54).

In our view, the perspective that most closely approximates the truth and effectively eliminates many of these difficulties emerges in the argument between Stern and Delacroix. Data from ethnic and child psychology (see Piaget, 1923) indicate that for the child the word is for some time *more a characteristic of the thing than a symbol for it*. As we have seen, the child masters the *external structure earlier* than the *internal structure*. He first masters the *external* structure -- word-thing. Only later does this *become* a symbolic structure.

We are once again faced with an issue that has not been empirically resolved. We are faced with several hypotheses and can only select the one that is the more probable. Our own tendency would be to reject out of hand the attribution of the discovery of the symbolic function of speech to the one-and-a-half year old child. First, such a discovery is a conscious and very complex intellectual operation which does not seem to correspond with the general level of the child's mental development at this age. Second, the experimental data indicate that the functional use of the sign, even of sign forms that are less complex than the word, appears at a later stage of the child's development. It is completely inaccessible to the child at this stage. Third, data on the child's speech indicate that it does not attain conscious awareness of the symbolic significance of speech for a long time and uses the word as one of the characteristics of the thing. Fourth, observations of abnormal children (Hellen Keller in particular[47]), observations that are cited by Stern himself, indicate that if one traces how this critical

moment emerges in the speech of deaf children one finds no "discovery" that can be identified with temporal precision. On the contrary, there is a whole series of "molecular" changes (Buhler, 1923).

Finally, this view coincides with the mastery of the sign as it emerged in the experimental studies outlined in the preceding section. Even in the school-age child, we never observed a discovery that led directly to the sign's functional use. There was always a prior stage of "naive psychology," a stage of mastering the *external structure of the sign*. It was only later, in operating with the sign, that the child was led to its proper functional use. The child who views the word as a characteristic of the thing alongside its other characteristics is at precisely this stage in speech development.

All this evidence indicates that Stern's position was improperly based on an external interpretation of the child's questions, that is, on a *phenotypal* interpretation of these questions. However, our basic conclusion that thinking and speech move along different genetic paths in ontogenesis, that their developmental courses intersect only at a given point, does not fall along with Stern's perspective on this issue. Whether Stern's position or any another stands or falls, this basic conclusion remains. All agree that the child's initial intellectual reactions, reactions established experimentally by Kohler and others, are as independent of speech as are the chimpanzee's actions (Delacroix, 1924, p. 283). Moreover, all agree that the initial stages in the development of the child's speech are pre-intellectual.

With respect to the infant's babbling, the thesis that the initial stages of the child's speech are pre-intellectual is obvious and undisputed. In addition, however, this thesis has recently been affirmed with respect to the child's first words. It is true that several authors have recently disputed Meumann's position that the child's first words are affective-volitional in nature and that objective meaning is foreign to them, his position that they represent "wishes or feelings" (Meumann, p. 1928). Stern has argued that the elements of the object have not yet been differentiated in the initial words (Stern, p. 1928) and Delacroix sees a direct link between the initial words and the objective situation (Delacroix, p. 1924). However, both authors agree that the word has no constant or stable objective meaning at this point and that it is similar in this respect to the parrot's swear word. The word is linked with the objective situation only to the extent that wishes, feelings, and emotional reactions are linked with it. This does not constitute a rejection of Meumann's basic position (ibid, p. 280).

We can now summarize our analysis of the development of speech and thinking in ontogenesis. As was the case in phylogenesis, the genetic roots and the course of development of thinking and speech are different up to a *given point*. What is unique to human ontogenesis is the *intersecting of these paths of development*. That this intersection occurs is not disputed. Whether it occurs at a single point or many times, whether it occurs suddenly and catastrophically or develops slowly and gradually, whether it is the result of a discovery or of a simple structural action and an extended functional transformation, whether it occurs near the age of two or nearer school age, the basic fact remains unquestioned. These two lines of development intersect.

We must also summarize our analysis of inner speech. Once again, we find several hypotheses. However, whether inner speech passes through the whisper or through egocentric speech, whether it develops simultaneously with external speech or arises at a comparatively late stage of development, whether inner speech and the thinking associated with it are considered a distinct stage in the development of cultural forms of behavior, the basic facts remain. Inner speech develops through a long cumulative series of functional and structural changes. It branches off from the child's external speech with the differentiation of the social and the egocentric functions of

speech. Finally, the structure of speech that the child masters becomes the basic structure of his thinking.

A basic, indisputable, and decisive fact emerges here: thinking depends on speech, on the *means of thinking*, and on the child's socio-cultural experience. The development of inner speech is defined from the outside. As Piaget's research has shown, the development of the child's logic is a direct function of his socialized speech. This position can be formulated in the following way: the development of the child's thinking depends on his mastery of the social means of thinking, that is, on his mastery of speech.

Here, we approach the formulation of the fundamental thesis of our work, a thesis of great methodological significance for the correct statement of the problem of thinking and speech. This thesis stems from our *comparison* of the development of inner speech and verbal thinking in man with the development of speech and intellect as it occurs in the animal world and the earliest stages of childhood. This comparison demonstrates that the former does not represent a simple continuation of the latter. The very type of development changes. It changes from a biological form of development to a socio-historical form of development.

As the preceding section clearly demonstrated, verbal thinking is not a natural but a socio-historical form of behavior. It is therefore characterized by a whole series of *features and laws* that do not apply to natural forms of thinking and speech. The most important point, however, is that this recognition of the historical nature of verbal thinking requires that in analyzing it we apply the same methodological theses that historical materialism applies to the other historical phenomena of human society. We can anticipate that the basic features of the historical development of behavior in this domain will be directly dependent on the general laws that govern the historical development of human society.

In this way, the problem of thinking and speech grows beyond the boundaries of natural science. It is transformed into the central problem of the historical psychology of man. It becomes the central problem of social psychology. The methodological statement of this problem is also transformed. While we did not deal with this issue in its entirety, we attempted to address the *central points*. In methodological terms, these points are extremely difficult, but they are central to any analysis of human behavior. We have attempted to address them on the foundations provided by dialectical and historical materialism.

This second problem of thinking and speech, as well as many other aspects of the functional and structural analysis of the relationship between these processes, must be left for future studies.

Chapter 5

AN EXPERIMENTAL STUDY OF CONCEPT DEVELOPMENT

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Until recently, a major impediment to the study of concepts has been a lack of experimental methods that would allow the investigation of their formation and their psychological nature.

Traditional methods for studying concepts fall into two basic groups. The first is typified by what is called the method of definition. This method involves the study of fully developed and fully formed concepts through the use of verbal definitions. Despite its wide acceptance, this method suffers from two fundamental inadequacies that make it unreliable for any realistic investigation of concept formation.

1. This method deals with the results of the completed process of concept formation, with the ready-made product of that process. When we use this approach, we are not looking at the dynamics of the process itself, at its development, its course, its beginning and its end. This method is an investigation of the product not of the process that leads to its formation. Consequently, in studying definitions of developed concepts, we are frequently dealing less with the child's thinking than with his reproduction of fully formed knowledge and definitions. Thus, when we study the child's definitions of a particular concept, we are studying his knowledge or experience and the level of his verbal development more than we are studying his thinking in the true sense of the word.

2. The method of definition depends almost exclusively on the word. It overlooks the fact that, for the child in particular, the concept is linked with sensual material, the perception and transformation of which gives rise to the concept itself. This sensual material and the word are both necessary for the concept's development. Divorced from this material, the word transfers the process involved in the concept's definition to a purely verbal plane, a plane that is not characteristic of the child. When this method is used, we therefore rarely succeed in identifying the relationship that exists between the meaning the child attributes to the word in a purely verbal definition and the word's real meaning in the process of its living relationship to the objective reality it designates.

When this method is used, that which is most essential to the concept (i.e., its relationship to reality) remains unexplored. When we attempt to approach the meaning of the word through other words in this way, what we discover would better be attributed to the relationships among word families that have already been learned or mastered than to a true reflection of the nature of the child's concepts.

The second group of methods used in the study of concepts attempts to overcome the inadequacies of the purely verbal approach of the method of definition by focusing on the mental functions and processes that underlie the formation of concepts. These methods are concerned with the functions and processes that underlie the transformation of the concrete experience from which the concept is born. Here, the child is presented with the task of isolating some general feature from several concrete impressions, of isolating or abstracting this feature from others that are perceptually intertwined with it. The child is presented with the task of generalizing or abstracting this feature.

The inadequacy of this second group of methods is that they replace a complex synthetic process with an elementary one that constitutes only one part of the whole. The role of the word or sign in the process of concept formation is ignored. The result is that the process of abstraction is radically oversimplified. It is torn away from its relationship with the word. This relationship, however, is fundamental to the process of concept formation. It is, indeed, the determining feature of that process.

Thus, both of these traditional methods for studying concepts divorce the word from objective material. One begins by isolating the word from the objective material. The other begins by isolating the objective material from the word.

The development of an experimental method that could adequately reflect the process of concept formation by including both features of the process, by including the material on the basis of which the concept is worked out and the word through which it arises, represented an important step forward in the study of concepts.

We will not dwell on the complex history of this new method. We will only note that its introduction opened up an entirely new plane for the researcher. This method created the potential for studying the process of concept formation rather than merely studying the fully developed concept. As used by N. Ach, the method was justifiably called the synthetic-genetic method. It involves investigating the process through which the concept is constructed, the process involved in the synthesis of the several features that form the concept. That is, this method involves the investigation of the process of the concept's development.

This method involves the introduction of: (1) artificial words that are initially meaningless to the subject and have no connections with the child's previous experience, and (2) artificial concepts that are composed for experimental purposes by combining features so that the resulting set of features is not encountered in the concepts designated by our normal speech. In Ach's experiments, for example, the word "gatsun" was initially meaningless to the subject but acquired a certain meaning over the course of the experiment. This word became the bearer of a concept designating things that are big and heavy. In a similar way, the word "fal'" became the bearer of a concept that designated things that are small and light.

In this experiment, the whole process through which the initially meaningless word acquires meaning (i.e., the concept's development) is laid out in front of the investigator. Through the introduction of artificial words and concepts, this method overcomes a critical failing of other methods. Specifically, the subject's resolution of the task that faces him in the experiment presupposes no previous experience or knowledge. Therefore, the positions of the young child and the adult are equalized in

this respect. Ach utilized his method with both a five year old child and an adult. This allowed him to study the process involved in concept formation in pure form.

A major deficiency of the method of definition is that the concept is torn from its natural connections. It is isolated in a congealed and static form from the actual processes of thinking where it is encountered. It is isolated from the processes of thinking where it is born and lives. The experimenter selects an isolated word and the child must define it. This definition of the isolated word taken in a congealed form tells us nothing of the concept in action. It tells us nothing of how the child operates with the concept in the real-life process of solving a problem, of how he uses it when some real-life need for it arises.

As Ach suggests, ignoring this functional aspect of the concept reflects a failure to remember that the concept does not live in isolation, that it is not a congealed, static formation but a formation that is always encountered in the vital and complex process of thinking. A concept always fulfills some function in communication, reasoning, understanding, or problem solving.

The new method is not deficient in this way. Here, the *functional conditions of the concept's origins* are the focus of investigation. The concept is taken in connection with a particular task or need that arises in thinking, in connection with understanding or communication and with the fulfillment of a task or instruction that cannot be carried out without the formation of the concept. As a consequence, this new research method is an extremely valuable tool for studying concept development.

Although Ach himself did not study the formation of concepts in the transitional age, he could nonetheless not help but note the dual transition (involving both the content and the form of thinking) that occurs in the intellectual development of the adolescent. This transition signifies the transition to thinking in concepts.

Rimat[48] conducted a special and thorough investigation of the processes involved in the formation of concepts in adolescence. These studies were based on methods developed by Ach. Rimat found that concept formation begins to occur only when the child approaches the transitional age, that it is inaccessible to the child before this period. Ach writes that:

> We can firmly establish that only toward the end of the twelfth year of life do we see a sharp increase of the capacity for independent formation of general objective representations. In my view, it is extremely important to turn our attention to this fact. Thinking in concepts divorced from immediately perceivable features presents the child with demands that exceed his mental capacities before the age of twelve years (Rimat, 1925, p. 112).

We will not dwell on how this study was conducted or on the other theoretical conclusions Rimat derives from it. We will limit ourselves to emphasizing its central findings. Specifically, Rimat's findings contrast with the claims of psychologists who reject the emergence of any new intellectual functions in adolescence, psychologists who claim that the three year old has all the intellectual operations of the adolescent. His research shows that it is only after the age of twelve (i.e., with the beginning of adolescence and the completion of the first school age) that the child begins to develop the processes that lead to the formation of concepts and abstract thinking.

One of the basic conclusions to which we are led by the research of Ach and Rimat is the refutation of the associative perspective on concept formation. Ach's research shows that however numerous and strong the associative connections between verbal signs or objects, the presence of such connections is insufficient for the formation of concepts. There is no experimental support here for the old idea that the concept arises through associative processes, through the reinforcement of the associative

connections that correspond to the features common to several objects and through the weakening of the connections that correspond to the features with respect to which these objects differ.

Ach's experiments show that concept formation always has a productive rather than reproductive character. They show that the concept arises and is formed in a complex operation that is directed toward the resolution of some task. They show that the simple presence of certain external conditions and the mechanical establishment of connections between objects and the word is not sufficient for the emergence of the concept. In addition to establishing the non-associative and productive character of the process of concept formation, these experiments led to another equally important conclusion. Specifically, Ach's experiments identified what he views as the basic factor which defines the course of concept formation. Ach calls this factor the *determining tendency*.[49]

Ach uses this phrase to refer to the tendency that regulates the flow of our representations and actions. The tendency emerges from the representation of the goal toward which these actions are directed and from the task that the activity is meant to achieve. Prior to Ach, psychologists distinguished two basic tendencies that subordinate the flow of our representations, specifically, the reproductive (or associative) tendency and the perseverative tendency. The first is the tendency to elicit representations associated with a given representation in previous experience. The second is the tendency of each representation to return or re-enter the flow of representations.

In his early studies, Ach showed that these tendencies are insufficient to explain consciously regulated acts of thinking that are directed toward the resolution of some problem. The latter are regulated not by acts of reproduction of representations through associative connections or by the tendency of each representation to re-enter consciousness but by a special determining tendency deriving from the representation of the goal. In studying concepts, Ach once again showed that the critical feature in the emergence of a new concept is the determining tendency that regulates the action, the tendency that emerges from the task presented to the subject.

Thus, according to Ach's scheme, concepts are not constructed as associative chains, where one connection elicits another that is connected with it through processes of association. Rather, they are constructed through a goal-directed process composed of several operations that function as means for the solution of the basic task. In itself, learning words and their connections with objects does not lead to the formation of concepts. The subject must be faced with a task that can only be resolved through the formation of concepts.

We have said that Ach's work represents a tremendous step forward in comparison with earlier research. He included the process of concept formation within the structure of the resolution of a particular task. He studied the functional significance and the role of this aspect of the problem. However, this is not a complete solution to the problem. Of course, the goal or task that is established is necessary for the emergence of the process that is functionally linked to the task's resolution. There are, however, goals in the activity of the preschooler and even younger children. As we have seen, however, no child younger than twelve years is fully capable of conscious awareness of the task before him nor is he capable of working out a new concept.

Ach himself demonstrated experimentally that the difference between preschool children and adults or adolescents in the solution of a problem is not that the former represent the goal of the task less fully or correctly than the latter but that the act of resolving the problem unfolds in a completely different manner. In an extensive experimental study of concept formation in the preschooler (which we will discuss in more detail later), Uznadze[50] has shown that in functional terms the preschooler en-

counters the problem in precisely the same way as the adult who is operating with concepts. However, the preschooler resolves the task in an entirely different way. Like the adult, the child uses the word as a means. Consequently, the word is for him connected in the same way with the functions of communication, interpretation, and understanding.

Thus, it is not the task, the goal, or the determining tendency but factors not considered by these researchers that underlie the difference between adult conceptual thinking and the forms of thinking characteristic of the young child. In particular, Uznadze pointed out the importance of a functional factor which is advanced to the forefront by Ach's research, specifically, the factor of communication, of mutual understanding between people through speech.

> However, the word is a tool used for the attainment of mutual understanding. This plays a decisive role in the development of the concept. In the process of attaining mutual understanding, a complex of sounds acquires a definite meaning and is consequently transformed into a word or concept. If this functional aspect of mutual understanding did not exist, this complex of sounds could not be transformed into a carrier of meaning. Not a single concept would arise (Uznadze, 1966, p. 76).

Contact between the child and the adult world that surrounds him is established extremely early. From the outset, the child develops within the atmosphere provided by a speaking environment. He begins to use the mechanism of speech in the second year of life. "There is no question that what he uses are not complex meaningless sounds but true words. In time, they acquire increasingly differentiated meanings" (ibid, p. 77). Nonetheless, it seems to be relatively late that the child achieves the degree of socialization in his thinking necessary for the emergence of fully developed concepts.

> Thus, we see on the one hand that the true concept, which indicates a high level of socialization of thinking, develops only at a late stage. On the other, we see that the child begins to use words and understand the words of adults at a very early age. It is clear, then, that before it attains the status of a true concept, the word can take on this communicative function and serve as a means of establishing mutual understanding. A special investigation of the appropriate age group would show how these forms of thinking (the equivalent of conceptual thinking though non-conceptual) develop and achieve the level characteristic of fully developed thinking (ibid).

Uznadze's research shows that though these forms of thinking are the functional equivalent of conceptual thinking, they differ qualitatively and structurally from the more developed thinking of the adolescent and adult. Nonetheless, this difference is not a function of the factor that Ach identifies. As Uznadze has shown, it is precisely in the functional sense, that is, with respect to the resolution of particular tasks and with respect to the determining tendencies that are derived from representations of goals, that these forms are the equivalent of the concept.

We are confronted with the following situation. First, the task - and the goal representations that are derived from it - turn out to be accessible to the child at a relatively early stage of development. Precisely because the task of understanding is the same for the child and the adult the functional equivalents of the concept develop at a very early stage of childhood. Given this identity in task, this functional equivalence, there is nonetheless a profound difference in the composition, structure, and mode of

activity of the forms of thinking that function to resolve the task in the child and the adult.

Obviously, the task and the representation of a goal do not themselves determine and regulate the entire process. There is an additional factor that Ach has failed to consider. It is also apparent that the task and the determining tendency that is associated with it are inadequate to explain the genetic and structural differences that we observe in these functionally equivalent forms of thinking in the adult and child.

The goal is not a sufficient explanation. Of course, without the goal no form of goal-oriented action is possible. However, irrespective of whether we are speaking of its development or its structure, the presence of this goal does not explain the process through which it is attained. As Ach himself says with reference to the older methods, the goal and the associated determining tendency make the process possible but they do not regulate it. The presence of the goal and task is a necessary but not sufficient condition for the emergence of goal-oriented activity. They do not guarantee that a true goal-oriented activity will emerge. At any rate, they do not possess the power to determine and regulate the course and structure of that activity. The child's experience and the experience of the adult correspond fully when unresolved tasks arise before them. Thus, we must begin with the goal in our attempt to explain the nature of the mental processes that lead to the resolution of a task, but we cannot limit our explanation to it.

As we said earlier, the goal cannot explain the process. The basic problem associated with the process of the concept formation, and, more generally, with the process of goal-oriented activity, is the problem of the means through which a given mental operation is fulfilled, the problem of how a given goal-oriented activity is completed. In much the same way, we cannot satisfactorily explain labor by saying that it is called to life by the goals and tasks with which man is faced. Labor must be explained in terms of the use of tools and the application of the means without which it could not arise. In precisely the same sense, the central problem for the explanation of the higher forms of behavior is the problem of the means through which man masters the processes of his own behavior.

As is indicated by the study that we will discuss here, all the higher mental functions are mediated processes. A central and basic aspect of their structure is the use of the sign as a means of directing and mastering mental processes.

In the problem of interest to us, the problem of concept formation, this sign is the word. The word functions as the means for the formation of the concept. Later, it becomes its symbol. Only the investigation of the functional use of the word and its development from one age to the next (a development where the various uses of the word are genetically linked with one another) provides the key to the formation of concepts.

The major inadequacy of Ach's method is that it cannot help us clarify the genetic process involved in concept formation. It can only establish the presence or absence of this process. The organization of Ach's experiment presumes that the means through which the concept is formed (i.e., the experimental words which function as signs) are given from the outset; it presumes that they are constants that do not change over the course of the experiment. Moreover, their mode of application is predetermined by the instructions. Given his critical and polemical goal of trying to show that a single associative connection between words and objects is insufficient for the emergence of meaning, the goal of trying to show that the meaning of the word or concept is not equivalent to an associative connection between a sound complex and a series of objects, Ach consistently maintained a scheme that can be expressed in the following

words: from below to above, from separate concrete objects to the concepts that grasp them.

Ach himself shows, however, that the organization of this kind of experiment directly contradicts the actual process involved in concept formation. Fogel has stated that concept formation cannot be reduced to a movement upwards through a conceptual paradigm, to a transition from the concrete to the increasingly abstract. This is the basic conclusion of Ach and Rimat's research. They have demonstrated the falsity of the associative perspective on concept formation. They have shown the productive, creative character of the concept and clarified the essential role of function in the concept's origin. They have emphasized that the concept is formed only with the emergence of a need that can be satisfied in the concept, only in the process of some meaningful goal-oriented activity directed on the attainment of a particular goal or the on resolution of a definite task.

These studies have done away with the mechanistic representation of concept formation once and for all. Nonetheless, they have failed to reveal the actual genetic, functional, and structural nature of this process. They have taken a common path in using a purely teleological explanation of the higher functions. In essence, they are reduced to the assertion that the goal itself creates the corresponding goal-oriented activity through a determining tendency. They are reduced to the assertion that the solution is contained in the task itself.

We have mentioned that, in addition to the general philosophical and methodological inadequacies of this perspective, it leads to an irresolvable empirical contradiction. Given the functional identity of the tasks and goals throughout the process, it is impossible to explain within this framework why there are such profound differences in the forms of thinking with which the child approaches these tasks at various stages of development. It becomes incomprehensible how these different forms of thinking develop.

The studies of Ach and Rimat have initiated a new epoch in the study of concepts, but they have failed to offer a causal-dynamic explanation of concept formation. Therefore, experimental research is presented with the task of studying the development of concept formation, the task of studying how this process is causally and dynamically determined.

2

To resolve this problem, we have used an experimental method that we call the functional method of dual stimulation. In using this method, we study the development and activity of the higher mental functions with the aid of two sets of stimuli. These two sets of stimuli fulfill different roles *vis-a-vis* the subject's behavior. One set of stimuli fulfills the function of the object on which the subject's activity is directed. The second function as signs that facilitate the organization of this activity.

In the present context, we will not provide a detailed description of the application of this method to the study of concept formation. The method was developed by our colleague L. S. Sahkarov[51] and described elsewhere (Sahkarov, 1930). We will outline only the most basic characteristics of the method, focusing on those which are of particular significance to the problems discussed above. In this research, we wanted to clarify the role of the word -- that is, the nature of its functional application -- in the process of concept formation. In this respect, the organization of this experiment was the opposite of Ach's.

Ach's experiment begins with a learning period in which the experimenter has not yet assigned any task to the subject. The subject is, however, given the means (i.e., the words) necessary for the solution of the problem. During this period, the subject studies, picks up, examines, and names the objects that have been placed in front of him. The task is not given at the outset, but introduced later. However, the means (i.e, the words) are given from the outset. They are given in direct associative connection with the stimulus objects.

When the method of dual stimulation is used, the opposite situation holds. The task is presented fully to the subject in the initial moments of the experiment and remains consistent throughout. The underlying idea is that the establishment of the task or emergence of the goal is a prerequisite for the development of the process as a whole. In contrast, the means are introduced gradually. They are introduced as the words which have been provided prove inadequate for the subject's attempts to solve the task. There is no learning period before the experiment begins. Thus, the way that the task is to be resolved is transformed. The stimulus-sign or word constitutes the variable. The task is the constant. This makes it possible to study how the subject uses the sign as a means of directing his intellectual operations. Depending on how the word is used, depending on its functional application, we are able to study how the process of concept formation proceeds and develops.

When the experiment is organized in this way, the pyramid of concepts is turned on its head. This factor is extremely important and we will discuss it in more detail later. Here, the path through which the task is resolved in the experiment corresponds with the actual process of concept formation. As we will see, this process does not occur mechanically or through a summarizing process as with Galton's photographs. It does not occur through a gradual transition from the concrete to the abstract. The reverse movement, the movement from above to below, from the general to the particular or from the top of the pyramid to its base is as characteristic of this process as is the reverse movement toward the pinnacle of abstract thinking.

Finally, the functional aspect that Ach referred to is extremely important. The concept does not emerge in a static and isolated form but in the vital process of thinking and resolving a task. The whole investigation can be broken down into several separate stages, each of which includes the concept in action, that is, in one of its functional applications to the processes of thinking. There is initially a process in which concepts are worked out. This is followed by a stage in which these concepts are transferred to new objects, then by the use of the concept in free association, and, finally, by the application of the concept in the formation of judgments and the definition of developed concepts.

The experiment proceeds in the following manner. First, several objects varying in color, form, and dimension are placed on a special board that is divided into separate sections. These objects are illustrated in Figure 1. One of these objects is then shown to the subject. On the underside of each is a nonsense word that the subject reads.

The subject is then asked to place all the objects on which he believes the same word is written on a single section of the board. After each attempt by the subject to solve the task, the experimenter corrects him and reveals the name on an additional object. This new object may have the same name as that which was revealed previously. In this case, it may differ from the former in a single feature and be similar to it in all others. The new object may also have be designated by another sign. In this case, it will be similar to the former in one feature and different in all others.

Thus, after each new attempt, the quantity of objects and the number of desig-

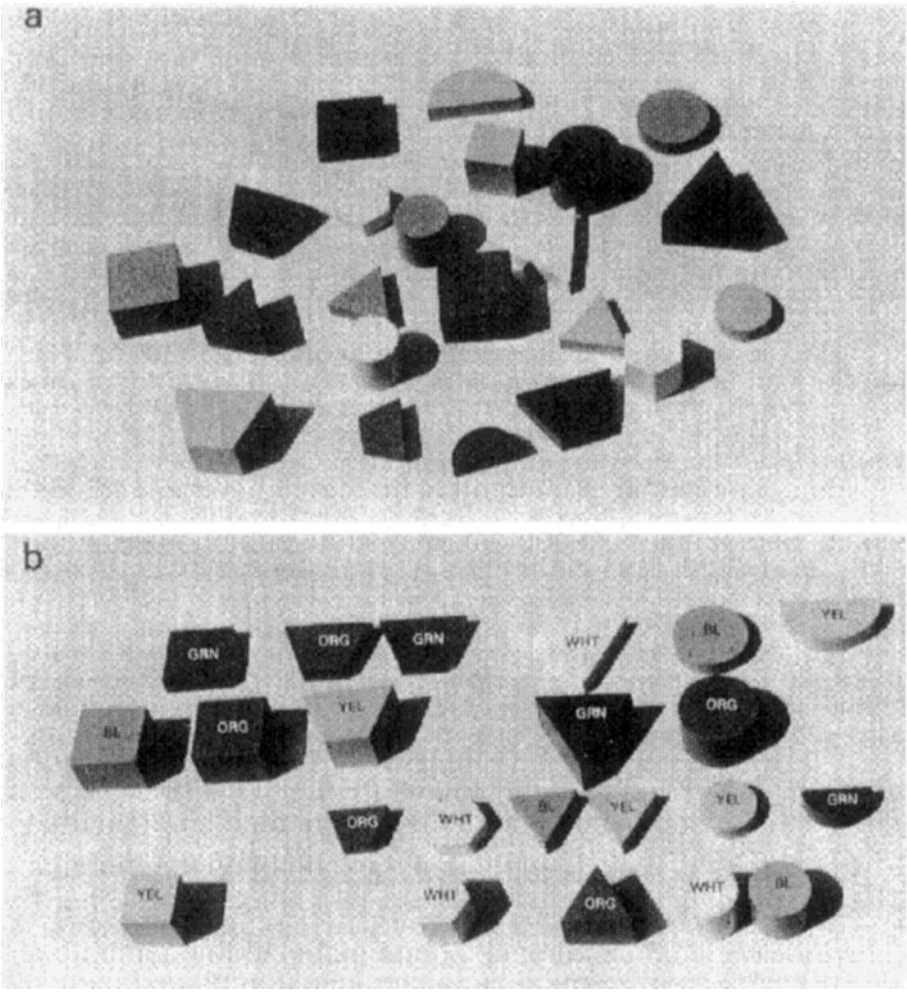

FIGURE 1. Experimental concept formation: The method of L. S. Sakharov. (a) The blocks in random arrangement. (b) The blocks arrayed in four categories. [The colors of the blocks have been noted. Photo: A.S.C.].

nating signs that are revealed to the child both increase. This allows the experimenter to study how the character of the task resolution changes in dependence on this factor. The task itself remains the same throughout the experiment. That is, the same word is found on the objects throughout the experiment. The objects are associated with a single general experimental concept designated by a single word.

3

A series of studies on the process of concept formation were begun in our laboratory by Sakharov and completed in cooperation with Iu.V. Kotelova and E. I. Pashkovska. More than 300 normal children, adolescents, and adults participated in these studies. In addition, we studied several subjects suffering from various pathologies of intellect and speech.

The basic conclusion of this research has direct relevance for the theme with which we are currently concerned. We were able to study the genetic path characteristic of concept formation in subjects of various age groups. We compared and evaluated this process as it occurred under identical conditions in children, adolescents, and adults. On the basis of this experimental research, we were able to clarify the basic laws governing the development of this process.

In genetic terms, the basic conclusion of our research can be formulated in the following way: *The development of the processes that eventually lead to the formation of concepts has its roots in the earliest stages of childhood. However, these processes mature only in the transitional age. It is only at this point that the intellectual functions which form the mental basis for the process of concept formation are constituted and developed.*

Only with the transformation of the child that occurs in adolescence does the decisive transition to thinking in concepts become possible. Before this age, a unique intellectual formation that is externally similar to the true concept is present. A superficial research effort might be misled by the external similarity of these two formations, resulting in a claim that true concepts are present at a very early age. The unique intellectual formations present in the preadolescent period are, in fact, functionally equivalent to the true concepts that mature later. They fulfill a function similar to that of concepts and function in the resolution of similar tasks. However, experimental analysis indicates that their psychological nature, their constituents, their structure, and their mode of activity differ significantly from those of the true concept. These formations have much the same relationship to the true concept that the embryo has to the mature organism. If we identify these two formations with one another, we ignore an extended developmental process and put an equal sign between the initial and final stages of this process.

We would not be exaggerating if we said that the common tendency to identify the intellectual operations emerging in the transitional age with those of the three year old child has no more foundation than an identification of the epoch of sexual maturation characteristic of the transitional age with the sexuality of the infant. Just as the elements of the adolescent's future sexuality and sexual attraction are present in infancy, the elements and constituents of the adolescent intellect are present in the young child.

We will conduct a detailed comparison of true concepts and the functionally equivalent formations found in the thinking of the preschool and school-aged child. However, as a foundation for that discussion, we must first establish what actually does emerge in the child's thinking in the transitional age. We must establish what impels the formation of concepts toward the center of the mental transformation that constitutes the crises of this period. As a first step, we must consider the most general characteristic of the process of concept formation and indicate why it is only in adolescence that the child masters this process.

Experimental research on concept formation has shown that a fundamental and necessary part of the process is the functional use of words or other signs as means of actively directing attention, partitioning and isolating attributes, abstracting these attributes, and synthesizing them. The formation of the concept and the acquisition of

word meaning is the result of a complex activity (i.e., the activity of operating on the word or sign) in which all the basic intellectual functions participate in unique combination.

This allows us to formulate the basic claim to which our research has led us. This research indicates that the proximal factor determining the formation of concepts (i.e., of this unique mode of thinking) is not association (as many authors suggest), attention (as G. Muller[53] argues), the mutual cooperation of judgment and representation (as Buhler's theory of concept formation implies), or the determining tendency (as Ach proposes). All these processes participate in the formation of concepts. None of them, however, is the determining and essential factor. None of them is a factor which itself constitutes an adequate explanation of the emergence of this new form of thinking. This form of thinking is unique and irreducible to elementary intellectual operations.

None of the processes mentioned above undergoes any noticeable transformation during the transitional age. None of these elementary intellectual functions emerge for the first time during this period. They are not a new acquisition of the transitional age. In this connection, the widespread notion that there is nothing fundamentally new in the intellect of the adolescent is correct. These functions were defined and matured at a much earlier age. During adolescence they simply continue the smooth course of their development.

The process of concept formation cannot be reduced to the processes of association, attention, representation, judgment, or determining tendencies, though all of these functions are indispensable for the complex synthetic process involved in concept formation.

Research indicates that what is central to this process is the functional use of the sign or word as the means through which the adolescent masters and subordinates his own mental operations and directs their activity in the resolution of the tasks which face him.

All the elementary mental functions that are commonly cited in connection with concept formation do actually participate in that process. However, their participation takes an entirely different form than is generally assumed. These processes do not participate as processes developing independently of one another in accordance with their own internal logic. They participate as processes that are mediated by the sign or word, as processes that are directed toward the solution of a given task and are thereby introduced into a new combination or synthesis. It is only within this new synthesis that each of the participating processes acquires its true functional significance.

Applied to the problem of concept development, this means that factors such as the accumulation of associations, the development of the volume or stability of attention, the accumulation of groups of representations, or the existence of determining tendencies, cannot themselves lead to the formation of concepts, however far the development of these factors may have progressed. None of these processes alone is the genetic factor that determines the development of concepts. The concept is not possible without the word. Thinking in concepts is not possible in the absence of verbal thinking. The new, essential, and central feature of this process, the feature that can be viewed as the proximal cause of the maturation of concepts, is *a specific way of using the word*, specifically, the functional application of the sign as a means for forming concepts.

In discussing our research method, we noted that neither the establishment of the task nor the emergence of a need for the formation of the concept can be considered the cause of the process of concept formation. These factors can set the process of task resolution in motion, but cannot insure its realization. Identifying the goal as the

active force in concept formation cannot explain the causal-dynamic and genetic relationships that constitute the basis of this complex process any more than the target toward which a cannon ball is directed explains its flight. To the extent it is taken into consideration by those who aim the cannon, there is no question that the end goal is one of the features that determines the cannon ball's actual trajectory. In the same way, the character of the task with which the adolescent is faced and that he resolves through the formation of concepts is without question among the functional features that must be considered in a complete scientific explanation of the process of concept formation. It is precisely this emerging task, need, or goal that is posed for the adolescent by the surrounding social environment that impels and forces him to make this decisive step in the development of his thinking.

In contrast to the maturation of instincts or innate tendencies, the motive force that determines the beginning of this process and sets in action the maturational mechanism of behavior impelling it forward along the path of further development is located not inside but outside the adolescent. The tasks that are posed for the maturing adolescent by the social environment -- tasks that are associated with his entry into the cultural, professional, and social life of the adult world -- are an essential functional factor in the formation of concepts. Repeatedly, this factor points to the mutually conditioned nature, the organic integration, and the internal unity of content and form in the development of thinking.

Later, in our discussion of the factors underlying the cultural development of the adolescent, we will consider the fact -- long established by scientific observation -- that where the environment does not create the appropriate tasks, advance new demands, or stimulate the development of intellect through new goals, the adolescent's thinking does not develop all the potentials inherent in it. It may not attain the highest forms of intellect or it may attain them only after extreme delays. Therefore, it would be a mistake to ignore or fail to recognize the significance of the life-task as a factor that nourishes and directs intellectual development in the transitional age. However, it would also be a mistake to view this aspect of causal-dynamic development as the basic mechanism of the problem of concept development or as the key to this problem.

The researcher is faced with the task of understanding the internal connections between these factors. That is, the researcher is faced with the task of understanding the process underlying concept formation as a function of socio-cultural development, taking both the content and mode of the adolescent's thinking into account. The new use of the word as a signifier, that is, its use as a means of concept formation, is the proximal psychological cause of this intellectual revolution that occurs on the threshold between childhood and the transitional age.

Though no new elementary functions appear during this period, it would be incorrect to conclude that there is no transformation of the existing elementary functions. These functions are included within a new structure. In a subordinate position, they form a new synthesis or complex whole. The fate of each of the component parts is determined by the laws that govern the whole. Fundamental to the process of concept formation is the individual's mastery of his own mental processes through the functional use of the word or sign. This mastery of the processes of one's own behavior through auxiliary means attains its final form only in adolescence.

It has been demonstrated experimentally that the formation of concepts cannot be equated with the formation of habits. Experimental research on concept formation in adults, the investigation of their development in childhood, and the study of their disintegration with the pathological disturbance of intellectual activity permits the con-

clusion that the identification of the nature of the higher intellectual processes with the kinds of elementary, associative processes involved in habit formation (an identification made by Thorndike) is unsupported by data concerning the content, functional structure, and genesis of concepts.

This research shows that like the development of any higher form of intellectual activity the process of concept formation is not simply the product of a quantitative transformation of lower forms. The difference between the process of concept formation and purely associative activity is not merely the function of the quantity of connections involved. This process represents something fundamentally new, something qualitatively irreducible to any type of activity based on associative connections. The basic difference between these two qualitatively different kinds of intellectual activity consists in the *transition from unmediated intellectual processes to operations that are mediated by signs.*

The signifying structure (i.e., the function associated with the active use of signs) is the law that is common to the construction of all the higher forms of behavior. This law is not identical to the associative structure of the elementary processes. In itself, the accumulation of associative connections will never lead to the emergence of the higher forms of intellectual activity. The difference between the lower and higher forms of thinking cannot be explained in terms of quantitative change.

In his theory of intellect, Thorndike maintains that the higher forms of intellectual operations are identical to purely associative activity, to the formation of connections. He maintains that they depend on the same type of physiological connections but simply require more of them. The difference between the adolescent's intellect and that of the child is reduced to one of the quantity of connections. Thorndike argues that an individual whose intellect is more powerful, more advanced, or better than that of others differs not because he possesses a new type of physiological process but because he possesses a greater quantity of the normal types of connections.

As we have said, this hypothesis does not find support in the experimental analysis of the formation of concepts, in the study of their development, or in what we know of their disintegration. Thorndike takes the position that selectivity, analysis, abstraction, generalization, and reasoning arise as a direct consequence of an increase in the quantity of connections in both the phylogenesis and ontogenesis of intellect. Again, this position is not supported by research on experimentally organized concept development in the child and adolescent. The development from lower to higher forms of concepts does not occur through a quantitative increase in the number of connections. It involves the emergence of a qualitatively new type of formation. Speech, one of the basic components in the construction of the higher forms of intellectual activity, is incorporated into this new formation, not associatively as a function flowing in parallel with others, but in a functional manner as a rationally applied means of behavior.

Speech itself is not based on purely associative connections. It requires a fundamentally different type of relationship between the sign and the structure of the intellectual operation, a relationship characteristic of the higher intellectual processes generally. To the extent that we can explore the phylogenetic development of intellect by studying the mind and thinking of primitive man, we again find little evidence in this domain that would indicate that the path of development moves from lower to higher forms through a quantitative increase in the number of associations. Finally, research by Kohler, Yerkes, and others indicates that there is little reason to think that the investigation of the biological evolution of the intellect will provide support for this identification of intellect and association.

4

If we attempt to represent the genetic implications of our research schematically, it indicates that the course of concept development is composed of three basic stages, each of which breaks up into several distinct phases.

The first stage in the formation of concepts is most frequently manifested in the behavior of young children. Faced with a task that an adult would generally solve through the formation of a new concept, the child forms an unordered and unformed collection. He isolates an unordered heap of objects. The child's isolation of these objects, objects that are unified without sufficient internal foundation and without sufficient internal kinship or relationships, presupposes a diffuse, undirected extension of word meaning (or of the sign that substitutes for the meaning of the word) to a series of elements that are externally connected in the impression they have had on the child but not unified internally among themselves.

At this stage of development, word meaning is an incompletely defined, unformed, syncretic coupling of separate objects, objects that are in one way or another combined in a single fused image in the child's representation and perception. A decisive role is played in the formation of this image by the syncretism of the child's perception and action. This image is, therefore, extremely unstable.

In his perception, thinking, and action, the child has a tendency to connect the most varied elements, elements that may have no internal connections. Elements may sometimes be connected on the basis of a single impression. The result is an undifferentiated, fused image. Claparede referred to this tendency as the syncretism of the child's perception. Blonskii[54] referred to it as the connection-less connectedness of the child's thinking. Elsewhere, we have described this same phenomenon as the child's tendency to substitute a surplus of subjective connections for an insufficiency of objective connections. We have described it as the child's tendency to take connections of impression and thought for actual connections between things. Of course, this reproduction of subjective connections is a significant factor in the development of the child's thinking. It is the basis for the subsequent process of selecting connections that correspond to reality, connections that are verified in practice. In its external form, the type of word meaning characteristic of the child at this stage in his development can appear similar to the word meaning of the adult.

The child establishes social interaction with adults through words that have meaning. To a significant extent, objective connections are reflected in these syncretic connections, in this unordered syncretic heap of objects formed with the help of the word. Objective connections are reflected here to the extent that they correspond with the child's own impressions and perceptions. Therefore, the meaning of the child's words will frequently correspond with the meanings established in adult speech. This is particularly true where words are related to the concrete objects that form the reality immediately available to the child.

Thus, the meanings of the child's words frequently coincide with those of the adult; the meanings of a given word for the child and the adult often intersect on the same concrete object. This allows mutual understanding between the adult and child. However, the mental paths or modes of thinking that lead to this point of intersection are completely different. Even where the meaning of the child's word corresponds partially with that of the adult's speech, it is derived from entirely different mental operations. The meaning of the child's word is the product of the syncretic merging of images that stands behind it.

This general stage in the formation of concepts in the child can be broken down into three phases which we were able to study in some detail.

The first phase in the formation of the syncretic image (i.e., the heap of objects that corresponds at this stage with the meaning of the word) coincides with the trial and error period in the child's thinking. In this phase, a new group of objects is randomly formed by the child through a series of separate probes that supersede one another as their erroneous nature becomes apparent.

In the second phase, it is the spatial distribution of the objects in the experiment that plays the decisive role. Once again, the purely syncretic laws that govern the perception of the visual field and the organization of the child's perception are critical. The syncretic image or heap of objects may be formed on the basis of the spatial or temporal encounter of isolated elements, the direct contact among these elements, or some more complex relationship arising among them in the direct process of perception. The factor that continues to be basic to this period is the fact that the child is guided not by the objective connections present in the things themselves, but by the subjective connections that are given in his own perception. Objects are brought together in a single series and subordinated to a common meaning not on the basis of general features that are inherent to them and that have been isolated by the child but on the basis of a kind of kinship that has been established between them by the child's impressions.

The third phase of this stage signifies its completion and the transition to the second stage of the process of concept formation. In this phase, the basis on which the syncretic image is formed is more complex. Here, representations of various groups that have already been united in the child's perception are reduced to a single meaning. Thus, each of the elements of the new synthetic series represents some group of objects previously united in the child's perception. There are, however, no internal connections among these groups. They represent the same kind of unconnected heap that we find in the previous two phases.

The critical difference between this phase and the two that precede it is that here the connections which the child places at the foundation of the word are the product of what might be called a two-stage development of syncretic connections rather than of isolated perceptions. First, syncretic groups are formed. Subsequently, representatives of these groups are isolated and once again syncretically united. Thus, behind the meaning of the child's word we find not a one dimensional plane but a three dimensional space. We find a dual series of connections, a dual structured group. Nonetheless, this series and structure still fails to transcend the unordered collection or heap.

Having achieved this phase, the child completes this first stage in the development of concepts. He moves beyond heaps as the basic form of word meaning and advances to a second developmental stage. We will refer to this as the stage of the formation of complexes.

5

The second major stage in the development of concepts includes several different types of what is a single mode of thinking. These types vary functionally, structurally, and genetically. Like other modes of thinking, this one leads to the formation of connections, the establishment of relationships among different concrete impressions, the unification and generalization of separate objects, and the ordering and systematization of the whole of the child's experience.

Nevertheless, this mode of uniting concrete objects in a common group differs from that based on thinking in concepts or conceptual thinking. First, the nature of

the connections that are established among the objects in the group differs from that characteristic of concepts. Second, as defined by the relationship of each object in the group to the group as a whole, the structure of the unified group differs profoundly in type and mode of activity from that based on conceptual thinking.

We will refer to this mode of thinking as *thinking in complexes* [*complexive thinking* -- N.M.].

In structural terms, generalizations created on the basis of this mode of thinking are complexes of distinct concrete objects or things that are united on the basis of objective connections, connections that actually exist among the objects involved. This contrasts with the structure of generalizations created in the previous stage, generalizations which are formed on the basis of subjective connections arising in the child's impressions.

We have said that the first stage in the development of thinking is characterized by the construction of syncretic images that are the child's equivalent of adult concepts. Correspondingly, the second stage is characterized by the construction of complexes which have the same functional significance. This is a new step on the road to the mastery of concepts, a new stage in the development of the child's thinking. It constitutes a significant advance over the preceding stage and it is an extremely significant step forward in the child's life. Rather than the "unconnected connectedness" that provides the foundation for the syncretic image, the child begins in this second stage to unite homogeneous objects in a common group, to combine them in accordance with the objective connections that he finds in the things themselves.

To some degree, the child who has advanced to this form of thinking has overcome his egocentrism. He no longer takes the connections among his own impressions for the connections among things. In this, he has completed a decisive step in the movement from syncretism to the mastery of objective thinking. Complexive thinking is thinking that is both connected and objective. These two features of complexive thinking distinguish it from the syncretic thinking characteristic of the previous stage. Nevertheless, this connectedness and objectiveness is still not the connectedness that is characteristic of thinking in concepts, a form of thinking that is attained only in adolescence.

The complexes formed during this second stage are constructed in accordance with entirely different laws of thinking than are concepts. Objective connections are reflected in the complex, but they are reflected in a different manner and form than in the concept. Vestiges of complexive thinking can be found in adult speech. Perhaps the best illustration of the laws underlying the construction of the thought complex to be found in adult speech is the family name. Any family name such as "Smith" incorporates within it a complex of distinct objects, a complex that approximates the complexive character of the child's thinking. In a certain sense, we can say that the child at this second stage thinks in accordance with family names. In other words, the world of objects is united and organized for him by virtue of the fact that objects are grouped in separate though interconnected families. At this stage of development, word meanings are best characterized as family names of objects that are united in complexes or groups.

What distinguishes the construction of the complex is that it is based on connections among the individual elements that constitute it as opposed to abstract logical connections. It is not possible to decide whether a given individual belonging to the Smith family can properly be called by this name if our judgment must be based solely on logical relationships among individuals. Resolving this question means resolving the empirical question of whether the individual belongs to this group. The question

becomes an empirical one of whether a particular form of kinship exists among the group members.

The foundation of the complex lies in empirical connections that emerge in the individual's immediate experience. A complex is first and foremost a concrete unification of a group of objects based on the empirical similarity of separate objects to one another. This is fundamental to all the characteristics of this mode of thinking. The most important characteristic of complexive thinking is that it occurs on the plane of concrete-empirical thinking rather than on the plane of abstract-logical thinking. Therefore, the complex is not characterized by the underlying unity of connections which helped to establish it.

Like the concept, the complex is a generalization or unification of heterogeneous concrete objects. However, the nature of the connections through which this generalization is constructed is very different for the complex than for the concept. If empirically present, *any* connection is sufficient to lead to the inclusion of an element in a given complex. This is the essential characteristic of the complex's construction. The concept is based on connections of a single, logically equivalent type. In contrast, the complex is based on heterogeneous empirical connections that frequently have nothing in common with one another. Stated somewhat differently, objects are generalized by a single feature in the formation of the concept but by multiple features in the formation of the complex. Therefore, a single, essential, and uniform connection or relationship among objects is reflected in the concept while the connections are empirical, accidental, and concrete in the complex.

Thus, it is the heterogeneous nature of the connections which provide the foundation for the complex that constitute the main feature distinguishing it from the concept. The concept is based on uniform connections. In the concept, each object is included within the generalization on the same basis as are all the other objects. Each of the elements is connected to the whole that is expressed in the concept, and through this whole to each of the other elements, *by a single image and by the same type of connections*. In contrast, the elements of the complex may be connected to the whole and the other elements that constitute it by extremely heterogeneous connections. In the concept, these connections are essentially the relationship between the general and the particular, and between the particular and the particular through the general. In the complex, these connections can be as heterogeneous as the kinds of empirical contiguity and empirical kinship that can exist among the most varied objects found in any concrete relationship with one another.

Our research indicates that there are five basic types of complexes that provide the foundation for the generalizations that arise in the child's thinking during this stage of development.

We will refer to the first type of complex as an associative complex because it is based on an associative connection between an object that is included in the complex and any of the features that the child notices in the object that acts as the complex's nucleus. Around this nucleus, the child can build an entire complex composed of the most varied objects. Some objects may be included in the complex because they are the same color as the nucleus. Others may be included on the basis of similarity in form, dimension, or any other distinguishing feature that the child notices. *Any* concrete relationship that becomes apparent to the child, *any* associative connection between the nucleus and another object, is sufficient grounds for relating that object to the group and for designating it by the common family name.

The various elements of the complex may not be united with one another in any way. The sole principle for their generalization is their empirical kinship with the nucleus of the complex. As we have said, any associative connection may link an element

to the nucleus. One element may be linked to the nucleus of the emerging complex because of its color. Another may be linked to it because of its form. If we remember that this connection may vary not only in terms of the particular feature on which it is based but in terms of the character of the relationship between the two objects, we can begin to understand how varied, unordered, unsystematic, and un-unified the collection of concrete features lying behind complexive thinking may be at any given time. The complex may be based on a direct identification of features, on similarity or contrast among objects, or on an associative connection among objects stemming from their physical contiguity. However, the complex is always based on *concrete connections*.

In this phase of his development, words no longer function for the child as designations for distinct objects, each of which has it own name. Words have become family names. Thus, at this point in his development, when the child says a word, he indicates a family of things that are connected to one another by the most varied lines of kinship. To refer to a particular object using the appropriate name means to relate it to a particular concrete complex with which it is connected. To name an object is to name its family.

6

The second phase of the development of complexive thinking consists of the unification of objects and concrete images of things in groups that are reminiscent of what is commonly called a collection. Here, various concrete objects are united in accordance with a single feature, that is, on the basis of reciprocal supplementation. These objects form a unified whole consisting of heterogeneous, though supplementary, parts. What is most characteristic of this stage in the development of thinking is the *heterogeneous nature of the constituents, their reciprocal supplementation, and their unification on the basis of a collection.*

Under experimental conditions, the child selects objects to match the model that differ from it in color, form, size, or some other feature. However, the child's selection of these objects is neither chaotic nor accidental. Objects are selected in accordance with features that differentiate them from the model, in accordance with a principle of supplementing the feature of the model that has been taken as the basis for unification. The collection that arises on the basis of this kind of construction is a collection of objects that differ in color or form. It represents a set of the basic colors or the basic forms found in the experimental materials.

What distinguishes the collection from the associative complex is the fact that we do not find two objects with the same features. A single exemplar is selected from each group to represent that group. Rather than association by similarity, what we have here is something more like association by contrast. Frequently, this form of thinking is combined with the associative form of thinking we described above. When this happens, we find a collection constituted on the basis of different features. In forming the collection, the child does not maintain the sequential principle that is basic to the formation of the complex. Rather, he unites various features through association although each feature becomes part of the foundation.

This extended and stable phase in the development of the child's thinking has very deep roots in his concrete, visual, and practical experience. In visual and practical thinking, the child is always dealing with collections of things that mutually supplement one another. The most frequent form of generalization of concrete impressions that the child's concrete experience teaches him is a set of mutually supplementary objects

that are functionally or practically important and unified. Sets such as the cup, saucer, and spoon, the fork, knife, spoon and plate, or clothes are good examples of the kinds of complex-collections that the child encounters in his daily life.

It is both natural and understandable, then, that the child constructs these kinds of complex-collections even in his verbal thinking, that he combines objects in concrete groups in accordance with the principle of functional supplementation. As we will see later, this type of complex plays an extremely important role in adult thinking as well, especially in the thinking of the neurologically impaired or the mentally ill. In concrete speech, when the adult speaks of dishes or clothes, what he has in mind is often not the corresponding abstract concept but a set of concrete things that form a collection.

Thus, the syncretic image is based on subjective emotional connections among impressions that are taken by the child for the actual connections among things. The foundation for the associative complex, on the other hand, is found in shifting features of similarity between objects. In the same sense, the foundation for the collection is found in the connections and relationships among things that are established in the child's practical action and visual experience. Thus, the complex-collection is *a generalization of things based on their co-participation in a single practical operation*, a generalization of things based on their functional collaboration.

In the present context, these three forms of thinking are of interest in their capacity as different genetic paths leading to a single point, to the formation of the concept.

7

In correspondence with the logic of experimental analysis, the phase of the complex-collection is followed by the chained complex. The chained complex is also an inevitable step in the child's movement toward the mastery of concepts.

The chained complex is constructed in accordance with the principle of a *dynamic, temporal unification of isolated elements in a unified chain, and a transfer of meaning through the elements of that chain.* Under experimental conditions, this type of complex is generally manifested in the following manner: The child selects an object, or several objects, to match the model on the basis of some type of associative connection they have with it. The child then continues to select concrete objects to form a unified complex. However, his selection is guided by the features of objects selected in previous stages of the action, features that may not be found in the model itself.

For example, the child may select several objects having corners or angles when a yellow triangle is presented as a model. Then, at some point, a blue object is selected and we find that the child subsequently begins to select other blue objects that may be circles or semicircles. The child then moves on to a new feature and begins to select more circular objects. In the formation of the chained complex, we find these kinds of transitions from one feature to another.

The meaning of the word shifts in accordance with the connections that constitute the complex chain. Each element in the chain is united with that which precedes it and with that which follows it. The distinguishing feature of this type of complex is that the character of the connection between any element in the chain and the elements that precede and follow it may be entirely different.

Once again, the complex has its foundation in associative connections among the separate concrete elements that form it. Here, however, these connections will not necessarily connect each element with the model. By virtue of being included in the

complex, each element assumes a position equal to that of the model. Through association, it may become the critical element that allows several objects to be attached to the complex.

The concrete and graphic character of complexive thinking becomes apparent here. In accordance with some associative feature, the object is included in the complex as a particular concrete object which retains all its features rather than as the carrier of a single feature which defines the object's membership in the complex. No single feature abstracted from others plays a unique role. The significance of the feature that is selected is essentially functional in nature. It is an equal among equals, one feature among many others that define the object.

Here we can begin to sense the common characteristic that distinguishes complexive thinking generally from conceptual thinking. In contrast to the concept, no hierarchical connections or relationships among features are found in the complex. The functional significance of all features are, in principle, equal. Whether we consider the relationship of the general to the particular (i.e., the relationship of the complex or concept to each of its constituents), the relationships among the elements, or the laws underlying the construction of the whole, we find that the complex differs fundamentally from the concept.

There may be no structural center in the chained complex. The separate elements may come into connection with one another, changing the central or model element at each stage. Some elements may have nothing at all in common with the other elements of the complex. Each belongs to the complex because it shares some feature with some other element. The first and third elements in a chain may have no connection other than their mutual connection with the second.

With some justification, then, the chained complex can be considered the purest form of complexive thinking because it does not have the central element which acts as a model that we find in the associative complex. As we have seen, the connections among the separate elements of the associative complex are established through some common element that constitutes a center. There is no such center in the chained complex. Here, the connection exists wherever its separate elements can be brought together empirically. The chain's final element may have nothing in common with its initial element. The fact that they are connected by an intermediate unifying element is sufficient for their membership in a single complex.

If we were to attempt to characterize the relationship of the separate concrete element to the complex as a whole, we would say that in contrast to the concept the element enters the complex as a real concrete unit with all its empirical features and connections. The complex is not superordinate to its elements in the way the concept is superordinate to the concrete objects that are included within it. The complex merges empirically with the concrete elements which constitute it. This merging of the general and the particular, of the complex and its element (i.e., what Werner has called a mental amalgam), constitutes the essential feature of complexive thinking generally and of the chained complex in particular. The complex is inseparable from the concrete group of objects that are unified by it. It merges with this concrete group. As a result, it acquires an undefined character, what might be referred to as an overflowing character.

The connections that form the chained complex and their character and type shift imperceptibly. Sometimes, the most remote similarity, the most superficial point of contact, will be sufficient for the formation of a connection. Here a remote, vague impression of some commonality between the objects, rather than any real similarity,

may lie at the foundation of a connection. For purposes of experimental analysis, we call what emerges under these conditions a diffuse complex. This diffuse complex constitutes the fourth phase in the development of complexive thinking.

8

In this fourth type of complex, the feature that unifies the separate concrete elements in the complex is diffuse, undefined, and vague. The resulting complex is formed on the basis of diffuse, undefined connections of concrete groups of images or objects. Given a yellow triangle as a model, for example, the child selects not only a triangle but a trapezoid. With its sharp angles, the latter reminds the child of the triangle. Subsequently, a square is affiliated with the trapezoid, a hexagon with the square, a polygon with the hexagon, and finally a circle with the hexagon. Further, just as we find this kind of spreading and lack of definition when form is taken as the object's basic feature, we sometimes find that a diffuse feature of color provides the basis for a complex. The child may follow a yellow object with a green one, a green with a blue, and a blue with a black.

This form of complexive thinking is extremely stable and important in the natural conditions of the child's development. It is also of particular interest for experimental analysis, since it clearly reflects another extremely important feature of complexive thinking, that is, the undefined nature of its outlines and the fact that it is by nature undefined.

Just as the ancient biblical family, a concrete familial unity of people, dreamed of multiplying and becoming as numerous as the stars in the heavens, the diffuse complex in the child's thinking is a familial unification of things. It includes within itself limitless possibilities for extension. New concrete objects are continually included within the basic family.

As we said, the complex-collection is represented in the child's natural life primarily by generalizations that are based on the functional similarity of various objects. The corresponding prototype of the diffuse complex in life, the natural analog of the diffuse complex in the development of the child's thinking, is the type of generalization he creates in domains of thinking that are not subordinated to practical verification. In other words, they are generalizations in domains other than the domain of concrete or practical thinking. We are all familiar with the unexpected rapprochements, the leaps of thought, the treacherous generalizations, and the diffuse transitions that the child manifests when he begins to discuss or think beyond the limits of the concrete-object world, beyond his actual practical experience. The child enters a world of diffuse generalizations where features glide past one another and constantly shift, where the transitions from one feature to another are often imperceptible. There are no firm outlines here. Unbounded complexes govern. These complexes which are often striking because of the universal character of the connections which unify them.

One need only look carefully at this type of complex to realize that the principle underlying its construction is identical to that which underlies the construction of restricted concrete complexes. In neither case does the child go beyond the concrete image or empirical connections between different objects. What is unique to the diffuse complex is that it unifies things that are outside the child's practical knowledge. The result is that the connections which provide its unity depend on false, vague, and undefined features.

9

One final phase remains to complete the picture of the development of complexive thinking. This final form of complexive thinking has tremendous significance for the child's thinking in both the experiment and real life. It casts light both backward and forward. On the one hand, it illuminates the phases of complexive thinking that the child has already passed through. On the other, it serves as a bridge to a new and higher stage, as a bridge to the formation of concepts.

We call this complex a pseudoconcept because it has strong external similarities to the concept that we find in the adult's intellectual activity. However, in its essence, in accordance with its true psychological nature, it is very different from the true concept.

A careful study of this final stage in the development of complexive thinking demonstrates that this form of generalization is a complexive unification of a series of concrete objects. Phenotypically, on the basis of its external appearance and external characteristics, the pseudoconcept corresponds completely to the concept. However, genotypically, in accordance with its emergence, its development, and the causal-dynamic connections which underlie it, the pseudoconcept is clearly not a concept. Externally, we see a concept -- internally a complex. This is why we call it a pseudoconcept.

Under experimental conditions, the child forms a pseudoconcept when he selects objects to match a model which are like those that would be selected and united with one another on the basis of an abstracted concept. Thus, this generalization could arise on the basis of a concept. In fact, however, it arises on the basis of the child's complexive thinking. It is only in terms of the final result that this complexive generalization corresponds with a generalization constructed on the basis of a concept. For example, given a yellow triangle as a model, the child selects all the triangles in the experimental materials. A group of this kind could arise on the basis of abstracted thinking (i.e., on the basis of the concept or idea of a triangle). However, our research indicates that the child actually unites the objects on the basis of their concrete, empirical connections, on the basis of simple association. He constructs only a bounded associative complex. He arrives at the same point as one would have through thinking in concepts, but he takes an entirely different route.

This type of complex, this form of concrete thinking, is predominant in both functional and genetic terms in the child's actual thinking. Therefore, more detailed consideration must be given to this critical moment in the development of the child's concepts, a moment which simultaneously separates and connects complexive and conceptual thinking.

10

The pseudoconcept is the most common form of complex in the preschooler's real life thinking. It is a form of complexive thinking that prevails over all others. It is sometimes the exclusive form of complexive thinking. Its wide distribution has a profound functional basis and significance. This form of complexive thinking gains its prevalence and dominance from the fact that the child's complexes (which correspond to word meanings) do not develop freely or spontaneously along lines demarcated by the child himself. Rather, they develop along lines that are preordained by the word meanings that have been established in adult speech.

It is only in the experiment that we free the child from the directing influence of the words of adult language with their developed and stable meanings. It is only here that we allow the child to develop word meanings and create complexive generalizations in accordance with own his free judgment. The experiment is of tremendous significance in this sense. It allows us to discover how the child's own activity is manifested in learning adult language. The experiment indicates what the child's language would be like and the nature of the generalizations that would direct his thinking if its development were not directed by an adult language that effectively predetermines the range of concrete objects to which a given word meaning can be extended.

One could argue that our use of phrases such as "would be like" and "would direct" (i.e., our use of the subjunctive mood) in this context provides the basis for an argument against rather than for the use of the experiment since the child is not in fact free to develop the meanings he receives from adult speech. We would respond to this argument by noting that the experiment teaches more than what would happen if the child were free from the directing influence of adult speech, more than what would happen if he developed his generalizations freely and independently. The experiment uncovers the real activity of the child in forming generalizations, activity that is generally masked from casual observation. The influence of the speech of those around the child does not obliterate this activity. It merely conceals it, causing it to take an extremely complex form. The child's thinking does not change the basic laws of its activity simply because it is directed by stable and constant word meanings. These laws are merely expressed in unique form under the concrete conditions in which the actual development of the child's thinking occurs.

With the stability and consistency of its meanings, the speech of those who surround the child predetermines the paths that the development of the child's generalizations will take. It links up with the child's own activity, directing it along a certain, strictly defined, channels. However, as he moves along this predetermined path, the child thinks in correspondence with the characteristics of a particular stage in the development of intellect. By addressing the child in speech, adults determine the path along which the development of generalizations will move and where that development will lead, that is, they determine the resulting generalizations. However, the adult cannot transfer his own mode of thinking to the child. Children acquire word meanings from adults, but they are obliged to represent these meanings as concrete objects and complexes.

The paths through which word meanings are extended or transferred are determined by the people around the child in their verbal interaction with him. However, the child cannot immediately learn adult modes of thinking. The product he receives is similar to that of the adult. However, it is obtained through entirely different intellectual operations. This is what we call a pseudoconcept. In its external form, it appears to correspond for all practical purposes with adult word meanings. However, it is profoundly different from these word meanings in its internal nature.

It would be a profound mistake to view the dual character of this product as a reflection of discord or bifurcation in the child's thinking. This discord or bifurcation exists only for the observer who is studying this process from two different perspectives. For the child himself, what exist are complexes that are the equivalent of the adult's concepts. That is, what exist are pseudoconcepts. This situation was observed frequently in our experimental studies of concept formation. The child formed a complex with all the typical structural, functional, and genetic characteristics of complexive thinking. For all practical purposes, however, the product of this complexive thinking corresponded with the generalization that would have been constructed on the basis of thinking in concepts.

This correspondence in the result or product of thinking makes it extremely difficult for the researcher to differentiate between cases where he is dealing with thinking in complexes and those where he is dealing with thinking in concepts. This masking of complexive thinking that arises from the external similarity between pseudoconcepts and true concepts is a serious obstacle for the genetic analysis of thinking. It is precisely this circumstance that has led many researchers to the conclusion we discussed at the beginning of the chapter. The external similarity between the thinking of the three year old child and the thinking of the adult as well as the practical correspondence between the word meanings of the child and adult creates the possibility for verbal interaction and mutual understanding between them. This functional equivalence of the complex and concept has led researchers to the false conclusion that all the forms of adult intellectual activity are present in undeveloped form in the three year old child. It has led researchers to the conclusion that no fundamental transformation, no new stage in the mastery of concepts, occurs during the transitional age.

It is not difficult to understand how this mistake has been made. At an early age, the child learns a whole series of words that mean for him just what they mean for the adult. The resulting potential for mutual understanding between the adult and child creates the impression that the beginning and the end point in the development of word meaning correspond, that the completed concept is given from the outset with no role for development. Identifying the word's initial meaning with the concept (a mistake that was made by Ach) leads inevitably to this false conclusion, this conclusion that has its foundation in illusion.

It is extremely difficult to identify the boundary which separates the pseudoconcept from the true concept. This problem is nearly inaccessible to a purely formal, phenotypal analysis. In its external characteristics, the pseudoconcept is as similar to true concept as the whale is to the fish. However, if we turn to the "origin of the species" of intellectual and animate forms, it becomes apparent that the pseudoconcept is related to complexive thinking and the whale to the mammals.

Thus, in the most widely distributed concrete form of complexive thinking in the child (i.e., in the pseudoconcept) there lies an internal contradiction that is engraved in its very name. On the one hand, this contradiction presents a tremendous obstacle for the scientific investigation of the pseudoconcept. On the other, this contradiction is why the pseudoconcept is of such extraordinary functional and genetic significance, why it is such a critical moment in the development of the child's thinking. This contradiction consists in that, in the pseudoconcept, we have a complex that is the functional equivalent of the concept. This complex and the concept are equivalent in functional terms in that we notice no difference in them in the speech interaction and mutual understanding between the adult and child.

Thus, we have a complex which corresponds for all practical purposes with the concept, which includes the same group of concrete objects as the concept. We have a shadow of the concept, one that reproduces its contours. Yet, this complex is a form of generalization that is constructed in accordance with entirely different laws than the true concept.

Earlier, we showed how this real contradiction arises and what causes it. We saw that adult speech, through its stable, well-defined meanings, determines the developmental course taken by generalizations; we saw that it determines the child's complexive formations. The child does not choose the meaning of the word. It is given to him through verbal interaction with adults. The child is not free to construct his own complexes. He finds them in completed form in the process of understanding unfamiliar speech. He is not free to select the separate concrete elements that constitute the complex in which he will include them as elements. The child receives in com-

pleted form a series of concrete objects generalized by a given word. The child does not spontaneously relate a given word to a given concrete group of objects and then transfer its meaning from object to object, extending the circle of objects that are grasped by the complex. He follows adult speech, learning established concrete word meanings that are given to him in developed form. Stated simply, the child does not create his speech but learns the developed speech of the adults around him. Everything is contained in this statement. It implies that the child does not create the complex that corresponds with the meaning of a word but finds it ready made, classified by a common word or name. The result is that the child's complexes correspond with the adult's concepts. The pseudoconcept, a concept-complex, arises.

We have said, however, that while there is an external correspondence between the pseudoconcept and the concept in terms of the end product, the thinking of the child that leads to the pseudoconcept does not correspond with the intellectual operations characteristic of adult thought. This is precisely the source of the tremendous functional significance of the pseudoconcept as a special, internally contradictory, form of thinking in the child. The pseudoconcept would not be the dominant form of childhood thinking if the child's complexes diverged from adult concepts, as was the case in our experiment where the child was not bound to an assigned word meaning. Mutual understanding by means of words, verbal interaction between the adult and child, would be impossible if word meanings diverged in this way. This interaction is possible only because the child's complexes correspond empirically with the concepts of the adult. The concept and the complex turn out to be functionally equivalent. As we noted earlier, this gives rise to an extremely important circumstance which leads to the extraordinary functional significance of the pseudoconcept. The child who thinks in complexes and the adult who thinks in concepts establish mutual understanding and verbal interaction because their thinking meets in the corresponding complex-concept.

In beginning this chapter, we said that the entire difficulty of the genetic problem of the formation of concepts in childhood lies in clarifying this internal contradiction inherent to the child's concepts. From the outset, the word serves as a means of interaction and mutual understanding between the child and adult. As Ach demonstrated, it is this functional aspect of the word that leads to the emergence a definite word meaning and to the ultimate fate of the word as the carrier of the concept. As Uznadze notes, without this functional aspect of mutual understanding, no sound complex could become the bearer of meaning, no concept could arise.

Verbal contact and verbal understanding between the adult and the child appears very early. As we have said, this is why many researchers assume that the emergence of the concept also occurs at an early stage in the child's development. We have seen, however, that the true concept emerges at a comparatively late stage in the development of the child's thinking and that this is true despite the fact that mutual verbal understanding between the child and the adult is established very early.

Uznadze writes: "This makes it clear that before the word achieves the status of a true concept it can assume the concept's function; it can serve as a tool for mutual understanding" (1966, p. 77). The researcher is faced with the task of discovering the development of forms of thinking that are not concepts but are their functional equivalents. The contradiction between the late development of the concept and the early development of verbal understanding finds its actual resolution in the pseudoconcept, a form of complexive thinking that provides the potential for correspondence between the thinking and understanding of the child and adult.

Thus, we have discovered the cause as well as the significance of this important form of complexive thinking in the child. We must now consider the genetic significance of this concluding stage in the development of the child's thinking. Because of

the dual functional nature of the pseudoconcept, this stage in the development of the child's thinking acquires a unique *genetic significance.* It serves as a *link unifying complexive and conceptual thinking.* It opens up before us the process through which the child's concepts are established. This complex contains the kernel of the future concept that is germinating within it. Thus, verbal interaction with adults becomes the motive force behind the development of the child's concepts. The transition from complexive to conceptual thinking is imperceptible to the child because his pseudoconcepts correspond for all practical purposes with the adult's concepts.

What emerges here, then, is a genetic situation of a special nature, one that is more the rule than the exception for the whole of the child's intellectual development. It consists in that the child begins to apply concepts in practice and operate with them long before he gains conscious awareness of them. The concept "in itself" and "for others" develops earlier in the child than the concept "for itself." The concept "in itself" and "for others" is already contained in the pseudoconcept. It is a fundamental genetic prerequisite for the development of the true concept.

Thus, the pseudoconcept, viewed as a basic phase in the development of the child's complexive thinking, completes the second stage in the development of the child's thinking and opens the door for the third. It serves as the unifying link between these two stages. It is the bridge that lies between the child's concrete and abstract thinking.

11

The final phase in the development of the child's complexive thinking that we have just described completes this entire epoch in the development of concepts. In examining this stage as a whole, we will not restate the characteristics of each of the various forms of complexive thinking. In our analysis of these various forms, we have outlined complexive thinking with sufficient clarity from both above and below. That is, we have identified the characteristics that distinguish complexive thinking from syncretic images as well as those that distinguish it from concepts.

The absence of unity in its connections, the absence of hierarchy, the concrete character of the connections that underlie it, the relationship of the general to the particular and the particular to the general, the interrelationships of the separate elements, and the laws governing the construction of the complexive generalization have been discussed in all their uniqueness. We have seen how profoundly the complex differs from higher and lower forms of generalization. The logical essence of the various forms of complexive thinking were laid bare with all the clarity that the experiment is able to provide. However, we must reach agreement concerning several characteristics of the experimental analysis that could provide the foundation for erroneous conclusions concerning what has been said above.

The process of concept formation as it is elicited through the experiment is never a perfect reflection of the actual process of development. In our view, however, this is not the weakness but the merit of experimental analysis. The experiment allows us to reveal the essence of the genetic process of concept formation in abstracted form. The experiment provides the key to a true understanding of the actual process of concept development in the child.

Dialectical thinking does not place logical and historical methods for acquiring knowledge in opposition to one another. In accordance with Engels's well known definition, the logical method of investigation is itself an historical method. Logical methods are merely freed from their historical form and from the element of chance in

history that interferes with the structure of the scientific account. The logical course of thought and history begin with the same thing. Moreover, the development of logical thought is nothing but a reflection of the historical process in an abstracted and theoretically consistent form. It is a refined reflection of the historical process, but it is refined in correspondence with the laws that historical reality itself teaches us. The logical mode of investigation provides the possibility for studying any aspect of development in it most mature stage and in its classic form (Marx & Engels, *Collected Works*, v. 13, p. 497).

Applying this general methodological position to our own research, we can say that even the basic forms of concrete thinking that we have enumerated are the central features of development in their most mature stages, in their classical and true form taken to its logical limits. In the actual course of development, these forms of thinking are found in complex and confused form. Their logical description, as prompted by experimental analysis, is an abstract reflection of the actual course of concept development.

Thus, we must think of the experimental analysis of the major features in the development of concepts in historical terms. They must be understood as a reflection of the most important stages in the actual development of the child's thinking. Here, historical analysis becomes the key to the logical understanding of concepts. The developmental perspective becomes the point of departure for the explanation of the process as a whole and for the explanation of each aspect of that process.

One contemporary psychologist has noted that in the absence of genetic analysis a morphological analysis of complex mental formations and manifestations will inevitably be incomplete. In his words, however, the more complex the processes being studied, the more their prerequisites will be found in previous experiences and, therefore, the more their analysis will require a clear statement of the problem in methodological comparison and in the conceptual connections concerning the inevitability of development. This is true even where we are concerned with the elements of activity, elements that contain only a slice of consciousness.

This psychologist has demonstrated that a purely morphological study is as impossible as organizing and differentiating mental formations from above. In the absence of genetic analysis and synthesis, the investigation of preceding forms, and the general comparison of constituents, we can never solve this inherently complex and internally interconnected problem. Only a comparative analysis of numerous slices of the genetic process can reveal the actual construction of psychological structures and their interconnections.

Development is the key to understanding any of the higher forms. Gesell[55] writes that:

> The higher genetic law is apparently the following: Any development in the present is based on past developments. Development is not a simple function fully determined by X units of inheritance plus Y units of environment. It is an historical complex that selects at each stage what is included in its past. In other words, the artificial dualism of environment and heredity leads down a false path. It hides the fact that development is an unbroken, self-conditioned process, not a marrionette directed by tugs on two threads (1932, p. 218).

On the one hand, then, experimental analysis of concept formation leads inevitably to functional and genetic analysis. Using morphological analysis, we must attempt to bring the major forms of complexive thinking that we have identified through experimental analysis into correspondence with the forms of thinking that are actually

found in the child's development. An historical or genetic perspective must be introduced into the experimental analysis. On the other hand, we must attempt to clarify the actual process involved in the development of the child's thinking using data obtained through experimental analysis. Bringing experimental and genetic forms of analysis together in this way -- finding a rapprochement between the experiment and reality -- leads us from the morphological analysis of complexive thinking to the investigation of complexes in action, to the investigation of complexes in their actual functional significance and in their actual genetic structure.

What is opening up before us here is the task of bringing together morphological and functional, or experimental and genetic, forms of analysis. The data from experimental analysis must be verified on the basis of data on the child's actual development. Correspondingly, the actual course of concept development must be illuminated through experimental data.

12

We can summarize our study of the second stage of concept development in the following way. When the child is at the stage of complexive thinking, he thinks of the same objects as the adult in connection with a word's meaning. This creates a potential for understanding between the child and adult. However, the child thinks the same thing in a different way, on the basis of different intellectual operations.

The validity of this position can be demonstrated functionally. If we analyze the adult's concepts and the child's complexes in action, the differences in their mental nature will emerge clearly. If the child's complex differs from the concept, *the activity of thinking in complexes will unfold differently than the activity of thinking in concepts.* We will briefly compare our results with psychological data on the characteristics of the child's thinking and with data on the development of primitive thinking. This will permit a functional verification of the characteristics of complexive thinking which we have identified.

The first phenomenon that attracts our attention in what we know of the development of the child's thinking is the purely associative manner in which word meanings are transferred. If we consider the child's first words, study the groups of objects they designate, and study the way that the child forms these groups through the transfer of word meaning, we find something very similar to what we have called the syncretic image and associative complex.

Consider the following example, which we take from the work of Idel'berger. At 251 days, a child uses the word "vau-vau" to designate a porcelain figure of a girl. At 307 days, this child uses the same word to designate a dog lying in the yard, a portrait of a grandmother and grandfather, a toy horse, and a wall clock. At 331 days, he uses the word to designate a fur boa with a dog's head and another boa without a dog's head (in this context, he paid special attention to the glass eyes). At 334 days, the same name was given to a rubber toy man that squeaked when it was squeezed. At 396 days, it was used to refer to a black button on the child's father's shirt. At 433 days, the child pronounced the same word when he saw pearls on a dress as well as when he noticed a bath thermometer.

Analyzing this example, Werner concluded that by using the word "vau-vau" the child is designating a multitude of objects that can be ordered in the following way. First, we have living and toy dogs and small, oblong, doll-like objects (i.e., the rubber doll, the thermometer for the bath, etc.). Second, we have buttons, pearls, and similar

small objects. Underlying this unification are the oblong form and bright objects with surfaces similar to the eye.

It is apparent, then, that these concrete objects are united by the child in accordance with the *principle of complexes*. These natural complexes fill the entire first chapter in the history of the development of the word in the child.

To take another example, the child initially used the word "kva" to refer to a duck swimming in a pond. He then used it to refer to any liquid, including the milk that he drank from his bottle. Later, when he saw a picture of an eagle on a coin, he used the same name to refer to the coin. This was sufficient for the subsequent use of the term to refer to all circular objects similar to coins. Here we see a typical example of the chained complex. Each object is included in the complex on the basis of a feature that it has in common with some other link. The result, of course, is that the character of this feature can change indefinitely.

It is because of the complexive character of the child's thinking that a single word can have different meanings and can indicate different objects in different situations. In certain situations which are of particular interest to us, a single word can unite contradictory meanings if they are related to one another in the way that a knife and fork are related to one another.

The fact that the child uses the word "before" to designate the temporal relationships "before" and "after," or uses the word "tomorrow" to designate both "tomorrow" and "yesterday," is analogous to the fact that two contradictory meanings are often united in a single word in ancient languages (for example, Hebrew, Chinese, and Latin). In the Roman language, for example, a single word designated both "high" and "deep." This combining of opposing meanings in one word is possible only on the basis of complexive thinking, because the concrete objects included in the complex preserve their concrete independence rather than merging with other elements of the complex.

13

There is one very interesting characteristic of the child's thinking that is an excellent means of verifying complexive thinking in functional terms. In children at a somewhat higher stage of development than those represented in the examples we have just discussed, complexive thinking is usually based on the pseudoconcept. Despite its external similarity with the true concept, the pseudoconcept is a complex. The difference between the concept and the complex will be reflected in action.

Researchers have long been aware of an extremely interesting characteristic of thinking that was first described by Levy-Bruhl in primitive peoples, by Shtorkh in the mentally ill, and by Piaget in children. This characteristic of primitive thinking, of thinking in its early genetic stages, is usually called participation. This word designates the relationship that primitive thought establishes between two objects or phenomena that are partially identified, objects that are seen as having a very close influence on one another although no spatial contact or other conceptual causal connection exists between them.

Piaget has made very interesting observations relevant to this kind of participation in the child's thinking. These observations relate to the child's establishment of connections between objects and actions that seem incomprehensible from a logical point of view and that have no basis in the objective connections among things.

As an example of participation in the thinking of primitive man, Levy-Bruhl used the following case. According to von den Steinen, a northern Brazilian tribe called the Borora take pride in the fact that tribal members are red parrots called "arara." Ac-

cording to Levy-Bruhl, this means something more than that tribal members become red parrots after their death and that red parrots are transformed into Borora following theirs. Von den Steinen writes that:

> There are Borora who do not want to believe in this but who become convinced because of their categorical assertion. They calmly claim that they are actually red parrots, as a caterpillar might say that she is a butterfly. This is not a name that the Borora have appropriated for themselves. It is a kinship upon which they insist. What they have in mind here is identity of being (Levy-Bruhl, 1930, pp. 48-49).

Shtorkh, who conducted a very careful analysis of archaic primitive thinking in schizophrenia, observed the same phenomenon of participation in this population.

The phenomenon of participation has not, however, been explained sufficiently for psychological purposes. In our view, there are two reasons for this.

First, researchers have generally studied this phenomenon by focusing on content. They have studied the unique connections that are established in this type of thinking while ignoring the functions and forms of thinking and the intellectual operations through which these connections are developed and established. In other words, they have studied the final product rather than the process through which this product emerges. As a result, the product itself has acquired a mysterious and obscure character.

Second, researchers have not sufficiently integrated their knowledge of this phenomenon with the knowledge of the other types of connections and relationships that are established by primitive thinking. The connections characteristic of primitive thinking have generally attracted researcher's attention only when they are extremely unusual or diverge sharply from the logical forms of thinking to which we are accustomed. The Borora's assertion that they are red parrots attracts the researcher's attention because it seems so absurd.

A careful analysis of the kinds of connections that are established by primitive thinking that do not seem, on the surface, to diverge from our own logic, convinces us that the mechanisms of complexive thinking provide the foundation for these connections as well as those characteristic of what is called participation.

If we remember that the child (at a given stage of development) possesses complexive thinking, that the word is for him a means of designating complexes of concrete objects, and that the basic form of generalization or connection that he establishes is the pseudoconcept, it becomes clear that the product of such complexive thinking must necessarily be participation. In this form of thinking, connections and relationships between things will inevitably arise that are impossible and unthinkable from the perspective of thinking in concepts.

From this perspective, we can also understand how a single thing can enter into different complexes in accordance with its various concrete characteristics and how it can, consequently, receive a variety of names in accordance with the complexes in which it is included.

In our own experimental research we frequently observed this type of participation, that is, the process of simultaneously relating a concrete object to two or more complexes and referring to it by multiple names. For complexive thinking, participation is more the rule than the exception. It would be odd if these connections, connections which are impossible for our own logic, failed to arise at every step in primitive thinking.

The key to understanding participation and the thinking of primitive peoples is the fact that this thinking is carried out in complexes rather than concepts. Conse-

quently, in these languages the functional application of the word is entirely different than it is in our own. The word is used in a different manner. It is not a means for forming and carrying concepts. It is a family name. It is a means of naming groups of concrete objects that are united in accordance with some type of empirical kinship.

As in the child, this complexive thinking (as Werner correctly calls it) will inevitably lead to the kind of interweaving of complexes that gives birth to participation. At the foundation of this form of thinking lies a concrete group of objects. Werner's outstanding analysis of primitive thinking convinces us that the key to understanding participation lies in the unique combination of speech and thinking that characterizes this stage in the historical development of the human intellect.

Finally, schizophrenic thinking is also complexive in character. We find many unique motives and tendencies in schizophrenic thinking which Shtorkh believes share the common feature that they are associated with a primitive stage of thinking. The isolated representations that emerge among the ill are connected in a complexive, aggregated manner. From thinking in concepts, the schizophrenic turns to a more primitive stage characterized (as Bleuler has noted) by an abundance of images and symbols. Shtorkh emphasized that the distinguishing feature of primitive thinking is probably the fact that concrete images are used alongside abstract concepts.

Turnvald[57] sees this as the critical characteristic of the thinking of primitive people. In his view, this thinking relies on aggregated and undifferentiated impressions of phenomena. Primitive people think in completely concrete images that retain the form they are given in reality. The concrete, aggregated formations that become predominant and replace concepts in schizophrenic thinking are analogous to the concepts and images that take the place of our logical categorical structures in primitive stages of thinking.

Given all the unique characteristics that differentiate the thinking of the ill, primitive peoples, and the child, it is nonetheless apparent that participation is the common formal symptom of the primitive stage in the development of thinking and that it is a symptom of complexive thinking. The mechanism of complexive thinking, and the functional use of the word as a familial sign or name, always lies at the foundation of participation. Therefore, Levy Bruhl's interpretation of participation seems to us to be mistaken. In his analysis of the assertion that the Borora are red parrots, he consistently operates on the basis of the concepts that are characteristic of our own logic. That is, he assumes that in primitive thinking this kind of assertion indicates identity of being or substance. A more profound mistake in the interpretation of this phenomenon is, in our view, impossible. If Borora thought were mediated by logical concepts, there could be no other consistent interpretation of their assertion. However, since for the Borora the word is not the carrier of a concept but a formal designation for concrete objects, the assertion that they are parrots has an entirely different significance for them. The word "arara" which designates the red parrot that they relate themselves to is a general name for a complex to which both the bird and the tribe are related. Thus, this assertion does not imply an identification of parrot and people any more than identification is implied by the fact that two people related by kinship have the same family name.

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If we consider the history of our own speech, it becomes apparent that complexive thinking is the mechanism that underlies its development. According to contemporary linguistics (especially Peterson's thinking), it is important to make the distinction be-

tween word meaning and object relatedness, that is, between word meaning and the objects that are indicated by a word or expression.

Meaning may be one and the objects various, or meaning may be various and the object one. Whether we say "the victor at Jena" or "the vanquished at Waterloo," the person to whom we refer is the same (i.e., Napoleon). However, the meaning of the two expressions is different. There is also a word, the personal name, whose entire function is to indicate an object. In this way, contemporary linguistics distinguishes between the meaning and the word's object relatedness.

If we apply this insight to the problem of complexive thinking in the child, we can say that the child's words correspond to those of the adult in their object relatedness; they indicate the same objects. They relate to the same circle of phenomena. They do not, however, correspond in meaning.

We have identified this correspondence in object relatedness and noncorrespondence in word meaning as the central characteristic of complexive thinking in the child. In the development of language, this constitutes the rule rather than the exception. As we have said, the most important finding of our investigation is that, with respect to the meaning of the word, the child thinks in the same way as the adult; he thinks of the same objects. This permits understanding between the child and the adult. However, the child thinks the same content differently, in another mode, and through different intellectual operations.

This same formula can be applied to the history of development and to the psychology of language as a whole. We find empirical support for this position at every step. For words to correspond in their object relatedness, they must indicate the same objects. They can indicate one and the same object in different ways however.

The synonyms that are found in all languages are good examples of this kind of correspondence in object relatedness combined with a noncorrespondence in the thought operations that underlie word meaning. In Russian, the words *luna* [moon] and *mesiats* [moon] designate the same object. However, they designate that object in different ways, each of which carries the imprint of the word's history. The origins of *luna* link it with a Latin word designating "capricious" or "inconstant." A person using this word to refer to the moon obviously wants to isolate the feature of inconstancy in its form, to indicate the transitions from one phase to another as what distinguishes it from the other heavenly bodies. The word *mesiats* is linked with the meaning "to measure." *Mesiats* means "measuring instrument." A person referring to the moon using this word wants to indicate another of the moon characteristics, that is, that the lunar phases can be used to measure the passage of time.

In the sense that they indicate the same objects, the words of the adult and child are synonyms. They name the same things and correspond in their nominative functions. However, the thought operations that underlie them are different. The mode through which the child and adult arrive at this naming, the operations through which they think of the object and the word meaning, are completely different.

In much the same way, the same objects will correspond in their nominative function in different languages but be referred to with completely different features. The modern Russian word *portnoi* [tailor] has its origin in the Old Russian word "port," a word that referred to a "piece of fabric" or a "shawl." In French and German, the tailor is designated in terms of a different feature, in terms of the idea of "covering" or "cutting."

Thus, in what is commonly called word meaning, we must distinguish two features. These are the meaning of the expression in the true sense of the word and its function as a *name* which relates to a particular object, that is, its *object relatedness* (R. Shor).

We think that this distinction provides the key to the correct analysis of the development of the child's thinking in its early stages. With good reason, Shor notes that the difference between these two aspects of word meaning emerges clearly in the development of the child's lexicon. The child's word may correspond with the adult's in object relatedness, but not in meaning.

If we consider the history of word development or the transfer of word meaning in any language, it becomes apparent that change in word meaning occurs here in the same way as it does in the child. Earlier, we saw how the child names a whole series of what seem to us to be the most varied objects with the word "vau-vau." Similarly, in the history of the word, we find transfers of meaning based on the mechanism of complexive thinking, transfers of meaning which indicate that the word is applied in accordance with a different mode of thinking than that characteristic of the development of thinking in concepts.

We will take the Russian word *sutki* [a twenty-four hour day] as an example. Initially, the word designated a "seam," the "place where two pieces of fabric are united," or "something woven together." Subsequently, it came to designate a joint of any kind, a corner in a hut, or the place where two walls come together. At a later point in the transfer of meaning, the word was used to designate twilight, that is, the place where day and night are joined. Finally, it came to include the time from twilight to twilight, or the period of time including the morning and evening twilight. That is, it came to designate "day and night," or *sutki* as it is now understood.

In the historical development of this word, these various objects and phenomena (i.e., seam, corner in a hut, twilight, and *sutki*) are unified in a single complex in accordance with the same type of images that unite the child's complex.

Shor points out that anyone who begins to study the problems associated with etymology will discover the lack of content in the expressions used to name objects. Why do "swine" [*svin'ia*] and "woman" [*zhenshchina*] both mean "birth giver" [*rodiashchaia*]. Why are "bear" [*medved'*] and "beaver" [*bober*] both called "the brown ones" [*burymi*]. Why does "measuring" [*izmeriaiushchii*] designate "month" [*mesiats*]. An analysis of the history of these words indicates that neither logical necessity nor connections established among concepts, but image-generated concrete complexes underlie this, that is, connections that are of precisely the same character as those we find in the child's thinking. The object receives its name in accordance with the isolation of some concrete feature of the object.

Korova [cow] means *rogataia* [horned]. In other languages, analogous words have emerged from this same root that also mean "horned" but these words indicate the goat, deer, or another horned animal. "Mouse" means "thief," "bull" means "?howler" [*revyshchii*], "daughter" means *"milker"* [*doil'shchitaa*], "child" and "maid" are connected with the verb "to milk" and designate "suckling" and "feeder."

If we analyze the law that unites these families of words, it is apparent that new phenomena and objects are referred to by the word in accordance with a feature that is logically inessential, a feature that does not logically express the essence of the phenomena. The name is never conceptual in origin. In logical terms, the name is inadequate because it is both too narrow and too broad. Words like "horned," as a name for cow or "thief" as a name for mouse are too narrow in the sense that the features contained in their names do not exhaust the features of a cow or mouse. However, these words are also too wide in that this name is applied to a whole series of objects. Thus, in the history of language, we find a struggle between conceptual thinking and the more ancient complexive thinking. Having been isolated in accordance with a certain feature, the name of the complex comes into opposition with the concept that it designates. As a result, there is a struggle between the concept and the image that lies at

the foundation of the word. The image is erased. It is forgotten and ousted from the speaker's consciousness. The connection between the sound and the concept that is the word's meaning becomes incomprehensible to us. When using the word *okno* [window], the modern speaker of Russian is aware that this word indicates the place to which one looks or the place where light passes through, that this word contains not the slightest hint of the idea of "frame" or "opening." Still, in using the word *okno*, we are generally referring to a frame with glass. We have completely forgotten the link between this word and its original meaning. In the same way, *chernila* [ink] initially designated the fluid used for writing by indicating its external characteristic, that is, its black color. In naming this object, then, the complex of black things was included by means of an association. Today, this does not stop us now from speaking of red, green and blue "chernila," absurd though this word combination may be.

If we consider the transfer of names, then, we see that they are transferred through processes of association, transferred in often ludicrous ways that are based on the similarity of images. They are transferred not in accordance with the laws of logical thinking but in accordance with the laws of complexive thinking. Even today, an analysis of the process underlying the formation of new words will reveal extremely interesting processes involving the relating of the most varied objects to a single group through complexive thinking. For example, when we speak of the neck of the bottle, the foot of the table, the handle of the door, or the branch of the river, we are introducing precisely this kind of complexive relating of the object to a single general group.

Essential to this kind of transfer of names is the fact that the word is not fulfilling *a semasiological function* or a function involving the attribution of meaning. In this context, the word's function is nominative or indicative. The word indicates or names something. Stated differently, the word here is not a sign of some meaning with which it is connected in an act of thinking. It is a sign of a sensually given thing that is connected through association with some other sensually perceived thing. Since the name is connected with the designated thing through associations, the transfer of the name occurs through diverse associations, associations that can only be reconstructed on the basis of precise knowledge of the historical situation in which the name was transferred.

As is true of the complexes formed in the child's thinking, it is concrete empirical connections that underlie this kind of transfer. Applying this to the speech of the child, we can say that what happens with the child's understanding of adult speech is similar to what happened in the examples discussed above. Pronouncing a given word, the child and adult relate it to the same individual or object, to Napoleon for example, but one thinks of him as the victor at Jena and the other as the vanquished at Waterloo.

In Potebniia's[58] words, language is a means of understanding oneself. Therefore, we must study the function that language and speech fulfill in the child's thinking. This leads to the need to establish the fact that the child understands himself differently through speech than does the adult through this same speech. The acts of thinking carried out by the child through speech do not correspond with the operations carried out in the adult's thinking with the pronunciation of the same word.

We have discussed an author who said that the first word cannot be taken as a sign of a concept, that it is more an image, a picture, a mental illustration, or a small tale about the concept. It is a work of art. It has a concrete complexive character. It designates several objects which are related simultaneously to a single complex.

One might more accurately say that in naming an object with this type of illustration-concept, man relates it to a certain complex and links it to a group with a whole

series of objects. Referring to the emergence of the word "veslo" [oar] from the word "vesti" [to carry], Pogodin[59] was fully justified in saying that the word "veslo" may have been more appropriately used to refer to a boat as a means of transportation, a pack horse, or a vehicle. All these objects are related to a single complex, a complex of the kind we observe in the thinking of the child.

15

Deaf and mute children provide a particularly interesting example of complexive thinking because they lack that which underlies the formation of children's pseudoconcepts. As we noted earlier, the formation of pseudoconcepts is a function of the fact that the child finds words in adult speech that are already connected with definite groups of objects. The child is not free to form his own complexes by unifying objects in integrated groups. This is why the child's complex corresponds with the adult's concept in object relatedness. The child and adult understand each other with the pronunciation of the word "dog" because they relate the word to the same object, because they have the same concrete content in mind. However, one thinks of the concrete complex "dog" and the other of the abstract concept "dog."

Since verbal interaction with adults is absent in the speech of the deaf and mute, this factor loses its impact. These children are free to form different complexes designating a single object. The result is that the characteristics of complexive thinking are manifested with particular clarity. Thus, in the language of the deaf and mute, the word "tooth" may have three different meanings: "white," "stone," and "tooth." Different names are linked in a single complex. The combination of an indicative and illustrative gesture is required to further define the object relatedness of a particular meaning. These two functions of the word are physically disconnected. The deaf and mute first indicate the tooth. Then, attracting attention to the surface of the tooth or the act of throwing as illustrated by an arm movement, they indicate what type of object the word is to be related to.

An extremely interesting phenomenon can also be observed in adult thinking. Although adult thinking has achieved the formation of concepts and generally operates on that foundation, not all the adult's thinking is based on these operations. In dreams, for example, one can observe the ancient primitive mechanism of complexive thinking, the concrete fusion, condensation, and shifting of images. As Kretschmer[60] has correctly noted, the study of the generalizations that are observed in dreaming is the key to the correct understanding of primitive thinking. It does away with the prejudice that generalization in thinking emerges only with the most developed form of thinking, only with thinking in concepts.

In his research, Jaensch observed that there is a special form of generalization or unification of images in concrete thinking, what might be considered the concrete analogues of concepts, that is, concrete concepts. Jaensch calls these meaningful compositions and fluxes. In adult thinking, transitions from thinking in concepts to concrete complexive thinking occur continually.

The pseudoconcept is not the exclusive achievement of the child. In our everyday lives, our thinking frequently occurs in pseudoconcepts. From the perspective of dialectical logic, the concepts that we find in our living speech are not concepts in the true sense of the word. They are actually general representations of things. There is no doubt, however, that these representations are a transitional stage between complexes or pseudoconcepts and true concepts.

16

The child's complexive thinking constitutes only the first of two roots underlying the development of concepts. The second root constitutes a third stage in the development of the child's thinking. Like the second, it consists of a series of separate phases. Thus, the pseudoconcept constitutes a transitional stage between complexive thinking and this second root or source of the development of the child's concepts.

In our account, the development of the child's concepts was represented as it appears under the conditions of experimental analysis. Under these artificial conditions, the process of concept development appears in a logically consistent manner. There is, therefore, some divergence between this and the actual process involved in concept development. The actual development of the child's thinking, the sequence of stages and the phases within each stage, does not correspond fully with our depiction of it.

We have consistently taken a genetic approach to the analysis of our problem. We have, however, attempted to represent the moments of this genetic process in their mature, classic forms. The inevitable result is that we have diverged from the complex and twisting path that characterizes the actual development of the child's concepts.

In turning to the consideration of this third and final stage in the development of the child's thinking, it is important to emphasize the fact that the initial phase of this stage does not necessarily occur later than the final phases of the stage of complexive thinking. We have said that the higher forms of complexive thinking, especially the pseudoconcept, are maintained in our everyday thinking and its foundation in ordinary speech. Indeed, the rudiments of the forms of thinking which we will now describe significantly predate the formation of pseudoconcepts. In their logical nature, however, they are an independent second root of concept development. They have an entirely different genetic function and an entirely different role in the development of the child's thinking than the pseudoconcept.

The critical characteristic of complexive thinking is the establishment of the connections and relationships that constitute its basis. At this stage, the child's thinking forms complexes of objects that are isolated in perception and it connects them in groups. In the process, it forms the initial foundations for the unification of distinct impressions. This is the first step in the process of generalizing isolated elements of experience.

In its natural developed form, however, the concept presupposes more than the unification and generalization of the distinct concrete elements of experience. It presupposes the isolation and abstraction of separate elements, the ability to view these isolated, abstracted elements independently of the concrete and empirical connections in which they are given. Complexive thinking is helpless in this respect. It is permeated with an over abundance of connections and is characterized by a paucity of abstraction. The capacity to isolate features is extremely limited. The true concept, however, depends equally on the processes of analysis and synthesis. Partitioning and connecting are equally important internal aspects of its construction. As Goethe has noted, analysis and synthesis presuppose one another, just as inspiration and expiration presuppose one another. This is true in the construction of the individual concept and in conceptual thinking generally.

We will not find the development of complexes, and the development of the function which allows the partitioning the whole into its elements in isolation from one another in the actual development of the child's thinking. These two aspects of concept development will be found fused with one another. We present the two lines of development separately only in the interest of scientific analysis and of following the devel-

opment of each of these two roots of the concept with the greatest possible clarity. However, this separation of these two lines of development is not merely one of many possible modes of analysis. It is rooted in the very nature of things. The psychological natures of these two functions are fundamentally different.

Thus, the genetic function of this third stage in the development of the child's thinking is the development of partitioning, analysis, or abstraction. In this respect, the first phase of this third stage stands very close to the pseudoconcept. A unification of different concrete objects occurs on the foundation of maximal similarity among its elements. Because this similarity can never be total, we have what is in psychological terms an extremely interesting situation here. Specifically, in this situation, the child attends to the various features of an given object differentially. Those features that in aggregate reflect a maximal similarity with respect to the model become the center of attention. In the process, they are isolated or abstracted from the features that remain at the periphery of attention. For the first time, there emerges a *process of abstraction.* This abstraction is frequently poorly differentiated in nature because it is a whole group of inadequately differentiated features that is abstracted (often based only on a confused impression of commonality) rather than sharply isolated features.

Nonetheless, the child's integral perception has been overcome. Features have been differentiated into two unequal groups. The two processes that Kulpe's[61] school called positive and negative abstraction have emerged. The concrete object with all its features, in all its empirical completeness, no longer enters into the complex; it is no longer included in the generalization. As it enters the complex, it now leaves some of its features on the threshold. As a result, it is impoverished. Those features that serve as the foundation for its inclusion in the complex emerge in special relief in the child's thinking. This generalization, created by the child on the basis of maximal similarity, is at one and the same time a more impoverished and a more enriched entity than the pseudoconcept. It is more enriched in that it is constructed through the isolation of the object's more important and essential features. It is more impoverished in that the connections that support it are extremely poor, including only vague impressions of commonality or maximal similarity.

17

The second phase in the process of concept development might be called the stage of potential concepts. During this phase, the child operating under experimental conditions usually isolates a group of objects that are unified in accordance with a single common feature. Once again, what we see here resembles what we found with the pseudoconcept. Moreover, like the pseudoconcept, it might be mistaken for the true concept since the same product could result from adult conceptual thinking.

This external similarity to the true concept links the potential concept with the pseudoconcept. However, the potential concept and the pseudoconcept are fundamentally different.

This difference was identified by Groos,[62] who made it his point of departure in the analysis of concepts.

> The *potential* concept can be nothing other than a habitual action. In its most elementary form, it consists in that we expect that a similar ground will elicit a *similar common impression*. More precisely, we have an established set that this will be the case....If the potential concept is actually as we have just described it, a set on a habit, then it emerges very early in the child....In my view, it is a condition that necessarily precedes the appearance of intel-

> lectual characteristics. In itself, however, *it has nothing intellectual in it* (1916, p. 196).

Thus, this potential concept is a pre-intellectual formation arising very early in the development of thinking.

Most contemporary psychologists agree that the potential concept, in the form we have just described it, is found in animals. In this respect, Kroh[63] seems to have been fully justified in opposing the widely accepted assertion that abstraction appears for the first time in the transitional age. He maintains that the isolating abstraction can be found in animals.

In fact, experiments dealing with the abstraction of form and color in chickens have demonstrated that something very similar to the potential concept, something which involves the isolation of distinct features, is found in the early stages of the development of animal behavior.

Defining the potential concept as a set on a usual reaction, Groos is completely justified in rejecting the notion that it is a unique feature of the development of the child's thinking. He correctly ranks it, in genetic terms, among the pre-intellectual processes.

> Our initial potential concepts are pre-intellectual. No logical processes need be assumed to understand the action of these potential concepts. The relationship between the word and what we refer to as its meaning can sometimes be a simple association that does not contain true word meaning (ibid, p. 201 ff.).

If we consider the child's first words, it becomes apparent that they are similar in meaning to these potential concepts. They are potential, first, because of their *practical relatedness to a certain circle of objects* and, second, because of the *isolating abstractions* that underlie them. They have the potential for being concepts, but this potential has not been realized.

In this sense, Buhler is fully justified in drawing an analogy between the way that a child uses one of his habitual words with a new object and the way that an ape -- in a situation where a stick would be useful -- recognizes the similarity between the stick and things that had not previously reminded him of it. Kohler's experiments on tool use among chimpanzees demonstrates that once they have used a stick as a tool, the significance of the tool is extended to other objects that have something in common with the stick and can fulfill its function.

The external similarity to the concept is striking, lending substance to the name "potential concept." Summarizing his findings, Kohler argues that the only interpretation that corresponds with chimpanzee behavior is: 1) that the stick that is sighted is attributed a functional meaning for certain situations, and 2) that this meaning is extended to all other objects which share certain objective features of form and strength with the stick. Kohler's experiments demonstrate that the ape begins to use a shoe, a piece of wire, a straw, or a towel as a stick. That is, the ape begins to use a wide variety of objects that share the stick's elongated form and appear to have the potential of acting as a substitute for it. It is apparent, then, that a generalization of an entire series of concrete objects emerges here.

Groos differentiates this form of generalization from the potential concept. He argues that with the apes we are dealing with similarity of functional significance, while with the potential concept we are dealing with similarity of impressions. The potential concept is developed in the domain of concrete thinking, while with the ape we are dealing with the domain of practical thinking or thinking in action. This type of

concept, what Werner calls a dynamic or movement concept and Kohler calls "functional meaning," is present for a rather long time in the child's thinking, right up to the school age. The child's definition of concepts has precisely this kind of functional character. To define an object or concept means for the child to say what it does or, more frequently, what can be done with it.

When the issue is the definition of abstract concepts, it is the active situation, the equivalent of the child's word meaning, that advances to the forefront. In a study of thinking and speech, Messer gives a typical example of a definition of an abstract concept that was elicited from one of his subjects who was in the first year of instruction. The child said: "Intelligence is when I am thirsty but do not drink from a dirty pond." This type of concrete functional meaning is the sole mental foundation of the potential concept. We should note that this type of potential concept plays an extremely important role even during the stage of complexes and frequently unites with the construction of complexes. As we have seen, in the associative complex as well as in other types of complexes, the construction of the complex presupposes the isolation of a certain feature common to the various elements. In pure forms of complexive thinking, this feature is unstable, giving way very easily to other features. Therefore, it is in no way privileged in comparison with the other features of these objects. This is not the case with the potential concept. Here, the feature that serves as the basis for the object's inclusion in the general group is a privileged feature which has been abstracted from the concrete group of features with which it is empirically connected.

Potential concepts play an extremely important role in the history of the development of the word. Earlier, we introduced examples indicating that a new word arises through the isolation of some single feature that strikes the observer and serves as the basis for the construction of a generalization of a series of objects that are named or designated by a single word. Potential concepts often remain at this stage of development, not making the transition to true concepts. Nonetheless, they play an extremely important role in the development of the child's concepts. It is in the potential concept, in the associated abstraction of distinct features, that the child first destroys the concrete situation and the concrete connections among the object's features. In this process, he creates the prerequisites for the unification of these features on a new foundation. Only the mastery of the processes of abstracting, combined with the development of complexive thinking, can lead the child to the formation of true concepts, that is, to the fourth and final phase in the development of the child's thinking.

The concept arises when several abstracted features are re-synthesized and when this abstract synthesis becomes the basic form of thinking through which the child perceives and interprets reality. As we have said, the *word* plays a decisive role in the formation of the true concept. It is through the word that the child voluntarily directs his attention on a single feature, synthesizes these isolated features, symbolizes the abstract concept, and operates with it as the most advanced form of the sign created by human thinking.

Of course, the word already has an important role in complexive thinking. Complexive thinking is impossible without the word. It assumes the role of a family name, uniting a group of objects that are related to one another through the child's impressions. In this sense, our position is in opposition to others in that we differentiate complexive thinking as a stage in the development of verbal thinking from the wordless concrete thinking characteristic of animal representations, a form of thinking that Werner and others refer to as complexive thinking because of the tendency toward the fusion of separate impressions that is inherent to it.

These authors are inclined to equate the processes of condensation and shifting manifested in dreaming with the complexive thinking of primitive peoples*, in spite of the fact that the latter is one of the higher forms of verbal thinking, the product of a long historical evolution of the human intellect, and the inherent predecessor of conceptual thinking. Several authorities, including Folkelt, have gone still further. They are inclined to identify the complexive thinking of spiders with the child's primitive verbal thinking.

In our view, a fundamental difference distinguishes the product of biological evolution (i.e., the natural form of thinking) from the historically emerging forms of human intellect. Recognizing the decisive role of the word in complexive thinking does not imply an identification of its role in complexive thinking with its role in conceptual thinking. To the contrary, the primary distinction between complexes and concepts is that these two forms of generalization are the result of different functional uses of the word. The word is a sign and a sign can be used in various ways. There are different ways of applying it. It can serve as a means for different intellectual operations and the different intellectual operations that are realized through the word underlie the basic differences between complexes and concepts.

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The most important conclusion of our investigation is that it is only in the transitional age that the child completes the third stage in the development of his intellect, *that he reaches the point where he is thinking in concepts.* In experiments with adolescents, it became apparent that the primitive forms of syncretic and complexive thinking (as well as potential concepts) begin to appear less frequently in their thinking and they begin to use true concepts in thinking.

However, these processes of transition are not mechanical processes, where each new phase begins only with the completion of the previous one. The developmental process is much more complex. *The various genetic forms co-exist,* just as strata representing different geological epochs coexist in the earth's crust. This is more the rule than the exception for the development of behavior generally. Human behavior is not consistently characterized by a single higher level of development. Forms of behavior that have emerged very recently in human history dwell alongside the most ancient. The same can be said of the development of the child's thinking. A child who has mastered the higher forms of thinking, a child who has mastered concepts, does not part with the more elementary forms of thinking. In quantitative terms, these more elementary forms continue to predominate in many domains of experience for a long time. As we noted earlier, even adults often fail to think in concepts. The adult's thinking is often carried out at the level of complexes, and sometimes sinks to even more primitive levels. When applied in the domain of life experience, even the concepts of the adult and adolescent frequently fail to rise higher than the level of the pseudoconcept. They may possess all the features of the concept from the perspective of formal logic, but from the perspective of dialectical logic they are nothing more than general representations, nothing more than complexes.

The transitional age, then, is not one of completion but one of crisis and maturation. With the higher forms of thinking that are attainable to the human mind, this age

* Kretschmer writes that "this primitive form of thinking is also referred to as complexive thinking (Price) to the extent that here complexes of images that frequently shift into one another, or fuse in conglomerates, take the place of sharply defined abstract concepts (1927, p. 83)." All authors agree that this type of thinking is a preparatory stage in the process of concept formation.

is transitional in all other respects as well. The transitional character of the adolescent's thinking becomes particularly apparent if we look at it in action, that is, if we submit it to a functional analysis rather than taking the adolescent's concept in its developed form. The true psychological nature of this formation is manifested in action, in application. By analyzing the concept in action, we can discover several extremely important psychological laws that underlie this new form of thinking. These laws help clarify the general character of the adolescent's intellectual activity, and (as we shall see later) the general nature of the development of his personality and world-view.

First, we should note the profound *divergence manifested in the experiment between the concept's formation and its verbal definition.* This divergence is not only present in the adolescent. It is found in adult thinking, sometimes in very developed forms of thinking. *The existence of a concept does not coincide with consciousness of that concept either in the moment of its appearance or in its mode of functioning.* The former may appear earlier than the latter and act independently of it. Analysis of reality on the basis of the concept emerges much earlier than analysis of the concept itself.

This is clearly manifested in experiments carried out with adolescents. These experiments bear witness to the most characteristic feature of this age, one that demonstrates the transitional character of these forms of thinking. This feature is the divergence between word and deed in the formation of concepts. In the concrete situation, the adolescent forms the concept and applies it correctly. However, when it comes to the verbal definition of this concept, the adolescent's thinking encounters extreme difficulty. The concept's definition is significantly narrower than the concept as it is actually used. This indicates that the concept arises as the result of processes other than the logical processing of certain elements of experience. Moreover, it comes into conscious awareness and acquires a logical character at a comparatively late stage of its development.

Another feature characteristic of the application of concepts in the transitional age is also apparent here. Specifically, it is in the concrete situation that the adolescent uses the concept. When the concept is not torn from the concretely perceived situation, it guides the adolescent's thinking easily and faultlessly. The application of experience to entirely different domains, the process of transferring concepts, presents much greater difficulties. These difficulties arise when the features isolated and synthesized in the concept encounter other features in entirely different concrete surroundings and when these features are given in entirely different proportions. Thus, with changes in the concrete situation, the use of concepts becomes much more difficult. As a rule, however, the adolescent becomes successful in making this type of transfer in the first stage of the maturation of thinking.

The process of defining the concept when it is torn from the concrete situation in which it was developed, when it no longer depends on concrete impressions and begins to develop in an entirely abstract plane, is significantly more difficult. That is, the verbal definition of the concept, the ability to attain clear conscious awareness of it and define it, produces significant difficulties. In our experiments, we often observed situations where the child or adolescent correctly resolved the task involved in the formation of the concept. However, in providing a definition of the concept he had formed, the same child sank to a more primitive level and began to enumerate the concrete objects grasped by the concept in a particular situation.

Thus, the adolescent uses the word as a concept, but defines it as a complex. This type of oscillation between thinking in complexes and thinking in concepts is characteristic of the transitional age.

However, the greatest difficulty for the adolescent and one that he overcomes only at the end of the transitional age is the further transfer of the sense or meaning of

the developed concept to new concrete situations that he also thinks about on an abstract plane. Thus, the path from the abstract to the concrete is no less difficult for the adolescent than was the path from the concrete to the abstract in its time.

The experiment leaves no doubt that the representation of the process of concept formation commonly accepted by traditional psychology does not correspond to the actual process. In this respect, traditional psychology acted like a slave in following the description of the process of concept formation assumed by formal logic, depicting the process in the following way. First, the foundation of the concept is a series of concrete representations. One psychologist suggests using the concept "tree" as an example. This concept emerges on the basis of a series of representations of "tree" that are similar to one another. The following schema is provided to clarify the process involved in concept formation. First, assume that I have seen three different trees. The representations of these three trees can be decomposed into their constituents, into their form, color, and size. The constituents of these representations that remain are those that correspond to one another. A process of assimilation occurs for each of these constituents, the result of which is a general representation of each feature. Following a synthesis of these representations, we obtain one general representation or concept of "tree."

From this perspective, the process of concept formation parallels the process involved in Galton's collective photography through which he attains a family portrait based on individuals who belong to a single family. The images representing each individual are superimposed on one another such that frequently repeated features, those common to many family members, appear in relief while features unique to a single individual tend to suppress one another. In this way, similar features are isolated. In the traditional view, the concept is the aggregate of these common features, features isolated from a series of similar objects.

It is difficult to imagine a more distorted representation of the actual course of concept development. Psychologists have long noted that *the formation of the adolescent's concepts never takes the logical path depicted by this traditional scheme* and our experiments clearly support this position. Fogel's research, for example, demonstrated that the child does not enter the domain of abstracted concepts by traversing a path that begins with particular species and moves continually higher. On the contrary, the child uses the most general concepts from the very beginning. He reaches the middle level concept not through abstraction, not by moving from below to above, but through definitions, by moving from the higher to the lower. The child's representations move from the undifferentiated to the differentiated, from genus to species and variety.

In Fogel's words, if we consider the pyramid of concepts, we find that thinking almost always moves toward the top and toward the bottom, rarely along the horizontal. At one point, this position represented a complete reversal of traditional psychological theories of concept formation. Rather than involving a simple isolation of similar features from a series of concrete objects, the process of concept formation came to be understood as *a complex process involving the movement of thinking through the pyramid of concepts*, a process involving constant movement from the general to the particular and from the particular to the general.

Buhler has recently advanced a theory on the origin of concepts. Like Fogel, Buhler is inclined to reject the traditional representation of concept development involving the isolation of common features. He distinguishes two genetic roots in the formation of concepts. The first is the unification of the child's representations in isolated groups and the merging of these groups in complex associative connections that are formed among the groups of representations and among the elements constituting each group. The second is the function of judgment. As a result of thinking or of

judgments that have already formed, the child achieves the creation of concepts. Buhler sees proof for this in the fact that the words which designate concepts for the child rarely reproduce ready-made judgments although this is frequently the case with children in the associative experiment. It is obvious that the judgment is something simpler. As Buhler says, the natural logical place of the concept is the judgment. Representation and judgment interact with one another in concept formation.

Thus, the formation of concepts develops simultaneously from two directions, from the direction of the general and the particular.

The fact that the first word the child uses is actually a general designation is an extremely important piece of evidence for this position. Concrete, particular designations arise in the child only later. Thus, the child learns the word "flower" before he learns the names of individual flowers. However, even if for some reason he were to master the name of some particular flower (e.g., the word "rose") before the word "flower," this word would be used to refer not to roses alone but to all flowers. Even here, then, the child would use the particular designation as a general one. In this sense, Buhler is fully justified in saying that the process involved in the formation of concepts is not one of raising the pyramid of concepts from below to above but one that moves simultaneously from both directions like the process of breaking open a tunnel.

Of course, this raises an extremely important and difficult problem for psychology. Recognizing that the child learns the general and more abstract names earlier than the more concrete, many psychologists have begun to reconsider the traditional claim that abstract thinking develops comparatively late, that it develops only in the period of full maturation. Beginning with a correct analysis of the sequence underlying the development of general and concrete names in the child, these psychologists draw the false conclusion that abstract concepts emerge simultaneously with the appearance of general names in the child's speech, that is, extremely early. C. Buhler's theory is a good example. We have seen that this theory leads to the false claim that there are no special changes or significant advances in thinking during the transitional epoch. It holds that if we compare the thinking of the adolescent with the thinking that we encounter in the intellectual activity of the three year old, we will find nothing that is fundamentally new.

We will be able to consider this question in more detail in the following chapter. At this point, we will note only that *the use of the general word does not in any sense presuppose the mastery of abstract thinking.* As we have seen, the child uses the same words as the adult and relates them to the same circle of objects, but he thinks of them in an entirely different way. Therefore, the child's very early use of words that represent the most abstract forms of thinking in adult speech does not indicate the presence of abstract thinking in the child.

We must remember that the words of the child's speech correspond with the adult's words in their object relatedness but not in their meaning. Therefore, the fact that a child uses abstract words provides no foundation for ascribing abstract thinking to him. As we will try to show in the following chapter, the child thinks of the object concretely though he may use abstract words. At any rate, there is no question that the old conception concerning the formation of concepts, the conception that has its analogy in collective photography, fails to correspond with actual psychological observations or with data from experimental analyses.

A second of K. Buhler's conclusions which is supported by experimental data is also beyond doubt. The concept actually does find its natural place in judgments and conclusions, acting as a constituent of them. The child who responds with the word "big" when presented with the word "house" or with the phrase "apples hang from it"

when presented with the word "tree" proves that *the concept exists only within a general structure of judgments, that it exists only as an inseparable part of that structure.*

The word exists only within the phrase. Moreover, the phrase appears earlier in psychological terms than does the separate, isolated word. In the same way, judgment arises in the child's thinking earlier than separate, isolated concepts. Therefore, as Buhler argues, the concept cannot be a pure product of association. The association of the connections among separate elements is a necessary but insufficient prerequisite for the formation of concepts. In Buhler's view, these two roots of concepts in the processes of representation and judgment are the genetic key to the correct understanding of the processes involved in the formation of concepts.

In our experiments, we actually observed both of these features mentioned by Buhler. However, his conclusion concerning the concept's dual roots seems to us to be false. Lindner[64] attracted attention to the fact that very general concepts are acquired by the child at an early age. There is no question that the young child learns the correct use of general names. Further, there is simply no truth to the notion that the child's concept develops through the ascent of the concept pyramid. In our experiments, the child frequently matched a series of figures to the model and designated them by a single name. In the process, he extended the word meaning to all these objects, that is, he used the word as a very general and undifferentiated rather than a concrete name.

We also saw how the concept arises as the result of thinking and finds its organic place within judgment. In this sense, the experiment provided support for the theoretical position that the concept does not arise mechanically as a collective photograph of concrete objects. The brain does not act as a photographic apparatus producing a collective photograph. Thinking does not operate through the simple combination of these photographs. On the contrary, the processes of concrete and active thinking arise long before the formation of concepts. Concepts themselves are the product of the long and complex process that constitutes the development of the child's thinking.

As we have said, the concept arises in the intellectual operation. It is not the play of associations that leads to its construction. In a unique combination, all the elementary intellectual functions participate in its formation. The central feature of this operation is the functional use of the word as a means of voluntarily directing attention, as a means of abstracting and isolating features, and as a means of the synthesizing and symbolizing these features through the sign.

During the course of the experiment, we frequently saw that what might be called the indicative function is the initial function of the word. In genetic terms, the word indicates a certain feature much earlier than it assumes the signifying function, before it assumes the function of substituting for a series of concrete impressions and designating them. Under the conditions imposed by our experiment, the meaning of what was initially a meaningless word was linked to the concrete situation. As a result, we had the opportunity to observe how word meaning first arises when it is present in this way. We were able to study this process of relating the word to a certain feature in its living form, to observe how that which is perceived is isolated and synthesized, how it becomes the sense or meaning of the word, how it becomes a concept. We were then able to observe how these concepts are extended and transferred to other concrete situations and how the subject gains conscious awareness of them.

The formation of concepts occurs whenever the adolescent is faced with the task of resolving some problem. The concept arises only as a result of the solution of this problem. Thus, the data from our experimental analysis indicate that Buhler did not represent the dual roots of concept formation in a completely accurate manner.

The concept does indeed develop along two different channels. First, we have tried to show how the function of combining or connecting a series of separate objects through a common family name is basic to the child's complexive thinking. This constitutes the first of the two channels. We have also tried to show how potential concepts, concepts which are based on the isolation of several common features, develop in parallel with complexes and constitute the second channel. These two forms constitute the dual roots of concept formation.

What Buhler maintains are the roots of concepts are only their apparent roots. The preparation of the concept in the form of associative groups and the preparation of concepts in memory is a natural process that is unconnected with the word. It is related to the form of complexive thinking we discussed earlier, the form that manifests itself completely unconnected with the word in concrete thinking.

In our dreams and in the thinking of animals we find a close analogy to these associative complexes of isolated representations. However, as we have pointed out, it is not these unifications of representations that underlie concepts. The foundation of the concept is to be found in the complexes that are created on the basis of the use of the word.

Thus, Buhler's first mistake was that of ignoring the role of the word in the complexive unifications that precede concepts, that of attempting to derive the concept from a purely natural form of the development of impressions. He ignored the historical nature of the concept and the role of the word in its formation. He failed to see the difference between the natural complexes that arise in memory (represented by Jaensch's concrete concepts) and the complexes that arise on the basis of highly developed verbal thinking.

Buhler made this same mistake in his analysis of the second root of concepts, that which lay in the processes of judgment and thinking. On the one hand, Buhler's assertion returns us to the logicalizing perspective, to the view that the concept has its roots in reflection and that it is the product of logical reasoning. We have seen, however, that both the history of concepts in the development of languages and the history of the child's concepts diverge from the path that logic prescribes. On the other hand, when he refers to thinking as the root of concepts, Buhler is once again ignoring the differences between forms of thinking. In particular, he is ignoring the differences between biological and historical, natural and cultural, lower and higher, and nonverbal and verbal forms of thinking.

If, in fact, the concept arises on the basis of judgment or thinking, we might ask what distinguishes the concept from the products of concrete or active thinking in practical contexts. Again, Buhler forgets what is central to concept formation. He forgets the word. He fails to take account of the word in his analysis of the factors that play a role in concept formation. As a consequence, he cannot understand how two processes as different as judgment and the combining of representations can lead to the formation of concepts.

These false premises inevitably lead Buhler to the false conclusion that the three year old child is already thinking in concepts and that the thinking of the adolescent does not constitute any fundamentally new stage in their development. Buhler is deceived by external similarity. He fails to consider the profound difference between the causal-dynamic connections and relationships that stand behind these two types of thinking. Externally, these types of thinking are very similar, yet in genetic, functional, and structural terms they are completely different.

Our experiments have led us to a fundamentally different conclusion. They show how the use of the word acts as a means of forming the concept, how from syncretic

images and connections, complexive thinking, and potential concepts there arises that unique signifying structure that we may call *a concept in the true sense of the word.*

Chapter 6

THE DEVELOPMENT OF SCIENTIFIC CONCEPTS IN CHILDHOOD

The development of scientific concepts[10] in the school-age child is primarily a practical issue of tremendous importance for the school's task of instructing the child in a system of scientific concepts. However, it is also an issue of tremendous theoretical significance. Research on the development of scientific concepts (i.e., true concepts) will inevitably clarify the most basic and essential general laws of concept formation. This problem contains the key to the whole history of the child's mental development. It must, therefore, be our point of departure in studying the child's thinking. Until recently, however, this problem has remained almost entirely unexplored. Our knowledge of the development of scientific concepts is extremely limited. Our own experimental research, which we will cite frequently in the present chapter, is among the first systematic studies of the issue.

This research (carried out primarily by Shif[65]) was a comparative study of the development of scientific and everyday concepts in school-age children. Shif's basic task was to carry out an experimental evaluation of our working hypothesis concerning the unique characteristics of the development of scientific as opposed to everyday concepts. A second basic concern was the more general problem of the relationship between instruction[11] and development. The attempt to study the actual development of the child's thinking in the course of school instruction grew from several basic assumptions: (1) in general terms, concepts or word meanings develop; (2) scientific concepts are not learned in final form -- they too develop; (3) findings based on the study of everyday concepts cannot be generalized to scientific concepts; and (4) the problem as a whole must be studied experimentally. A special experimental method was developed. Subjects were presented with problems that were structurally isomorphic, but which differed in that they incorporated materials based on either scientific or everyday concepts. Using a series of pictures, the experimenter told a story that ended with a sentence fragment broken off at the word "because" or "although." This procedure was supplemented by clinical discussion in order to establish levels of conscious reflection on cause-effect relationships and relationships of implication with both scientific and real-world material.

The pictures illustrated a sequence of events based either on materials from lessons in the social science program or common occurrences in everyday life. Prob-

lems based on everyday events required children to complete sentences such as: "Kolya went to the movie theater because...," "The train left the tracks because...," or "Olya still reads poorly, although...." Based on this model, several problems were also constructed using materials from the educational programs of second and fourth grade children.

As a supplementary mode of gathering data, we observed lessons of primary school children that were specially organized for this purpose.

The findings from this study lead to several conclusions concerning both the narrow issue of the development of scientific concepts and the broader issue of the development of thinking in school-age children. A comparative analysis of the results for each age group demonstrates that with the appropriate educational program the *development of scientific concepts outstrips the development of spontaneous concepts.** The table provides empirical support for this conclusion.

The table shows: (1) that there is a higher level of conscious awareness[12] of scientific than everyday concepts, and (2) that there is a progressive development of scientific thinking which is followed by a rapid increase in levels of performance with everyday concepts. This indicates that the accumulation of knowledge leads directly to an increase in the level of scientific thinking and that this, in turn, influences the development of spontaneous thinking. This demonstrates the leading role of instruction in the development of the school child.

The category of adversative relations ('although') develops genetically much slower than the category of causal relations ('because') and presents a picture in Grade IV similar to that of causal relations in Grade II. This is also associated with the characteristics of the materials used in the educational program.

These data lead to an hypothesis concerning the unique processes involved in the development of scientific as opposed to everyday concepts. The development of scientific concepts *begins with the verbal definition.* As part of an organized system, this verbal definition descends to the concrete; it descends to the phenomena which the concept represents. In contrast, the everyday concept tends to develop outside any definite system; it tends to move upwards toward abstraction and generalization.

The development of the scientific social science concept, a phenomenon that occurs as part of the educational process, constitutes a unique form of systematic cooper-

Tasks		Grades II % Completed sentences	IV
Sentences with the conjuction:			
Because	Scientific concepts	79.70	81.80
	Everyday concepts	59.00	81.30
Although	Scientific concepts	21.30	79.50
	Everyday concepts	16.20	65.50

* When the author uses phrases such as "spontaneous thinking" or "spontaneous concepts," he is referring to phenomena that develop through the child's practical activity and immediate social interaction, not to those that develop with his acquisition of a system of knowledge through instruction. Editor's note.

ation between the teacher and child. The maturation of the child's higher mental functions occurs in this cooperative process, that is, it occurs through the adult's assistance and participation. In the domain of interest to us, this is expressed in the growth of the *relativeness* of causal thinking and in the development of a certain degree of *voluntary control* in scientific thinking. This element of voluntary control is a product of the instructional process itself. The earlier maturation of scientific concepts is explained by the unique form of cooperation between the child and the adult that is the central element of the educational process; it is explained by the fact that in this process knowledge is transferred to the child in a definite system. This is also why the level of development of scientific concepts forms a zone of proximal possibilities for the development of everyday concepts. The scientific concept blazes the trail for the everyday concept. It is a form of preparatory instruction which leads to its development.

Thus, at a single stage in the development of a single child, we find differing strengths and weaknesses in scientific and everyday concepts.

Our data indicate that the weakness of the *everyday* concept lies in its *incapacity for abstraction*, in the child's incapacity to operate on it in a voluntary manner. Where volition is required, the everyday concept is generally used incorrectly. In contrast, the weakness of the scientific concept lies in its *verbalism*, in its insufficient saturation with the concrete. This is the basic danger in the development of the scientific concept. The strength of the scientific concept lies in the child's capacity to use it in a voluntary manner, in its "readiness for action." This picture begins to change by the 4th grade. The verbalism of the scientific concept begins to disappear as it becomes increasingly more concrete. This has its influence on the development of spontaneous concepts as well. Ultimately, the two developmental curves begin to merge (Shif, 1935).

How do scientific concepts develop in the course of school instruction? What is the relationship between instruction, learning, and the processes involved in the internal development of scientific concepts in the child's consciousness? Are these simply two aspects of what is essentially one and the same process? Does the process involved in the internal development of concepts follow instruction like a shadow follows the object which casts it, not coinciding with it but reproducing and repeating its movement, or do both processes exist in a more complex and subtle relationship which requires special investigation?

In contemporary child psychology, we find two answers to these questions. First, we find the position that *scientific concepts do not have their own internal history*, that they do not undergo a process of development in the true sense of the word. Rather, they are simply learned or received in completed form through the processes of understanding, learning, and comprehension. They are adopted by the child in completed form from the domain of adult thinking. From this perspective, the problem of the development of scientific concepts is essentially exhausted by that of teaching scientific concepts to the child and by that of learning concepts. This is the most widely accepted -- indeed the generally accepted -- perspective on this issue in contemporary child psychology. Until recently, it has provided the foundation for the construction of most theories and methods of school instruction.

Even the most rudimentary scientific critique makes the theoretical and practical inadequacy of this view apparent. We know from research on concept formation that the concept is not simply a collection of associative connections learned with the aid of memory. We know that the concept is not an automatic mental habit, but a *complex and true act of thinking* that cannot be mastered through simple memorization. The child's thought must be raised to a higher level for the concept to arise in consciousness. At any stage of its development, the concept is an *act of generalization*. The most

important finding of all research in this field is that the concept -- represented psychologically as word meaning -- develops. The essence of the development of the concept lies in the transition from one structure of generalization to another. Any word meaning, at any age, is a generalization. However, word meaning develops. When the child first learns a new word, the development of its meaning is not completed but has only begun. From the outset, the word is a generalization of the most elementary type. In accordance with the degree of his development, the child moves from elementary generalizations to higher forms of generalization. This process is completed with the formation of true concepts.

The development of concepts or word meanings presupposes the development of a whole series of functions. It presupposes the development of voluntary attention, logical memory, abstraction, comparison, and differentiation. These complex mental processes cannot simply be learned. From a theoretical perspective, then, there is little doubt concerning the inadequacy of the view that the concept is taken by the child in completed form and learned like a mental habit.

The inadequacy of this view is equally apparent in connection with practice. No less than experimental research, pedagogical experience demonstrates that direct instruction in concepts is impossible. It is pedagogically fruitless. The teacher who attempts to use this approach achieves nothing but a mindless learning of words, an empty verbalism that simulates or imitates the presence of concepts in the child. Under these conditions, the child learns not the concept but the word, and this word is taken over by the child through memory rather than thought. Such knowledge turns out to be inadequate in any meaningful application. This mode of instruction is the basic defect of the purely scholastic verbal modes of teaching which have been universally condemned. It substitutes the learning of dead and empty verbal schemes for the mastery of living knowledge.

Tolstoy, who had an extraordinary understanding of the nature of the word and its meaning, saw with both clarity and precision the futility of attempting to transmit concepts directly from teacher to student. He understood that it is impossible to transfer word meaning mechanically from one head to another through other words. Tolstoy experienced the futility of this approach in his own teaching. He attempted to teach children literary language by first translating the children's words into the language of the tale and then translating the language of the tale into a higher level of language. He concluded that it is impossible to teach students literary language as one commonly teaches them French, through forced explanation, memorization, and repetition.

Tolstoy writes:

> We must recognize that the frequency with which we have tried this approach in the past two months and the direct repulsion it encountered in the students proves that it was mistaken. These experiments have convinced me that even for a talented teacher, it is impossible to explain the meaning of a word. The explanations that untalented teachers are so fond of cannot be more successful. To explain a word such as "impression," you must replace it either with another equally incomprehensible word or with a whole series of words whose connection with it is as incomprehensible as the word itself (1903, p. 143).

We find truth and error mixed in equal measure in Tolstoy's categorical position on this issue. The correct aspect of his position is that which flows directly from the experience of any teacher who is struggling like Tolstoy and who analyzes the word as carefully. In Tolstoy's own words, the truth in this position consists in that fact that:

> it is rarely the word itself that is incomprehensible to the student. Rather, the child lacks the concept that the word expresses. The word is almost always ready when the concept is ready. The relationship of the word to thought and the formation of new concepts is such a complex, mysterious, and delicate process of the spirit that any interference with it is a powerful, awkward force which retards development (ibid).

The truth of this position lies in the fact that concepts or word meanings develop and in the fact that this developmental process is complex and delicate.

The incorrect aspect of this position, which is a direct expression of Tolstoy's general views on the issue of instruction, lies in his exclusion of any possibility of direct interference in this mysterious process. Tolstoy attempts to represent the process of concept development in terms of its own internal laws. He isolates the development of concepts from instruction. This condemns the teacher to extreme passiveness in the development of scientific concepts. This position emerges with particular clarity in Tolstoy's categorical formulation of his position, in his statement that "any interference is a crude, awkward force which retards development."

However, Tolstoy understood that not all forms of interference retard concept development. It is only crude, direct interference in the formation of concepts -- interference which attempts to move in a straight line along the shortest distance between two points -- that leads to injury. A different form of interference, a more subtle, complex, and indirect method of instruction, will lead this developmental process forward to higher levels. Tolstoy writes:

> It is important to give the pupil the opportunity to acquire new concepts and words from the general meaning of speech. The child hears or reads a word that he does not understand in a phrase that he does. Later, he hears or reads it again in another phrase. Through this process, he begins to acquire some vague understanding of it. Ultimately, he begins to feel the necessity of using this word. Once he has used it, the word and concept are made his own. There are a thousand other paths to this same end. I remain convinced, however, that consciously transferring new concepts or word forms to the pupil is as futile as attempting to teach the child to walk through instruction in the laws of equilibrium. Any attempt of this kind will not only fail to move the pupil toward the desired goal, but will interfere with that process, much like the crude hand of a man who attempts to build a flower from petals still contained within a bud because he wants to see it bloom (ibid, p. 146).

Thus, Tolstoy believes that there are a thousand paths other than that characteristic of traditional scholastic instruction through which we can teach new concepts to the child. He rejects only one path, the direct and crude mechanical construction of the new word from its "petals." Tolstoy's argument on this issue is correct. It is, indeed, indisputable, supported by both theory and practice. However, Tolstoy ascribes too much significance to the natural and accidental. He ascribes too much significance to the work of vague representations and feelings, to the internal process of concept formation closed off within itself. He underestimates the potential for direct influence on this process. Stated more generally, he exaggerates the distance between instruction and development.

However, in the present context, we are interested primarily in the kernel of truth that is contained in his position that the attempt to develop the new concept from its "petals" is like trying to teach a child to walk in accordance with the laws of equilibrium. This position is absolutely correct. The path from the child's first encounter

with a new concept to the moment when the word and concept are made the child's own is a complex internal mental process. This process includes the gradual development of understanding of the new word, a process that begins with only the vaguest representation. It also includes the child's initial use of the word. His actual mastery of the word is only the final link in this process. We attempted to express what is essentially the same idea in our argument that, when the child first learns the meaning of a new word, the process of development has not been completed but has only begun.

Our research in pursuit of the hypothesis stated at the beginning of this chapter shows that the paths through which we can teach concepts to the child are not limited to the thousand to which Tolstoy refers. *Conscious* instruction of the pupil in new concepts (i.e., in new forms of the word) is not only possible but may actually be *the source for a higher form of development of the child's own concepts, particularly those that have developed in the child prior to conscious instruction.* Our research demonstrates that it is possible to work directly on concepts in school instruction. It also shows, however, that this constitutes not the end but the beginning of the development of the scientific concept. It does not exclude the processes of development but gives them new directions. It places the processes of instruction and development in new and maximally propitious relationships.

It is important to note that when Tolstoy speaks of the concept it is always in connection with the problem of teaching literary language to the child. Tolstoy is not concerned with the concepts that the child acquires in learning a system of scientific knowledge, but with words and concepts that are woven into the same fabric as those that have developed in the child. The examples that he uses make this apparent. He speaks of explaining and interpreting words such as "impression" or "tool." In contrast to the scientific concepts with which our research is concerned, these words and concepts are not learned as part of a well-defined system. Naturally, we must consider to what extent Tolstoy's arguments can be extended to the processes involved in the formation of scientific concepts. To address this issue, we must explore the common characteristics of the processes involved in the formation of scientific concepts and those involved in the formation of the concepts that Tolstoy had in mind because they emerge from the child's own everyday life experience, we will refer to the latter as everyday concepts.

By differentiating scientific and everyday concepts in this way, we do not resolve the issue of whether this differentiation is objectively justified. Indeed, a basic task of our research is to clarify the issue of whether there is any objective difference between the processes involved in the development of scientific concepts and those involved in the development of other types of concepts. If such a difference does exist, we must clarify its nature. We must also identify objective differences which can provide a foundation for the comparative study of the processes involved in the development of scientific and everyday concepts. The task of this chapter is to show that this distinction is empirically warranted, theoretically justified, and heuristically fruitful. Its task is to show that it must function as the corner stone of our working hypothesis. We must demonstrate that *scientific concepts develop differently than everyday concepts*, that the development of these two types of concepts does not follow the same path. Therefore, the task of our experimental research includes acquiring empirical support for the position that there is a difference between the development of scientific and everyday concepts. It also requires the acquisition of data that will permit us to clarify the precise nature of this difference.

This differentiation of scientific and everyday concepts is basic to our working hypothesis and our statement of the research problem. It is not, however, generally ac-

cepted by contemporary psychologists. In fact, it contradicts the most widely held views on the matter. We should, therefore, attempt to clarify and support our position.

We mentioned earlier that there are currently two positions on the issue of how scientific concepts develop in the course of school instruction. As we have pointed out, the first position consists of a complete rejection of any internal development in the emergence of scientific concepts. We have already attempted to point out the inadequacy of this perspective. There is, however, a *second position* on this issue. This position -- currently the more widely accepted of the two -- is based on the idea that the development of scientific concepts *differs in no essential way from that of the concepts* which develop in the course of the child's own experience. This perspective suggests that there is no basis for the differentiation of these developmental processes. From this perspective, the process involved in the development of scientific concepts simply repeats the most basic and essential aspects of the process through which everyday concepts develop. The critical question at this point is whether this second position is well-founded.

If we review the scientific literature, it quickly becomes apparent that nearly all studies of concept formation in childhood have focused on the development of what we call everyday concepts. As we mentioned earlier, our work is one of the first systematic attempts to study the development of scientific concepts. All the established laws and regularities of the development of the child's concepts have been derived from studies of everyday concepts. In spite of the differences in the internal conditions under which these two types of concepts develop, these findings have been extended to the domain of the child's scientific thinking. No attempt has been made to verify the validity of such an extension. That the extension of these findings to the domain of scientific concepts has occurred without any attempt to assess its validity is primarily a function of the fact that the question of the propriety of this extension has never been raised.

Recently, several particularly insightful researchers (including Piaget) have found that they could not ignore this question. Moreover, when the problem presented itself, these researchers were obliged to differentiate sharply between representations that develop primarily through the operation of the child's own thought and those that arise under the decisive and determining influence of knowledge the child acquires from those around him.

Piaget refers to the first of these two types of representations as spontaneous representations.

Piaget demonstrated that these two types of representations have a good deal in common. They both: (1) manifest a resistance to external suggestion; (2) have deep roots in the child's thought; (3) manifest a certain commonality among children of the same age; (4) are maintained in the child's consciousness over a period of several years (giving way to new concepts gradually rather than disappearing suddenly); and (5) manifest themselves in the child's first true answers. These characteristics differentiate these two types of representations from suggested representations and from answers that are provided to the child through leading questions.

In our view, these positions are correct. They recognize that the child's scientific concepts (which clearly belong to the second group of representations discussed by Piaget) undergo a true process of development rather than arising spontaneously. This is made clear by the five features of these representations listed above. Piaget goes further and deeper than other researchers into the problem which interests us. He even recognizes that this group of concepts can become an independent object of investigation.

However, Piaget makes several mistakes that detract from the positive aspect of his argument. *Three interrelated aspects of Piaget's thought are mistaken* and of special interest to us. The first concerns the potential for independent studies of the child's nonspontaneous concepts and the fact that these concepts have roots deep in the child's thought. Piaget is inclined to a make an assertion that directly contradicts these ideas. He asserts that it is only the child's spontaneous concepts and representations which can serve as the source of direct knowledge of the unique qualities of the child's thought. In Piaget's view, the child's nonspontaneous concepts (concepts formed under the influence of the adults who surround the child) reflect not so much the characteristics of the child's thinking as the level and character of the adult thought that the child has learned. In this assertion, Piaget contradicts his own argument that the child reworks the concept in learning it. He contradicts the notion that the specific characteristics of the child's own thought are expressed in the concept in the course of this transformation. Piaget tends to argue that this applies only to spontaneous concepts, generally failing to see that it is equally true of nonspontaneous concepts. This constitutes the first mistake in Piaget's thought on these issues.

Piaget's second mistake flows directly from the first. Once it is accepted that the child's nonspontaneous concepts do not reflect the characteristics of the child's thought, and that these characteristics are contained only in the child's spontaneous concepts, we are obliged to accept the notion that between spontaneous and nonspontaneous concepts there exists an impassible, solid, eternal barrier which excludes any mutual influence. This notion is accepted by Piaget. Piaget succeeds in differentiating spontaneous and nonspontaneous concepts, but does not see that they are united in a single system that is formed in the course of the child's mental development. He sees only the break, not the connection. As a consequence, he views the development of concepts as a mechanical combination of two separate processes, processes which have nothing in common and move, as it were, along two completely isolated or separate channels.

Inevitably, these two mistakes tangle Piaget's theory in contradiction and lead to a third mistake. On the one hand, Piaget asserts that the child's nonspontaneous concepts do not reflect the characteristics of his thought. He asserts that this privilege belongs exclusively to spontaneous concepts. This implies that knowledge of these characteristics of the child's thought can have no practical significance, since the acquisition of nonspontaneous concepts is not dependent on them. On the other hand, a basic thesis of his theory is the recognition that the essence of the child's mental development lies in the progressive socialization of the child's thought. As we have seen, one of the basic and most concentrated contexts for the formation of nonspontaneous concepts is school instruction. If we accept Piaget's views on this matter, the process involved in the socialization of thought that we find in instruction (among the most important processes in the child's development) turns out to be entirely independent of the child's own internal processes of intellectual development. On the one hand, the internal development of the child's thought is deprived of any significance in explaining the socialization of the child in instruction. On the other, the socialization of the child's thought (which moves to the forefront in the process of instruction) is represented as unconnected with the internal development of the child's representations and concepts.

This contradiction constitutes the weakest link in Piaget's theory and is the point of departure for our critical analysis of his theory in the present study. Consequently, both the theoretical and practical aspects of this contradiction deserve to be considered in more detail.

The theoretical aspect of this contradiction has its roots in the way Piaget represents the problem of instruction and development. Piaget does not develop his ideas on this issue explicitly, touching on them only in passing. Nonetheless, a clear position on this issue is a postulate of fundamental importance for the structure of his theory. In fact, his theory as a whole stands or falls with this postulate. Our task is to isolate and develop this aspect of Piaget's theory in order to contrast it with the corresponding aspect of our own hypotheses.

Piaget represents the child's mental development as a process in which *the characteristics of the child's thought gradually die out.* For Piaget, the child's mental development consists of the gradual replacement of the unique qualities and characteristics of the child's thought by the more powerful thought of the adult. The beginning of the child's mental development is represented in terms of the solipsism of the infant. To the extent that the child's adapts to adult thought, this infantile solipsism gives way to the egocentric thought of the child. Egocentric thought is seen as a compromise between the characteristics of the child's consciousness and those of adult thought. This is why egocentrism is stronger in younger children. With age, the characteristics of the child's thought begin to disappear. They are replaced in one domain after another and ultimately disappear entirely. The developmental process is not represented as the continual emergence of new characteristics of thought, of higher, more complex, and more developed forms of thought on the foundations of more elementary and primary forms of thinking. Rather, development is portrayed as a process through which one form of thought is gradually and continuously being forced out by another. The socialization of thought is viewed as an external, mechanical process in which the characteristics of the child's thought are forced out. In this sense, development is comparable to a process in which one liquid -- forced into a vessel from the outside -- replaces another that had previously filled the vessel. A red liquid is continually forced into a vessel that contains a white liquid. The white, which represents the characteristics that are inherent to the child at the beginning of the developmental process, is forced out as the child develops. It is forced from the vessel as it increasingly becomes filled with the red liquid. In the end, the red liquid inevitably fills the entire vessel. Development is reduced to the dying out of the characteristics of the child's thinking. What is new to development arises from without. The child's characteristics have no constructive, positive, progressive, or formative role in the history of his mental development. Higher forms of thought do not arise from the characteristics of the child, but simply take the their place. According to Piaget, this is the sole law of the child's mental development.

If we extend Piaget's thinking on these issues, it becomes clear that the relationship between instruction and development is represented as one of antagonism in the process of the formation of the child's concepts. From the outset, the child's thinking is placed in opposition to adult thought. One does not arise from the other; one excludes the other. It is not only that the nonspontaneous concepts acquired by the child from adults have nothing in common with his spontaneous concepts. In a variety of ways, the former are in direct opposition to the latter. No relationships are possible between the two except continual antagonism and conflict, except the gradual and continual replacement of spontaneous by nonspontaneous concepts. One must be done away with so that the other can take its place. Thus, during the entire course of the child's development, two antagonistic groups of concepts must exist. All that changes with age is their quantitative relationship. One prevails at the outset, but with the transition from one stage to another the quantity of the other increases progressively. In connection with school instruction, the nonspontaneous concept begins to replace the spontaneous concept. This occurs between the ages of eleven and twelve. In

Piaget's view, this completes the child's mental development. The formation of true adult concepts, the decisive act of the whole drama of development and one that extends over the entire epoch of maturation, is dropped from the child's history as a superfluous or unnecessary chapter. Piaget argues that at each step in the development of the child's representations we encounter a real conflict between the child's thought and the thought of those around him. He argues that this conflict leads to a systematic deformation in the child's mind of that which is received from the adult. In accordance with this theory, development is reduced to a continual *conflict between antagonistic forms of thinking*; it is reduced to the establishment of a unique compromise between these two forms of thinking at each stage in the developmental process. This compromise changes with each stage in the process, a process in which the child's egocentrism ultimately dies out.

From a practical perspective, this contradiction in Piaget's thinking makes it impossible to apply findings from the study of the child's spontaneous concepts to the development of his nonspontaneous concepts. On the one hand, the child's nonspontaneous concepts (especially those that are formed in the process of school instruction) have nothing in common with the development of the child's own thought. On the other, an attempt is made to transfer the laws of development characteristic of spontaneous concepts to the development of concepts that results from school instruction. We find ourselves in an enchanted circle.

This emerges with particular clarity in Piaget's article entitled "The Psychology of the Child and the Teaching of History." Here, Piaget argues that if nurturing the child's historical understanding presupposes the presence of a critical or objective approach, if it presupposes an understanding of interdependencies, relationships, and stability, there is no better basis for determining the techniques to be used in teaching history than the study of the child's spontaneous intellectual state, however naive and insignificant that intellectual state may seem (Piaget, 1933). However, in this article, the study of the child's spontaneous intellectual state leads Piaget to the conclusion that that which constitutes the basic goal of the teaching of history -- this critical and objective approach and this understanding of interdependencies, relations, and stability -- is foreign to the child's thought. On the one hand, we find the argument that the development of spontaneous concepts cannot explain the acquisition of scientific concepts. On the other, we find the argument that there is nothing more important for the technique of teaching than the study of the child's spontaneous state. Piaget resolves this practical contradiction in terms of the antagonism that exists between instruction and development. Knowledge of the spontaneous state is important because it must be supplanted in the process of instruction. We must understand it in the same sense that we must understand an enemy. The ongoing conflict between adult thought (which is the foundation of teaching in school) and the thought of the child must be understood in order to improve teaching techniques.

The goal of the present study, the primary motivation for the construction and experimental verification of our working hypothesis, is essentially to overcome these three limitations in what is one of the best contemporary theories of the development of the child's thought.

Our first basic assumption is the direct opposite of Piaget's first mistaken thesis. *The development of nonspontaneous concepts* (particularly scientific concepts, which we consider a high, pure, and, both theoretically and practically, important type of nonspontaneous concept) *will manifest all the basic qualitative characteristics of the child's thought at a given stage of development.* This position is based on the idea that *scientific concepts are not simply acquired or memorized by the child and assimilated by his memory but arise and are formed through an extraordinary effort of his own thought.*

This implies that the development of scientific concepts must manifest the characteristics of the child's thought. This assumption is fully supported by our experimental research.

Our second assumption is also in opposition to Piaget's. As the purest type of nonspontaneous concept, scientific concepts not only manifest features that are the opposite of those manifested by spontaneous concepts but manifest features that are identical to those manifested by spontaneous concepts. The boundary that separates these two types of concepts is fluid. In the actual course of development, it shifts back and forth many times. If we are to make some assumption at the outset, it must be the assumption that the development of spontaneous and scientific concepts are closely connected processes that continually influence one another. On the one hand, the development of scientific concepts will depend directly on a particular level of maturation of spontaneous concepts. There is evidence for this in our practical experience. The development of scientific concepts becomes possible only when the child's spontaneous concepts have achieved a certain degree of development. This level of development is characteristically attained by the beginning of the school age. On the other hand, the emergence of higher types of concepts (e.g., scientific concepts) will inevitably influence existing spontaneous concepts. These two types of concepts are not encapsulated or isolated in the child's consciousness. They are not separated from one another by an impenetrable wall nor do they flow in two isolated channels. They interact continually. This will inevitably lead to a situation where generalizations with a comparatively complex structure -- such as scientific concepts -- elicit changes in the structure of spontaneous concepts. Whether we refer to the development of spontaneous concepts or scientific ones, we are dealing with the development of a unified process of concept formation. This developmental process is realized under varying external and internal conditions. By its very nature, however, it remains a unified process. It is not a function of struggle, conflict, and antagonism between two mutually exclusive forms of thinking. Once again, if we do not shy away from the results of the experimental research, we will find that this assumption is fully supported by the data.

Finally (in opposition to Piaget's mistaken and contradictory third position), we would argue that -- in the process of concept formation -- the relationship between the processes of instruction and development must be immeasurably more complex and positive in nature than the simple antagonism proposed by Piaget. It is reasonable to anticipate that research will show that instruction is a basic source of the development of the child's concepts and an extremely powerful force in directing this process. This assumption is based on the generally accepted fact that instruction plays a decisive role in determining the entire fate of the child's mental development during the school age, including the development of his concepts. Further, scientific concepts can arise in the child's head only on the foundation provided by the lower and more elementary forms of generalization which previously exist. They cannot simply be introduced into the child's consciousness from the outside. Again, this third and final assumption is supported by the research findings. This position on the issue allows us to assess the usefulness of psychological research on the child's concepts for teaching and instruction from a perspective that is very different from Piaget's.

We will attempt to develop these theses in more detail later. First, we must address the issue of what evidence is required to justify our distinction between spontaneous or everyday concepts on the one hand and nonspontaneous or scientific concepts on the other. Of course, we could rely exclusively on empirical verification of this distinction. In particular, we could cite the results of the experimental studies presented in the present book. These studies provide direct evidence that these two types of concepts produce different results in tasks that require identical logical operations.

They indicate that they manifest different levels of development at one and the same moment in one and the same child. This alone would be sufficient to justify the distinction between spontaneous and nonspontaneous concepts. However, to construct our working hypothesis and explain this distinction in theoretical terms, we must consider the factors which permitted us to anticipate the difference between these two types of concepts. These considerations fall into four groups.

The First Group: Here we are concerned with our empirical, experiential knowledge rather than experimental research. First, we cannot ignore the fact that the internal and external conditions under which development occurs differ for these two groups of concepts. Scientific concepts have a different relationship to the child's personal experience than spontaneous concepts. In school instruction, concepts emerge and develop along an entirely different path than they do in the child's personal experience. The internal motives that move the child forward in the formation of scientific concepts are completely different than those that direct his thought in the formation of spontaneous concepts. When concepts are acquired in school, the child's thought is presented with different tasks than when his thought is left to itself. In sum, scientific concepts differ from spontaneous concepts in that they have a *different relationship to the child's experience*, in that they have a different relationship to the object that they represent, and in that they follow a different path from birth to final formation.

Second, similar empirical considerations force us to recognize that the strengths and weaknesses of spontaneous and scientific concepts are very different in the school child. Just as the strength of the scientific concept is the weakness of the everyday concept, the strength of the everyday concept is the weakness of the scientific. When we compare the child's definitions of everyday concepts with the definitions of scientific concepts that he produces in school, we find that the latter are immeasurably more complex. A difference in the strengths of these two types of concepts emerges clearly here. The child formulates Archimedes' law better than he formulates his definition of what a brother is. This obviously reflects the different developmental paths that have led to the formation of these concepts. The child has learned the concept of "Archimedes law" differently than he has learned the concept of "brother." The child knew what a brother was, and passed through many stages in the development of this knowledge, before he learned to define the word "brother" (if he ever had the occasion to learn this). The development of the concept, "brother," did not begin with a teacher's explanation or with a scientific formulation. This concept is saturated with the child's own rich personal experience. It had already passed through a significant part of its developmental course and had exhausted much of the purely empirical content it contains before the child encountered it in definition. Of course, this was not the case with the concept that underlies "Archimedes' law."

The Second Group: We are concerned here with theoretical considerations and will begin with one on which Piaget himself depends. As evidence of the unique character of the child's concepts, Piaget cites Stern's demonstration that not even speech is learned by the child through simple imitation, that not even speech is borrowed by the child in completed form. The basic principle underlying Stern's arguments is the recognition that the originality and uniqueness of the child's speech cannot emerge through the child's simple adoption of the language of those around him. Piaget finds himself in full agreement with this principle. It is his view that the child's thought is even more original and unique than his language. The role of imitation as a formative factor is obviously of less significance here than in speech development.

Piaget's thesis that the child's thought is more unique than his language would seem indisputable. Given this, it seems reasonable to assume that the higher forms of thought characteristic of the formation of scientific concepts must be even more unique than those that are characteristic of the formation of spontaneous concepts. In other words, everything that Piaget has to say about spontaneous concepts in this connection must apply to scientific concepts as well. It is difficult to believe that the child learns scientific concepts without reworking them, that they simply drop into his mouth like hot cakes. Like the formation of spontaneous concepts, *the formation of scientific concepts is not completed but only begun at the moment when the child learns the first meanings and terms* that function as their carriers. This is a general law of the development of word meaning. It applies equally to the development of spontaneous and scientific concepts. The key is that there is a fundamental difference in the initial moments of the formation of these two types of concepts. This thought can be clarified through an analogy (although, as the further development of our hypothesis and research will show, this is something more than a simple analogy).

It is well known that the child learns a foreign language in school in a completely different way than he learns his native language. Few of the empirical regularities or laws characteristic of the development of the native language are repeated when a foreign language is learned by the school child. Piaget is right when he argues that adult language does not represent for the child what a foreign language represents for the adult. Specifically, it is not a system of signs that corresponds point for point with a system of concepts that have already been acquired. Learning a foreign language is profoundly different from learning a native language. This is partly because a set of fully formed and developed word meanings already exist in the former case. These word meanings are simply translated into the foreign language. In other words, this is partly a function of the relative maturity of the native language itself. It is also partially a function of the fact that the foreign language is learned under entirely different internal and external conditions, of the fact that the conditions that characterize the learning process differ profoundly from those that characterize the learning of the native language. Different developmental paths, followed under different conditions, cannot lead to identical results.

It would be odd if the process involved in learning a foreign language in school reproduced that involved in learning the native language, repeating a process that had occurred earlier under entirely different conditions. Nonetheless, the profound differences between these processes must not divert us from the fact that they are both aspects of speech development. The processes involved in the development of written speech are a third variant of this unified process of language development; it repeats neither of the two processes of speech development mentioned up to this point. All three of these processes, the learning of the native language, the learning of foreign languages, and the development of written speech interact with each other in complex ways. This reflects their mutual membership in a single class of genetic processes and the internal unity of these processes. As we indicated above, the learning of a foreign language is unique in that it relies on the semantic aspect of the native language. Thus, the instruction of the school child in a foreign language *has its foundation in his knowledge of the native language.* Less obvious and less well known is the fact that the foreign language influences the development of the child's native language. Goethe understood this influence clearly. In his words, he who does not know at least one foreign language does not know his own. This idea is fully supported by research. Learning a foreign language raises the level of development of the child's native speech. His conscious awareness of linguistic forms, and the level of his abstraction of linguistic phenomena, increases. He develops a more conscious, voluntary capacity to

use words as tools of thought and as means of expressing ideas. Learning a foreign language raises the level of the child's native speech in much the same way that learning algebra raises the level of his arithmetic thinking. By learning algebra, the child comes to understand arithmetic operations as particular instantiations of algebraic operations. This gives the child a freer, more abstract and generalized view of his operations with concrete quantities. Just as algebra frees the child's thought from the grasp of concrete numerical relations and raises it to the level of more abstract thought, learning a foreign language frees the child's verbal thought from the grasp of concrete linguistic forms and phenomena.

Thus, research indicates that: (1) the learning of a foreign language both depends on the child's native speech and influences it; (2) the course of its development does not repeat that of native speech; and (3) the strengths and weaknesses of native and foreign languages differ.

We have every reason to believe that an analogous relationship exists between everyday and scientific concepts. Two significant considerations support this notion. First, the development of all concepts (both spontaneous and scientific) is part of the more general process of speech development. The development of concepts represents the semantic aspect of speech development. Psychologically, the development of concepts and the development of word meaning are one and the same process. As part of the general process of linguistic development, it can be anticipated that the development of word meanings will manifest the regularities that are characteristic of the process as a whole. Second, in their most essential features, the internal and external conditions involved in the development of foreign languages and those involved in the development of scientific concepts coincide. Perhaps more significantly, they differ from the conditions involved in the development of the native language and spontaneous concepts in much the same way. In both cases, *instruction* emerges as a new factor in development. In this way, just as we differentiate spontaneous and nonspontaneous concepts, we can speak of spontaneous speech development with the native language and nonspontaneous speech development with the foreign language.

If we compare the results of the research discussed in the present book with psychological research on foreign language learning, the analogy we are presenting here is fully supported.

A theoretical consideration of no less importance is the fact that scientific and everyday concepts have different relationships to the object or act that is represented in thought. The development of these two types of concepts presupposes differences in the intellectual processes which underlie them. In receiving instruction in a system of knowledge, the child learns of things that are not before his eyes, things that far exceed the limits of his actual and or even potential immediate experience. To this extent, the learning of scientific concepts depends on the concepts developed through the child's own experience in the same way that the study of a foreign language depends on the semantics of his native speech. Just as the learning of a foreign language presupposes a developed system of word meanings, the learning of a system of scientific concepts presupposes the widely developed conceptual fabric that has emerged on the basis of the spontaneous activity of the child's thought. Finally, learning a new language does not begin with the acquisition of a new orientation to the object world. It is not a repetition of the developmental process that occurred in the acquisition of the native language. The process begins with a speech system that has already been learned, a system that stands between the newly learned language and the world of things. In the same sense, learning a system of scientific concepts occurs only through a similar form of mediation between the conceptual system and the world of objects, only through other concepts that have already developed. This process of concept formation re-

quires entirely different acts of thought, acts of thought which are associated with free movement in the concept system, with the generalization of previously developed generalizations, and with a more conscious and voluntary mode of operating on these existing concepts.

The Third Group: Here we are concerned with heuristic considerations. Contemporary psychological research knows only two modes of investigating concepts. One relies on rather superficial methods but deals with the child's actual concepts. The other relies on immeasurably more sophisticated modes of analysis and experimentation but deals only with concepts that are formed under artificial experimental conditions and designated with what are initially meaningless words. The immediate methodological task in this field of research is to move from the superficial study of actual concepts and the sophisticated study of experimental concepts to the sophisticated study of actual concepts. The significance of research on the development of scientific concepts becomes apparent in this connection. On the one hand, scientific concepts are actual concepts. At the same time, however, they are formed before our eyes in much the same way that experimental concepts are. Thus, scientific concepts combine the advantages of the two existing modes of research. They allow us to use experimental means of analysis in studying the birth and development of actual concepts.

The Fourth Group: Here we are concerned with practical considerations. Earlier, we questioned the notion that scientific concepts are simply learned or memorized. We are obligated, however, to analyze the nature of instruction and its central role in the emergence of scientific concepts. In arguing that the concept is not simply learned as a mental habit, we meant to suggest that *the relationship between instruction and the development of scientific concepts is more complex than the relationship between instruction and the formation of habits*. The immediate practical task of our research is to understand this more complex relationship. The working hypothesis we are developing must open a path for the resolution of this problem.

Only by clarifying the complex relationships that exist between instruction and the development of scientific concepts can we escape from the contradictions in which Piaget's thought is entangled. To his misfortune, Piaget saw nothing in the richness of these relationships other than conflict and antagonism.

These are the most significant of the considerations that caused us to frame our research around the differentiation of scientific and everyday concepts. The basic question that we will attempt to address in our research can be formulated in the following way: Are the paths along which the concepts "brother" and "exploitation" develop identical or different? Does the second concept simply repeat the developmental path of the first, with the developmental process manifesting the same characteristics, or does this concept have a distinct mental character? We must state an assumption that is fully supported by the results of our empirical research: *These concepts will differ both in the paths that their development takes and in their mode of functioning*. This finding opens up extremely rich potentials for the study of the mutual influence of these two aspects of concept formation in the child.

Having rejected the notion that scientific concepts do not develop, we are faced with two tasks. First, on the basis of experimental data, we must assess the validity of the notion that scientific concepts follow the same developmental path as everyday concepts. Second, on an equally empirical basis, we must assess the extent to which there is justification for the thesis that the development of scientific concepts has nothing in common with the development of spontaneous concepts, that it tells us

nothing about the unique nature of the child's thought. Our research will respond to both these questions in the negative, demonstrating that neither of these assumptions is corroborated by the empirical data. It will demonstrate the existence of a third alternative which grasps the actual, complex, and two-sided relationship between scientific and everyday concepts.

The only means we have for discovering this third alternative is to compare scientific concepts with everyday concepts, to compare a type of concept that is only now beginning to be systematically studied with a type of concept that has already been studied extensively. In other words, the only means we have for discovering this third alternative is to move from the known to the unknown. However, such a comparative study requires a clear differentiation of these two types of concepts. Relationships can exist only between things that do not coincide with one another. A thing can have no relationship with itself.

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To study the complex relationships between the development of scientific and everyday concepts, we must consider the scale to be used in making this comparison. That is, we must clarify the characteristics of the school-age child's everyday concepts. Piaget has demonstrated that the essential characteristic of the child's thinking and concepts at this age is *his incapacity for reflective awareness of relations that he can use correctly* when no reflective awareness on his part is required, that is, when he acts *spontaneously and automatically*. In Piaget's view, it is egocentrism that prevents the child's conscious awareness of his own thought. Piaget offers a simple example to illustrate the influence of this lack of conscious awareness on the development of the child's concepts. Specifically, Piaget asked children between seven and eight years of age what the meaning of the word "because" is in a sentence such as: "I am not going to school tomorrow because I am sick." The majority answered: "That means that he is sick." Others maintained that: "That means that he will not go to school." In short, these children simply did not have the capacity for conscious awareness of the word's definition, although they are able to use the word spontaneously.

The child's incapacity for conscious awareness of his own thought or for establishing logical connections with conscious awareness extends through the age of eleven to twelve years (i.e., through the first school age). The child manifests an incapacity for the logic of relationships and substitutes his own egocentric logic. Between seven and twelve years of age, these difficulties carry over into the verbal plane. In this way, forces that were present before this stage now influence the child's logic.

Functionally, the child's incapacity for conscious awareness of his own thought is reflected in a basic characteristic of his logic. The child is capable of several logical operations when they arise spontaneously in the course of his thought. He is not, however, able to carry out completely analogous operations if they must be carried out with volition and intention. Children of seven years were asked how the following phrase should be completed: "The man fell from the bicycle because...." They generally failed at this task. They frequently completed the phrase in the following ways: "He fell from the bicycle because he fell and was then badly injured." "The man fell from the bicycle because he was sick and therefore they picked him up from the street." "Because he broke his arm and his leg." At this age, the child is incapable of establishing a causal connection intentionally and voluntarily. He uses the word "because" correctly and meaningfully in spontaneous or nonvoluntary speech but is incapable of being consciously aware that the phrase cited in the previous paragraph

refers to the cause of the child's absence from school, that it does not refer to the isolated facts of non-attendance and illness. In spite of his incapacity for conscious awareness, however, the child does understand the meaning of the phrase; he understands simple causes and relationships. He does not, however, become consciously aware of this understanding. When he uses the conjunction "because" spontaneously he uses it correctly but he cannot apply it intentionally and voluntarily. Thus, we can establish the internal dependency of these two phenomena in the child's thought on a purely empirical basis. The child's thought lacks conscious awareness and is nonvolitional in nature. It is characterized by unconscious understanding and spontaneous application.

These two characteristics of the child's thinking are closely linked with its egocentric nature. They also lead to other characteristics of the child's logic that are manifested in his incapacity for the logic of relationships. They dominate the child's thinking throughout the school age. In development, which consists of the socialization of thought, we find a gradual disappearance of these phenomena. The child's thought is freed from egocentrism.

How does this occur? How does the child achieve conscious awareness of his own thought? How does he master it? Piaget relies on two psychological laws to explain this process. While he did not formulate these laws, they provide the foundation for his theory.

The first is the law of conscious awareness formulated by Claparede. Through a series of extremely interesting experiments, Claparede demonstrated that conscious awareness of similarity appears later in the child than conscious awareness of difference. The child behaves in consistent ways vis-a-vis similar objects. He experiences no need for conscious awareness of this consistency in his behavior. He acts in accordance with similarity earlier than he thinks it out. In contrast, the differences that exist between objects result in nonadaptive behavior on the part of the child. This nonadaptive behavior elicits conscious reflection. This led Claparede to what he called the law of conscious awareness. The more we use a given relationship, the lower the level of our conscious awareness of it. We are consciously aware only to the extent that we are unable to accommodate or adapt. The more extensively a relationship is used in our automatic behavior, the more difficult it is for us to be consciously aware of it.

Still, this law tells us nothing of how conscious awareness is realized. It is a functional law. It indicates only whether the need for conscious awareness is present or absent in a given individual. The structural issues remain unclarified. What is the means of this conscious awareness? What impediments does it encounter? To answer these questions, another law -- the law of displacement -- is introduced. To become consciously aware of an operation, it must be transferred from the plane of action to the plane of language; it must be recreated in imagination such that it can be expressed in words. This displacement of the operation from the plane of action to the plane of thought is accompanied by the same difficulties and complications that were encountered when the operation was first learned on the plane of action. Only the tempo changes; the rhythm remains the same. This reproduction on the verbal plane of the difficulties encountered in learning operations on the plane of action constitutes the essence of the second structural law of conscious awareness.

We will briefly analyze each of these laws and clarify the actual source and significance of the lack of conscious awareness in the school-age child, of the nonvolitional nature of his operations with concepts. We will also attempt to clarify how the child attains conscious awareness of his concepts and achieves the intentional, volitional use of concepts.

Since Piaget himself noted the fundamental inadequacy of Claparede's law of conscious awareness, our critical analysis of these laws can be brief. Stated simply, to explain the emergence of conscious awareness exclusively in terms of the need for it is much the same as explaining the development of feathers in birds by referring to the fact that birds need feathers to fly. This kind of explanation represents a great step backward in the development of scientific thought. It is based on the assumption that a creative capacity capable of producing that which is needed is present in the need itself. This conception of conscious awareness assumes the absence of any development. It implies that conscious awareness is preformed and always ready to emerge.

Perhaps it is not the child's encounter with the nonadaptive character of his behavior and the resulting need for conscious awareness that causes him to become aware of relationships of difference before he becomes aware of relationships of similarity. Perhaps conscious awareness of relationships of similarity requires a more complex structure of abstractions and concepts than the conscious awareness of relationships of difference. We conducted research which supports this perspective. Experimental analysis indicates that conscious awareness of similarity requires the formation of a concept or generalization which represents the objects between which the relationship exists. Conscious awareness of difference does not require the formation of such a concept; it can arise in a entirely different way. This explains the later development of conscious awareness of relationships of similarity that was established empirically by Claparede. That the sequence in which these two concepts emerge is the reverse of that in which they emerge on the plane of action is merely one example of another, more general phenomenon. For example, we were able to establish experimentally that this same reversed sequence is inherent in the development of meaningful perception of the object and the action.* Children respond to actions earlier than to differentiated objects, but they give meaning to or comprehend the object earlier than the action. The action develops in the child earlier than autonomous perception. However, meaningful perception leads the development of meaningful action by an entire age grade. Analysis indicates that this is a function of internal causes related to the nature of the child's concepts and their development.

Of course, one could argue that -- as a functional law -- Claparede's law cannot explain the structural aspect of the problem. This would imply that the key question is only whether it provides a satisfactory explanation of the functional aspect of the problem, that is, whether it is sufficient for Piaget's purposes. The essence of Piaget's argument on this issue is found in the picture he draws of the development of concepts in children between seven and twelve years of age. According to Piaget, it is during this period that the child runs up against the fact that his thought operations are not adaptive to adult thought. The child experiences failure and defeat which reflects the inadequacy of his logic. He bangs his forehead against a wall. In Rousseau's words, these bumps imprinted on the child's forehead are his best teacher. They engender the need for conscious awareness and this need magically opens up conscious awareness and volition in the use of concepts.

Is it possible that the higher level of concept development which is connected with conscious awareness arises only as a consequence of failure and defeat? Is it actually the case that striking ones head against a wall and the bump that results are the child's

* A single group of pictures were shown to two groups of preschool children who were equivalent in age and level of development. One group acted out the events that were illustrated in the series of pictures presented to them, revealing the pictures' content in action. The children in the other group were asked to relate the content of the pictures verbally, revealing the structure of meaningful perception. In action, the children reproduced the content of the picture fully. With verbal transmission, however, they simply enumerated the objects.

only teachers as he moves along this developmental path? Is it possible that the nonadaptiveness and inadequacy of the child's spontaneous thought is the *source* of the higher forms of abstraction that are characteristic of concepts? If these questions are formulated, it immediately becomes apparent that only a negative answer is possible. Just as we cannot explain the emergence of conscious awareness in terms of the child's need for it, we cannot explain the child's mental development in terms of the bankruptcy and failure of his thought.

The second law Piaget incorporates into his explanation of conscious awareness also requires analysis. The mode of genetic explanation fundamental to this law is extremely widespread. The foundation for its explanation of the later stages in the development of a given process is the principle of the repetition or reproduction of the events or laws characteristic of the earlier stages in the development of the same process. It is this mode of explanation that is used, for example, when the development of the school child's written speech is explained by claiming that it parallels the development of oral speech. Of course, when this explanatory principle is applied, the psychological differences between the two processes are overlooked. This principle implies that the dynamics of the development of one process must repeat or reproduce those of the other. The result is that *the differences between the two processes which are a function of the fact that the later process occurs on a higher level* are obscured by their similarities. The result is that we have a representation of the process of development not as a spiral but as a process that continually moves around in a single circle. However, we are not concerned with the detailed analysis of this explanatory principle in the present context. At this point, our concern is its value as a means of explaining the emergence of conscious awareness. Since Piaget himself recognizes the futility of trying to explain the emergence of conscious awareness on the basis of Claparede's law, we must ask whether the explanatory principle on which Piaget does rely -- the law of displacement -- has more explanatory power.

The very content of this law makes it apparent that its explanatory value is not much greater than that of the first. In essence, it is a law of repetition or reproduction of the characteristics of previous forms thought in a new developmental domain. Even if we were to assume that this law is correct, it does not answer the critical question. It can only explain why the school child's concepts are not characterized by conscious awareness or volition. The lack of conscious awareness and volition that were present in the logic of the preschooler's action reappears in the school child's thought.

This law cannot, however, help us answer the question that Piaget poses: How is conscious awareness realized? It cannot help us understand the nature and source of the transition from concepts that are not characterized by conscious awareness to those that are. In this respect, the second law is identical to the first. The first may possibly help to explain how the absence of need leads to the lack of conscious awareness. It cannot explain how the emergence of need produces conscious awareness. The second law can perhaps satisfactorily answer the question of why the concept is not characterized by conscious awareness in the school-age child. It cannot explain the emergence of conscious awareness of concepts. This, however, is precisely the problem we need to answer since development consists of the progressive emergence of conscious awareness of concepts and thought operations.

These two laws do not resolve the problem; they constitute it. It is not that they offer incorrect or inadequate explanations of the development of conscious awareness. The problem is that they offer no explanation. We must attempt to formulate a tentative explanation of this fundamental aspect of the school child's mental development, an aspect that is closely connected with the basic problem of our experimental research.

First, however, we must consider whether Piaget -- relying on these two laws -- has correctly explained why the school child's concepts are not characterized by conscious awareness. Of course, this question is closely connected with the issue of more direct interest to us, the issue of how conscious awareness is realized. These are two aspects of a single general problem, specifically, the problem of *how the transition from concepts that are not characterized by conscious awareness to those that are occurs.* The very statement of the issue of how conscious awareness is realized depends on how we answer the question of why conscious awareness is absent. If we resolve the first issue on the basis of Piaget's two laws, we must search for the resolution to the second on the same theoretical plane where Piaget sought it. If we reject Piaget's resolution of the first question and succeed even tentatively in identifying a different resolution, our search for the resolution to the second problem will take on an entirely different orientation.

For Piaget, the source of the lack of conscious awareness of concepts in the school child lies in the earlier stages of the child's development when the lack of conscious awareness dominated the child's thought to a much greater extent. By the time the child enters school, one part of his mind is freed from this dominance; another remains under its influence. As we descend the developmental ladder, conscious awareness extends the range of its dominance of the child's thought. In the world of the infant, conscious awareness is absent. Piaget characterizes the infant's consciousness as pure solipsism. In accordance with the degree of the child's development, solipsism gives way to socialized thought without struggle or opposition. This socialized thought is characterized by conscious awareness and has its source in the more powerful, encroaching thought of the adult. Solipsism is displaced by the child's egocentrism, which is a compromise between the child's own thought and the adult thought that he has learned.

Thus, Piaget represents *the lack of conscious awareness* we find in the concepts of the school-age child as *a residual of a dying egocentrism* which preserves its influence in the emerging processes of verbal thought. In this manner, Piaget's explanation of the lack of conscious awareness of concepts incorporates the notion of the child's residual autism as well as that of the inadequate socialization of thought. The question we must address, then, is that of whether the child's lack of conscious awareness of concepts is a direct function of the egocentric character of his thinking.

Given what we know of the mental development of the school-age child, this thesis seems doubtful. Theoretical considerations would certainly cause us to question its validity. Empirical research directly refutes it.

Before moving to a critical analysis of this issue, however, a second issue must be clarified. Specifically, we must consider how the path that leads to conscious awareness of concepts is represented within this framework. As we said, a given explanation of the lack of conscious awareness inevitably leads to single mode of explaining its emergence. Piaget nowhere speaks to this issue directly because it was not a problem for him. However, given his explanation for the lack of conscious awareness of concepts in the school child and his theory as a whole, his conception of the course of development is clear. This is precisely why Piaget did not think it necessary to dwell on the question.

In Piaget's view, conscious awareness is realized through the displacement of the remnants of verbal egocentrism by social or mature thought. Conscious awareness does not arise as a necessary higher stage in concept development. It is *introduced from without.* One mode of action simply supplants the other. Just as a snake throws off his skin to grow another, the child throws off or discards one mode of thinking so that he might learn another. This grasps the essence of Piaget's view of the emergence

of conscious awareness. This issue does not require the introduction of any laws. The lack of conscious awareness of concepts is explained. It is a function of the very nature the child's thought. However, conscious awareness of concepts exists outside; it exists in the atmosphere of social thought that surrounds the child. It is learned by the child in completed form when the antagonistic tendencies of his own thinking no longer interfere.

At this point, we can consider both these closely connected problems: (1) the initial lack of conscious awareness of concepts, and (2) the subsequent emergence of conscious awareness of concepts. Piaget's resolution of these problems is inadequate in both theoretical and practical terms. An explanation of the lack of conscious awareness of concepts in the child that relies on the notion that the child is incapable of conscious awareness in any context, an explanation that relies on the notion that the child is egocentric, is negated by the fact that the focal point of development for the school-age child is the emergence of *the higher mental functions, functions which are distinguished precisely by intellectualization and mastery, by conscious awareness and volition.*

For the school-age child, the focal point of development is the transition from lower forms of attention and memory to voluntary attention and logical memory. Elsewhere,[66] we have argued that to the extent we can speak of voluntary attention we can also speak of voluntary memory and that to the extent we speak of logical memory we can also speak of logical attention. This reflects the fact that the intellectualization and the mastery of functions are merely two aspects of one and the same process. We refer to this process as the transition to the higher mental functions. We master a given function to the degree that is intellectualized. The voluntary nature of the activity of a function is the reverse side of its conscious awareness. To say that memory is intellectualized in the school-age child is to say that voluntary remembering emerges. To say that attention in the school-age child becomes voluntary is to say (as Blonskii has correctly noted) that it becomes more and more dependent on thought or intellect.

In the spheres of attention and memory, then, the school child manifests a capacity for conscious awareness and voluntary behavior. Indeed, the emergence of this capacity is the central feature of mental development during the school age. We cannot, therefore, explain the school child's lack of conscious awareness of concepts or the involuntary nature of these concepts in terms of the general incapacity of his thought for conscious awareness and mastery, that is, in terms of his egocentrism.

However, one fact established by Piaget is beyond dispute. The school child is not consciously aware of his own concepts. How do we explain the school-age child's manifestation of a capacity for conscious awareness or mastery of important intellectual functions such as memory and attention while he is incapable of the mastery or conscious awareness of his own thinking? How do we explain the fact that during the school age all the intellectual functions except intellect are intellectualized and become volitional?

To resolve this paradox, we must consider the basic laws of mental development in children of this age. Elsewhere,[67] we have considered the changes in the connections and relationships among functions that occur in the course of the child's mental development. In that context, we were able to demonstrate empirically that the child's mental development consists not so much in the development or maturation of separate functions as in changes in the connections and relationships among these functions. Indeed, the development of each mental function depends on these changes in interfunctional relationships. Consciousness develops as a whole. With each new stage in its development, its internal structure -- the system of connections among its parts -- changes. Development is not a sum of the changes occurring in each of the

separate functions. Rather, the fate of each functional part of consciousness depends on changes in the whole.

Of course, the idea that consciousness is a unified whole with the separate functions existing in insoluble connection with one another is nothing new for psychology. Indeed, it is as old as psychology itself. Nearly all psychologists note that the mental functions act in unbroken connection with one another. Remembering presupposes the activity of attention, perception, and the attribution of meaning. Perception requires attention, recognition (or memory), and understanding. In both traditional and contemporary psychology, however, this concept of the functional unity of consciousness -- of the insoluble connections among the various aspects of its activity -- has consistently remained on the periphery. Its most important implications have not been recognized. Moreover, psychology drew inferences from this concept that seem to be in direct opposition to those that should flow from it. Having established the interdependency of functions (i.e., having established the unity of the activity of conscious awareness) psychology continued to study the activity of the separate functions, ignoring their relationships. It continued to treat consciousness as a collection of functional parts. This tendency of general psychology was transferred to genetic psychology. As a consequence, the development of the child's consciousness was represented as the sum of the changes occurring in the separate functions. Even here, the primacy of the functional parts over consciousness as a whole remained the supreme dogma. To understand how this occurred, we must consider the implicit postulates that provided the foundation for this traditional conception of the interconnection of functions and the unity of consciousness.

Traditional psychology taught that the mental functions always act in unity with one another (perception with memory and attention, etc.) and it is in this that consciousness is unified. However, it implicitly supplemented this idea with three postulates: (1) that these connections among functions are constant, unchanging, and uninfluenced by development; (2) that these connections operate consistently and identically in the activity of each function and that they can, therefore, be removed from the analytic frame (i.e., they do not have to be taken into account in studies of the separate functions); and (3) that these connections are inessential and that the development of consciousness must be understood in terms of the development of its functional parts; though the functions are interconnected, the stability of their connections gives them an entirely autonomous nature, an independence in their development and change. The liberation of psychology from these postulates represents the liberation of psychological thought from the functional forms of analysis that imprison it.

As we have suggested, all three of these postulates are false. These interfunctional connections and relationships are neither constant nor inessential. They cannot be placed outside the analytic frame within which psychological investigations are carried out. Change in these interfunctional connections, -- *change in the functional structure of consciousness -- is the main and central content of the entire process of mental development.* That which served as a postulate for traditional psychology must become psychology's central problem. Traditional psychology proceeded from the postulate that the mental functions are connected and did not pursue the question further. Neither the nature of these interfunctional connections nor their development became an object of investigation. For the new psychology, this change in interfunctional connections and relationships becomes the central problem. If we fail to resolve this problem, we will not be able to understand the changes we observe in the isolated functions. This conception of developmental change in the structure of consciousness must be considered if we are to resolve the question that interests us in the present context, the question of how the school-age child becomes consciously aware of atten-

tion and memory, and gains voluntary control over them while his intellect remains outside conscious awareness.

It is a general law of development that conscious awareness and mastery characterize only the higher stages of the development of a given function. It arises comparatively late and must be preceded by a stage where conscious awareness is absent, a stage where there is no volition in the application of a given form of conscious activity. For conscious awareness of a function to be achieved, the individual must first possess what he is to become consciously aware of. If we are to master something, we must have at our disposal what is to be subordinated to our will.

The first stage in the development of consciousness in infancy is characterized by a lack of differentiation in the separate functions. This stage is followed by two others. These are the stage of early childhood and the stage of the preschool age. Early childhood is characterized by the development and differentiation of *perception*. In this stage, perception is the dominating function of activity and of the development of consciousness as a whole. In the preschool age, the development of *memory* is dominant. Thus, by the time the transition to school age occurs, perception and memory are comparatively developed, creating a basic prerequisite for mental development during this stage.

If we consider the fact that attention is a function of the structuring that is perceived and represented in memory, it is apparent that when the child reaches school age he has comparatively mature forms of attention and memory at his disposal. He has what he must now gain conscious awareness of and master. This is why conscious awareness and voluntary control are characteristics of memory and attention that advance to the forefront during this phase of the child's development.

This makes it equally clear why the school child's concepts remain involuntary and outside conscious awareness. To become consciously aware of something and master it you must first have it at your disposal. However, concepts, or, more properly, preconcepts (we prefer this designation for these concepts of the school child, since they have not yet attained the higher degree of development), emerge for the first time in the school-age child. They mature only during this period. Prior to this stage, the child thinks in general representations or complexes (a term we have used elsewhere to refer to the structure of generalizations that dominates the preschool period). Since preconcepts emerge only during the school age, it would be odd if the school child attained conscious awareness or mastery of them. This would mean that consciousness is not only capable of becoming consciously aware of its functions (i.e., of mastering them) but of creating them from nothing before they develop.

These are the theoretical considerations that cause us to reject Piaget's explanation of the lack of conscious awareness of concepts. At this point, we must turn to the research data. We must come to understand the nature of conscious awareness to be able to clarify the manner that conscious awareness of attention and memory emerges. We must do this if we are to be able to specify the source of this lack of conscious awareness of concepts, the path by which the child ultimately attains this conscious awareness, and the sense in which conscious awareness and mastery are two aspects of the same process.

Research tells us that conscious awareness is a very special process. We will attempt to identify its general features. At the outset, we must pose the first and the most basic question: What does it mean to become "consciously aware." This phrase has two meanings, and serious confusion has arisen because Claparede and Piaget have confused them. Specifically, Claparede and Piaget have confused Freud's terminology and the terminology more characteristic of general psychology. When Piaget speaks of a lack of conscious awareness in the child's thought, he does not mean to

imply that the child is not conscious of what is occurring in his consciousness; he does not mean to imply that the child's thinking is unconscious. Piaget assumes that consciousness plays a role in the child's thought, but not to the end. In the beginning, in the infant's solipsism, we do have unconscious thought. Ultimately, conscious socialized thought is attained. In the interim, we have several stages that are represented by Piaget in terms of the gradual dying out of egocentrism and the gradual growth of social forms of thinking. Each of these middle stages represents a certain compromise between the infant's unconscious autistic thought and the adult's social conscious thought. What then, does it mean to say that the thought of the school child lacks conscious awareness? For Piaget, it means that the child's egocentrism is accompanied by a certain degree of unconsciousness. It means that thought is characterized by conscious awareness but not consistently. Thought contains elements of both the conscious and the unconscious. Piaget himself recognizes that one is on slippery ground with the concept of "unconscious reasoning." If we view the development of consciousness as the gradual transition from the unconscious (in Freud's sense) to full consciousness, this representation of the process is correct. However, Freud's research established that the unconscious -- which is carved out from consciousness -- emerges comparatively late. In a certain sense, it is a product of the development and differentiation of consciousness itself. Therefore, there is a great difference between the concepts of "unconscious" and "lack of conscious awareness." Lack of conscious awareness is not simply part of the conscious or unconscious. It does not designate a level of consciousness. It designates a different process in the activity of consciousness. I tie a knot. I do it consciously. I cannot, however, say precisely how I have done it. My action, which is conscious, turns out to be lacking in conscious awareness because my attention is directed toward the act of tying, not on *how* I carry out that act. Consciousness always represents some piece of reality. The object of my consciousness in this example is the tying of the knot, that is, the knot and what I do with it. However, the actions that I carry out in tying the knot -- what I am doing -- is not the object of my consciousness. However, it can become the object of consciousness when there is conscious awareness. Conscious awareness is an act of consciousness whose object is the activity of consciousness itself.*

Piaget's research has shown that introspection begins to develop significantly only in the school age. Further research has shown that as introspection develops something occurs that is analogous to what occurs in the development of external perception and observation during the transition from infancy to early childhood. It is well known that the most important change in external perception during this period is that the child makes the transition from nonverbal and therefore nonmeaningful perception to meaningful and verbal object perception. The same can be said of introspection at the beginning of the school age. The child makes the transition from nonverbal to verbal introspection. He develops internal meaningful perception of his own mental processes. However, whether it is external or internal, meaningful perception is generalized or abstracted perception. Consequently, *the transition to verbal introspection represents the initial generalization or abstraction of internal mental forms of activity.* This transition to a new type of internal perception represents a transition to a higher form of internal mental activity. To perceive something in a different way means to acquire new potentials for acting with respect to it. At the chess board, to see differently is to play differently. By generalizing the process of activity itself, I acquire the

* In the preschool age, the child is asked:"Do you know what your name is?," and the child answers: "Kolya." He is not consciously aware of the fact that the focus of the question is not *what* he is called but *whether or not he knows* his name. He knows his name, but is not consciously aware of his capacity in this respect.

potential for new relationships with it. To speak crudely, it is as if this process has been isolated from the general activity of consciousness. I am conscious of the fact that I remember. I make my own remembering the object of consciousness. An isolation arises here. In a certain sense, any generalization or abstraction isolates its object. This is why conscious awareness -- understood as generalization -- leads directly to mastery.

Thus, *the foundation of conscious awareness is the generalization or abstraction of the mental processes, which leads to their mastery.* Instruction has a decisive role in this process. Scientific concepts have a unique relationship to the object. This relationship is mediated through other concepts that themselves have an internal hierarchical system of interrelationships. It is apparently in this domain of the scientific concept that conscious awareness of concepts or the generalization and mastery of concepts emerges for the first time. And once a new structure of generalization has arisen in one sphere of thought, it can -- like any structure -- be transferred without training to all remaining domains of concepts and thought. Thus, *conscious awareness enters through the gate opened up by the scientific concept.*

Two aspects of Piaget's theory are worth noting in this context. The very nature of spontaneous concepts is defined by the fact that they lack conscious awareness. Children have the capacity to operate spontaneously with spontaneous concepts but lack the capacity for conscious awareness of them. We have seen how this is true of the child's concept "because." The spontaneous concept is characterized by a lack conscious awareness. Attention is always directed toward the object that the spontaneous concept represents rather than on the act of thought that grasps that object. Nowhere in Piaget's work do we find the thought that "spontaneous" is a synonym for "lack of conscious awareness" when we are referring to concepts. This is why Piaget limits the history of the child's thought to the development of spontaneous concepts. This is also why he fails to understand how conscious awareness of concepts can emerge in the child's spontaneous thought other than from the outside.

While conscious awareness is absent in the spontaneous concept, however, it is a basic characteristic of scientific concepts. The second of the two aspects of Piaget's theory that we said were worth noting in this context is related to this fact. All Piaget's research leads to the idea that *the decisive difference between spontaneous and nonspontaneous concepts, and the difference between spontaneous and scientific concepts in particular, is that spontaneous concepts are given outside any system.* Following Piaget's rule, if we want to find the path from the child's nonspontaneous concept to the spontaneous representation that is hidden behind it, we must free that concept from any trace of a system. Isolating the concept from the system in which it is included and in which it is connected with all other concepts is the ultimate methodology recommended by Piaget for the liberation of the mental orientation of the child from his nonspontaneous concepts. Piaget demonstrated in practice that this desystematization of the child's concepts is the best means for obtaining the kinds of answers from children that fill his books. It is obvious that the presence of a concept system is significant for the nature and structure of each individual concept. The concept becomes something different -- a complete change in its psychological nature occurs -- as soon as it is taken in isolated form. Its nature changes as soon as it is torn from the system of concepts and placed in a simpler and more immediate relationship to the object.

On this basis alone, we can state the core of our hypothesis (we will discuss this hypothesis in more detail later in summarizing our experiments): *Only within a system can the concept acquire conscious awareness and a voluntary nature. Conscious awareness and the presence of a system are synonyms when we are speaking of concepts, just as*

spontaneity, lack of conscious awareness, and the absence of a system are three different words for designating the nature of the child's concept.

This follows directly from what we said above. If conscious awareness means generalization, it is obvious that generalization, in turn, means nothing other than the formation of a higher concept (*Oberbegriff - ubergeordneter Begriff*) in a system of generalization that includes the given concept as a particular case. However, if a higher concept arises above the given concept, there must be several subordinate concepts that include it. Moreover, the relationships of these other subordinate concepts to the given concept must be defined by the system created by the higher concept. If this were not so, the higher concept would not be higher than the given concept. This higher concept presupposes both a hierarchical system and concepts subordinate and systematically related to the given concept. Thus, the generalization of the concept leads to its localization within a definite system of relationships of generality. These relationships are the foundation and the most natural and important connections among concepts. Thus, at one and the same time, generalization implies the conscious awareness and the systematization of concepts.

What Piaget himself has to say makes it clear that a system is significant for the internal nature of the child's concepts. Piaget notes that the child manifests little systematicity, connectedness, or deduction in his thought. The need to avoid contradiction is foreign to him. He places assertions alongside one another rather than synthesizing them. He is satisfied with synthetic schemes rather than submitting problems to analysis. In other words, the child's thought is closer to a collection of theses flowing simultaneously from actions and dreams than to adult thought, thought which is conscious of itself and has a system.

We will try to show somewhat later that all the empirical laws and regularities established by Piaget in connection with the child's logic apply only within the domain of the child's unsystematized thought. They apply only to concepts taken outside any system. This is the common cause of all the phenomena Piaget describes. To be sensitive to contradiction, one must do more than simply place judgments in a sequence. These judgments must be logically synthesized. The capacity for deduction is possible only within a definite system of relationships among concepts. The phenomena described by Piaget follow from the absence of such as system as inevitably as a shot follows pressure on the trigger of a gun.

However, only one issue is of interest to us at this point. We are interested in demonstrating that the system -- and the conscious awareness that is associated with it -- is not brought into the domain of the child's concepts from without; it does not simply replace the child's own mode of forming and using concepts. Rather, the system itself presupposes a rich and mature form of concept in the child. This form of concept is necessary so that it may become the object of conscious awareness and systematization. We are interested in demonstrating that the first system -- a system that emerges in the sphere of scientific concepts -- is transferred structurally to the domain of everyday concepts, restructuring the everyday concept and changing its internal nature from above. The dependence of scientific concepts on spontaneous concepts and their influence on them stems from the unique relationship that exists between the scientific concept and its object. As we said, this relationship is characterized by the fact that it *is mediated through other concepts. Consequently, in its relationship to the object, the scientific concept includes a relationship to another concept*, that is, it includes the most basic element of a concept system.

Thus, because it is scientific in nature, the scientific concept assumes some position within a system of concepts. This system defines the relationship of scientific con-

cepts to other concepts. The essence of any scientific concept was defined in a profound manner by Marx:

> If the form in which a thing is manifested and its essence were in direct correspondence, science would be unnecessary (Marx and Engels, *Collected Works*, v. 25, chap. 2, p. 384).

In this statement, Marx touches on the essence of the scientific concept. The scientific concept would be superfluous if it reflected the object in its external manifestation as an empirical concept. The scientific concept necessarily presupposes a different relationship to the object, one which is possible only for a concept. However, as we have shown above, the relationship to the object that is characteristic of the scientific concept presupposes the presence of relationships of concepts to one another. It presupposes a system of concepts. From this vantage point, we can say that the concept must be seen as part of the entire system of the relationships of generality that define its level of generality, just as a stitch must be seen as part of the fibers that tie it to the common fabric. At the same time, it becomes apparent that the distinction between spontaneous and nonspontaneous concepts in the child coincides logically with the distinction between empirical and scientific concepts.

We will return to this problem again. In this context, we will limit ourselves to a single illustration. It is well known that more general concepts arise in the child earlier than more specific ones. Thus, the child usually learns the word "flower" earlier than the word "rose." In this context, however, the concept of "flower" is not actually more general that the concept of "rose"; it is merely broader. When the child has mastered only a single concept, its relationship to the object is different than it is after he masters a second. However, even after he masters a second concept, there is a long period during which the concept of "flower" continues to stand alongside, rather than above, the concept of "rose." The former does not include the latter. The narrower concept is not subordinated. Rather, the broader concept acts as a substitute for the narrower one. It stands alongside it in a single series. When the concept of "flower" is generalized, the relationship between it and the concept of "rose" changes as well. Indeed, there is a change in its relationship with all subordinate concepts. This marks the emergence a concept system.

We return again, then, to the point where we began our discussion, that is, to the initial question posed by Piaget: How does conscious reflection arise? We have attempted to clarify why the school child's concept lacks conscious awareness and how it acquires conscious awareness and a volitional nature. We found the source of the lack of conscious awareness of concepts not in egocentrism but in the absence of system in the child's spontaneous concepts. This is why spontaneous concepts lack conscious awareness and volitional control. We found that conscious awareness is realized through the formation of such a system, a system which is based on specific relations of generality among concepts. We also found that conscious awareness of concepts leads to their volitional control. By its nature, the scientific concept presupposes a system. Scientific concepts are the gate through which conscious awareness enters the domain of the child's concepts.

It has become clear to us why Piaget's theory is powerless to answer the question of how conscious awareness is realized. Piaget's theory bypasses the scientific concept. All that is reflected in his theory are the laws and regularities characteristic of concepts as they exist outside any system. In Piaget's view, the child's concept can become the object of psychological investigation only when any trace of systematicity is removed from it. This makes it impossible to explain how conscious awareness is realized. As a consequence, Piaget's theory is relevant only within the narrow limits of

nonsystemic concepts. To resolve the problem that Piaget posed, the *system* that Piaget tossed out along the roadside must become the focus of our work.

3

The previous sections illustrate the extraordinary importance of scientific concepts for the development of the child's thinking. It is in this domain that thinking first crosses the threshold that separates preconcepts from true concepts. This is a critical point in the development of the child's concepts and is the focus of our research. We have seen, however, that this issue is merely one aspect of a more general problem, a problem that we will consider briefly in this section.

In essence, *the problem of nonspontaneous concepts -- of scientific concepts in particular -- is the problem of instruction and development.* Spontaneous concepts create the potential for the emergence of nonspontaneous concepts in the process of instruction. Instruction is the source of the development of this new type of concept. Thus, the problem of spontaneous and nonspontaneous concepts is a special case of the more general problem of instruction and development. Isolated from this more general context, the problem of spontaneous and nonspontaneous concepts cannot be correctly stated. At the same time, a comparative analysis of the development of scientific and everyday concepts provides an empirical foundation for addressing the more general problem of the relationship between instruction and development. It provides data on a limited and specific manifestation of the relationship between instruction and development that allow us to evaluate our general conception of this relationship. In this sense, our working hypothesis and the experimental research that it has produced have implications that extend beyond the boundaries of the narrow issue of concept development to the more general problem of the relationship between instruction and development.

We will not outline the problem of instruction and development in any extended form nor attempt even a tentative resolution of it in the present context. We have addressed this issue elsewhere. However, since this problem constitutes the framework for the focus of the present investigation and is in a certain sense its object, several basic issues must be addressed. Without attempting to outline all the attempts to resolve this question that have emerged in the history of our science, we will consider three that are currently of significance for Soviet psychology.

The first perspective on the relationship between instruction and development that we will consider is probably the most widely accepted. It is based on the assumption that *instruction and development are two distinct and essentially independent processes.* Within this framework, the child's development is conceptualized as a process that is subordinant to natural laws. The child develops in accordance with a maturational model. Instruction is understood as an external utilization of the potentials that emerge in development. The typical expression of this perspective in the analysis of the child's mental development is the attempt to isolate that which is a function of development from that which is a function of instruction. The fact that not a single investigator has succeeded in this task is generally attributed to limitations in research method. The attempt is made to compensate for these inadequacies of method through the power of abstraction. It is on this basis that the child's intellectual characteristics are differentiated into those which: (1) arise from development, and (2) owe their origin to instruction. It is generally assumed that a normal and high level of development can be attained without instruction. It is assumed that children will develop all the higher forms of thinking attainable by man without school instruction, that they

will manifest all the intellectual potentials manifested by children who have received school instruction.

This theory more often takes a somewhat different form which begins with the recognition of an indisputable dependency that exists between instruction and development. Development creates the potentials while instruction realizes them. The relationship between these processes is represented in much the same way that preformism represents the relationship between dispositions and development. Dispositions contain the potentials that are realized in development. Here again, we find the notion that it is development itself that creates potentials that are then realized in instruction. Instruction is *constructed over a framework provided by maturation.* As it is conceptualized within this framework, the relationship between instruction and development can be compared to the relationship between production and consumption. Instruction consumes the products of development. It uses them and applies them to life. There is a one-sided dependency between development and instruction. Instruction depends on development while development is not influenced by instruction.

In accordance with this theory, then, it is sufficient to recognize that a certain level of maturation in certain mental functions is a prerequisite for instruction. It is impossible to teach a one year old to read or a three year old to write. Consequently, analysis of the mental processes involved in instruction is reduced to the clarification of the types of functions and the degree of maturation necessary for instruction to occur. Instruction in writing can begin if the child's memory has reached a level of development that makes it possible for him to remember the letters of the alphabet, if his attention has developed to the extent that it can be maintained on matters of little interest to him for a given period of time, and if his thinking has matured to the point that makes it possible for him understand the relationships between sounds and the written signs that symbolize them.

Though this perspective recognizes a one-sided dependency of instruction on development, this dependency is conceptualized in purely external terms. Any internal interpenetration or interconnection between these processes is excluded. Though it approximates reality more closely than other members of this class, this is why we group this theory with those which begin with the postulate of the independence of instruction and development. To the extent that this is the case, the kernel of truth that is contained in this theory becomes lost in the mass of falsehoods that lie at the core of this entire group of theories.

Fundamental to this conception of the independence of the processes of instruction and development is a notion that has received little attention until recently. This notion concerns the issue of sequence as it relates to the processes of instruction and development. This theory resolves this basic issue of sequence with its assumption that *instruction rides on the tail of development,* that development must complete certain cycles or stages or bear certain fruits before instruction is possible.

Of course, this notion contains a certain element of truth. There are certain developmental prerequisites that must be met before successful instruction can begin. New forms of instruction are without question dependent on the completion of certain cycles in the child's development. There is a lower threshold prior to which instruction is not impossible. However, this dependency is not the most important characteristic of the relationship between instruction and development. It is of secondary importance. The attempt to represent it as the central issue, or, indeed, as the whole issue, leads to several misunderstandings and mistakes. Specifically, it has been assumed that instruction reaps the fruit of the child's maturation while it has no significance for development. The child's memory, attention, and thinking develop to the level where the child can be instructed in writing and arithmetic. In response to the question of

whether instructing the child in writing or arithmetic affects his memory, attention, or thinking, however, traditional psychology suggested that these processes always change when they are exercised whatever form that exercise may take. The course of development itself, however, does not change as a consequence of instruction. Nothing new emerges in the child's mental development when we teach him to write. The child we have when we finish is identical to the one we had when we began, with the sole exception that he is literate.

This perspective completely dominated traditional educational psychology, including Meumann's well known work. Piaget pushes this perspective to its logical limit. He assumes that *the child's thinking inherently passes through certain stages and phases of whether or not he receives instruction.* That the child receives instruction has no direct impact on the developmental process. It is not in any way unified with the processes of the child's own thinking. It is external to them. The teacher must view the autonomous characteristics of the child's thinking as a lower threshold that determines the possibilities which exist for instruction. When the child develops new potentials for thinking, new types of instruction will be possible. For Piaget, the index of the level of the child's thinking is to be found not in what the child knows or what he is able to learn but in his capacity for thinking in a domain where he has no knowledge. Here, instruction and development or knowledge and thinking are placed in the sharpest possible opposition. Proceeding from this thesis, Piaget presents the child with problems from domains where his lack of knowledge can be assumed. The underlying premise is that if we ask the child about things that he may know, the results we receive may represent not the child's thinking but his knowledge. Spontaneous concepts which arise in the child's development are therefore considered the proper indices of his thinking. Scientific concepts, which have their source in instruction, cannot be used as indices in this way. In this opposition of instruction and development we are brought once again to Piaget's basic premise: Scientific concepts do not emerge from spontaneous concepts or transform them; they force them out and replace them.

The *second* perspective on this issue is diametrically opposed to that we have just outlined. Here, *instruction and development are merged. The two processes are identified.* This perspective first developed in the educational psychology of William James.[68] James attempted to demonstrate that the formation of associations and habits lies at the foundation of both instruction and mental development. Of course, when these processes are identified, there is no foundation on which to differentiate them. This thesis inevitably leads to the declaration that instruction is development, that instruction and development are synonymous.

The foundation for this theory is provided by associationism, the concept that provided the basis for the whole of traditional psychology. The rebirth of this concept in educational psychology is now represented by the "last of the Mohicans," that is, by Thorndike and the reflexologists[69] who have translated the concept of association into the language of physiology. This theory represents the development of the child's intellect as a sequential and gradual accumulation of conditioned reflexes. It represents instruction in precisely the same way. The result is the conception that instruction and development are synonymous. The child develops to the extent that he is taught. Development is instruction; instruction is development. Rather than untying the knot which represents the relationship between instruction and development, the first theory cuts it. This theory recognizes no relationship between the two processes. This second theory eliminates or avoids this knot entirely. Since they are one and the same thing, the issue of the relationship between instruction and development or the nature of this relationship cannot arise.

There is a *third* group of theories that have been particularly influential in European child psychology. These theories attempt to rise above the extremes inherent in the two perspectives outlined above, they attempt to sail between the Scylla and Charybdis. The result, however, is typical of theories that attempt to occupy a middle ground between two extreme perspectives. This third group of theories fails to gain a position *above* the other two and assumes a position *between* them. To the extent that it overcomes the extremes of one perspective, it assumes the extremes of the other. It rises above the first false theory by yielding to some extent to a second which is equally false. It overcomes the extremes of the second by yielding to the first. This type of theory has an inherent duality. By occupying a position between two contradictory perspectives, it leads to a certain *unification of these points of view.*

This type of position is taken by Koffka. From the outset, he makes it clear that *development always has a dual character* and that it is necessary to distinguish development as maturation and development as instruction. Of course, this implies that we must recognize each of the two extreme positions in turn, that we must unify them. The first perspective is based on the concept that the processes of development and instruction are independent of one another. Koffka reiterates this position, arguing that development is maturation which has it own internal laws independent of instruction. The second perspective is based on the concept that instruction is development. Koffka literally reiterates this position.

If the first theory cuts the knot rather than untying it and the second eliminates or avoids it entirely, Koffka's theory tightens the knot further. Koffka's position not only fails to resolve the issue but confuses it. It lifts itself upward to the level of the principle which underlies the mistake that is common to both the first two groups of theories, to the level of the principle that produced their shared misstatement of the problem. Koffka's theory proceeds from a fundamentally dualistic understanding of development. Development is not represented as a unified process. There is development as maturation and development as instruction. In three respects, however, Koffka's thinking moves us beyond the other two theories.

1. The unification of these two contradictory perspectives requires the assumption that there is a mutual dependency between the two types of development, that is, between maturation and instruction. This assumption is included within Koffka's theory. Koffka establishes that maturation depends on the functioning of the organ and consequently on the development of its function in instruction. In turn, maturation moves instruction forward by opening up new potentials. Thus, instruction has some influence on maturation and maturation has some influence on instruction. This "some" is, however, left entirely uninterpreted in Koffka's theory. His theory does not go beyond a general recognition of this mutual influence. Rather than making it an object of investigation, Koffka is satisfied with merely postulating the mutual dependency between these two processes.

2. This third theory also leads to a new understanding of instruction. For Thorndike, instruction is a meaningless mechanical process which produces its results through trial and error. For structural psychology, *instruction represents the emergence of new structures and the development of old ones.* Since the process of structural development is recognized as primary -- recognized as an independent prerequisite for instruction -- this theory suggests from the outset that instruction has a meaningful structural character. The fundamental characteristic of any structure is that it is independent of the elements that form it, of the concrete material that provides its basis. Its fundamental characteristic is its potential for being transferred to other material. Thus, if the child forms a structure or learns an operation in the course of instruction, he has acquired more than the potential of reproducing that structure or operation.

He has acquired much greater potentials that extend to the domains of other structures. We have given the child a penny's worth of instruction and the consequence has been a dollar's worth of development. A single step in instruction can represent a hundred steps in development. This constitutes the most positive feature of this new theory. This theory teaches us to see the difference between instruction which provides only what it provides directly and instruction which provides more. Learning to type may not change the general structure of consciousness. Learning a new method of thinking or a new type of structure produces a great deal more than the capacity to perform the narrow activity that was the object of instruction.

3. The third positive feature of this new theory is a direct function of the second and is related to the issue of the sequence of instruction and development. This issue fundamentally distinguishes this third theory from the first two.

We have seen that the first theory takes the position that instruction follows on the tail of development. First there is development and only then instruction. The second theory cannot even state this question because the two processes are identified or merged with one another. In practical terms, however, the second theory proceeds from the presupposition that instruction and development proceed syncronically as two parallel processes, that development follows instruction step for step just as a shadow follows the object which casts it. To the extent that it unites these two perspectives and differentiates maturation and instruction, the third theory preserves both these representations of the temporal connections between instruction and development. However, it supplements them with something fundamentally new which stems from its conception of instruction as a structural and meaningful process. We have seen that within this framework instruction can give more to development than is present in its direct results. Applied to one point in the child's thought, it alters and restructures many others. Its developmental consequences may be distal as well as proximal. *Instruction is not limited to trailing after development or moving stride for stride along with it. It can move ahead of development, pushing it further and eliciting new formations.* This insight has immeasurable importance and value. It atones for many of the inadequacies of Koffka's eclectic theory, a theory which accepts all three of the logically conceivable temporal relationships between instruction and development as equally plausible and significant. In spite of their differences, the first and second theories lead to the conclusion that instruction changes nothing in development. Thus, this third theory leads to an entirely new problem, a problem that is extremely important for the hypothesis that we are developing.

Though in many respects entirely new, this problem also represents a return to a very old issue in psychology and education, an issue that has almost been forgotten. This return does not represent the rebirth of the conceptions associated with the original expression of the problem, conceptions whose inadequacy has long since been demonstrated. However, as is frequently the case in the history of scientific thought, the reanalysis of a theory from the new perspectives which science has achieved leads to the restoration of several correct positions that were found not only in the older theory that is being reanalyzed but in theories that preceded it.

We are referring here to the theory of formal discipline, a theory usually associated with the name of Herbart.[70] Fundamental to the concept of formal discipline is the notion that there are educational subjects which provide something more than the knowledge and skills that constitute the subject itself. These subjects contribute to the development of the child's general mental capacities. Proponents of this theory distinguished educational subjects in terms of their relative significance as formal disciplines. Though itself progressive, this perspective led educational practice to reactionary forms of teaching, the most direct instantiation of which were the German and

Russian classical gymnasiums. In the gymnasium, a great deal of attention was focused on the study of the Latin and Greek languages. This was done not because it was thought to be important for life, but because it was thought that the study of these subjects facilitated the child's general mental development. In the *Realschule*, this same significance was attributed to the teaching of mathematics. Just as ancient languages were thought to provide for the development of the mental capacities required in the humanitarian sciences, mathematics was thought to provide for the development of the mental capacities needed in the practical [scientific and technical] disciplines.

The total demise of the theory of formal discipline was partially a function of the undeveloped state of the theory. The primary factor in its demise, however, was its failure to correspond with the practical tasks of the new bourgeois pedagogy. It was Thorndike who emerged as the major ideologist here. In a series of studies, he attempted to show that the concept of formal discipline was a myth or legend, that instruction does not have any long term influences on development. In this research, Thorndike completely rejected the concept that there is any dependency between instruction and development. The theory of formal discipline had a correct premonition of this dependency but depicted it largely in caricature. Thorndike's position, however, is convincing only to the extent that it deals with the caricatured exaggerations and distortions of this dependency that were developed within the theory of formal discipline. He does not even address the core of the idea, much less destroy it. Thorndike's conclusions are not convincing primarily because he failed to overcome the false statement of the problem that is contained in the teachings of Herbart's followers. He attempts to refute these ideas by assuming the same position and using the same tools they did. The result is that he refutes not the ideas that lie at the core of this old teaching but only those which constitute the husk that covers it.

In theoretical terms, Thorndike approaches the problem of formal discipline within a framework which assumes that everything in instruction influences everything else. Thorndike raises the question of whether studying the multiplication tables will influence the capacities to chose a mate or understand anecdotes. In answering this kind of question in the negative, Thorndike demonstrates only what we knew from the outset. In neither instruction nor development does everything influence everything else. Influences cannot have a universal range. They cannot link points of instruction and development that have nothing of a mental nature in common. He is absolutely wrong, however, when he extends this perfectly correct thesis and concludes that nothing influences anything. Thorndike merely demonstrated that instruction which influences functions that have nothing in common with the functions that underlie other forms of activity or with the functions of thinking will not have any influence on these other forms of activity. This thesis is beyond dispute. It does not, however, clarify the question of whether instruction might have some influence on functions whose mental natures are similar (i.e., either identical or closely related). Thorndike has not resolved the question of whether instruction can facilitate the development of a certain system of functions or the study of subjects that depend on related mental processes. Thorndike's rejection of the concept of formal discipline is valid only where we are dealing with functions that are combined in a meaningless way.

Thus, Thorndike's conclusions are valid only if we are concerned with meaningless combinations of functions. On what basis does he extend these conclusions to the child's instruction and development as a whole? Why does his finding that everything does not influence everything convince him that nothing influences anything? The answer to these questions lies in the general theoretical conception that underlies all Thorndike's work. In accordance with this conception, there are no combinations in the activity of consciousness other than meaningless ones. Within this framework, all

instruction and development are reduced to the mechanical formation of associative connections. That is, all the activities of consciousness are connected in a single manner. The learning of the multiplication tables is connected with the understanding of anecdotes in the same way that the formation of algebraic concepts is connected with the understanding of the laws of physics. We know, however, that this is not the case. In the activity of consciousness, structured and meaningful connections and relations dominate. The presence of meaningless connections is more the exception than the rule. This view is fundamental to contemporary psychology. If we accept it, all the thunder and lightning that Thorndike attempts to bring down on the teaching of formal disciple strikes his own theory. Thus, though he does not recognize it, Koffka must to some degree return to the concept of formal discipline. Koffka represents structural psychology, and structural psychology rejects the very core of the associative conception of the child's instruction and mental development.

Even Koffka, however, overlooked a second mistake in Thorndike's critique of the theory of formal discipline. In his attempt to refute Herbart's conception, Thorndike resorted to experimentation on extremely narrow, specialized, and, therefore, elementary functions. He provided subjects with practice in discriminating the lengths of line segments and then studied how this form of instruction influenced their capacity to discriminate the size of angles. Of course, no influence was found. This was a function of two factors. First, Thorndike did not teach his subjects material of the type typical of school instruction. No one has ever argued that teaching someone to ride a bicycle, to swim, or play golf (forms of activity that are much more complex than the discrimination of the magnitude of angles) has any significant influence on the general development of the child's mind. Such an argument has been made only with respect to the study of subjects such as arithmetic or the child's native language, only with respect to complex subjects that are linked to the entire system of mental functions. That the discrimination of line lengths has no direct influence on the discrimination of angles provides no basis for the assumption that the study of the native language -- and the general development of the meaningful aspect of speech that is associated with it -- is not linked in some way to the study of arithmetic. Thorndike has demonstrated only that there are two kinds of instruction. One is epitomized by the formation of specialized, narrow skills. This form of instruction is often encountered in the professional adult instruction. The other form of instruction is typical of childhood and incorporates whole complexes of mental functions. It leads to the development of entire domains of the child's thinking. This form of instruction clearly influences similar, related, or even identical mental processes. For the first form of instruction, formal discipline is more the exception than the rule. It is a fundamental law of the second form of instruction.

Moreover, as we have seen, the activity that Thorndike used in his experiments is associated with what is structurally among the lowest, most elementary, and simplest functions. In contrast, school instruction is associated with the higher mental functions. Their complex structure distinguishes these mental functions from those studied by Thorndike. More importantly, however, they are distinguished by the fact that they are entirely new formations and by the fact that they are complex functional systems. Given what we know of the higher mental functions, it is apparent that the potential for formal discipline in the domain of the higher processes which arise in the course of the child's cultural development is fundamentally different from its potential in the domain of elementary processes. The homogeneity of the structure of the higher mental functions and the unity of their origin convinces us of this. We have noted that all the higher functions have a homogeneous basis. They become higher functions because the subject attains conscious awareness and mastery of them. As we said ear-

lier, logical memory can be called voluntary memory just as voluntary attention can be called logical attention. We would add here that both these functions can be called abstract as opposed to concrete, paralleling the way we generally distinguish abstract and concrete forms of thought. Thorndike's conception, however, rejects the notion of a qualitative difference between the higher and lower processes. It is the assumption that these processes are identical in nature that convinces Thorndike that he is justified in using studies of instruction that deal exclusively with the elementary processes in his attempt to resolve the question of formal discipline in the domain of school instruction.

4

Having prepared the necessary theoretical foundation and analyzed the question from a critical perspective, we can now attempt to outline our own perspective on it. We will rely on four groups of studies that lead us to a unified conception of the problem of instruction and development. Basic to our approach is the concept that instruction and development are neither two entirely independent processes nor a single process. In our view, they are two processes with complex interrelationships. We conducted a series of studies to explore these relationships and these studies provide the empirical foundation for our hypothesis.

As we said, this research is unified in its concern with the general problem of the relationship between instruction and development. Its basic task was to explore the complex relationships between instruction and development by focusing on the work that the child does in school, that is, by focusing on reading and writing, grammar, arithmetic, the natural sciences, and the social sciences. A variety of specific issues were explored. We looked at the child's mastery of the decimal system in association with the development of the number concept, at the development of conscious awareness of mathematical operations in solving problems, and at the construction and resolution of problems by primary school children. This research increased our understanding of the development of oral and written speech in the first school age, helped us to identify stages in the development of the understanding of transferred word meaning, provided data on the influence that the learning of grammatical structures has on the course of mental development, and clarified the relationship between the nature of the social and the natural sciences in school. Thus, some aspect of the general issue of the relationship between instruction and development was addressed in each of these studies.

The most important issues that we were able to address through this research concerned: (1) the maturity of specific mental functions when instruction begins; (2) the influence of instruction on their development, the temporal relationship between instruction and development, and; (3) the nature and significance of instruction as a formal discipline.*

1. The first series of studies dealt with the issue of the maturity of the mental functions that provide the foundation for instruction in basic school subjects such as reading, writing, arithmetic, and natural science. Though the first group of theories discussed above maintain that these functions must mature before instruction can begin, this first series of studies consistently indicated that they do not, even though instruction may be proceeding smoothly. We will clarify this point using the example of written speech.

* Vygotsky used the thesis research of his students at the Leningrad pedagogical institute here.--Editor's note.

Why is written speech so difficult for the school child? Why, at several stages, is there a difference of six to eight years in the speech age for written and oral speech? The most common explanation for this is based on the assumption that because written speech is a new function it must repeat the basic developmental stages that oral speech has already passed through. Thus, the eight year old's written speech will be similar to the two year old's oral speech. It has even been proposed that the age level for written speech should be measured from the point when instruction begins in order to establish this correspondence between written and oral speech.

This explanation is clearly unsatisfactory. The two year old uses comparatively few words and a primitive syntax because his vocabulary is still poor and because he has not mastered complex sentence structures. The vocabulary of the school child's written speech, however, is not poorer than that of his oral speech. They are one and the same vocabulary. The syntax and the grammatical forms of written and oral speech are also the same. The child has already mastered them by the time he reaches school. Thus, the poverty of vocabulary and the undeveloped syntax that explain the primitive nature of oral speech in the two year old cannot explain the primitive nature of the school child's written speech. This analogy does not adequately explain the large disparity in the school child's written and oral speech.

Research indicates that the development of written speech does not reproduce that of oral speech. Any similarity that exists between the two processes is external and symptomatic rather than essential. Written speech is more than the translation of oral speech into the written sign. Mastering written speech requires more than learning the techniques of writing. Otherwise, we would expect that once these mechanisms of written speech were learned, written speech would be as rich and developed as oral speech; the two would be as similar as the translation is to the original. This is not the case however.

Written speech is an entirely unique speech function. Its structure and mode of functioning are as different from those of oral speech as those of inner speech are from external speech. Even the most minimal level of development of written speech requires a high degree of abstraction. Written speech lacks intonation and expression. It lacks all the aspects of speech that are reflected in sound. Written speech is speech in thought, in representations. It lacks the most basic feature of oral speech; it lacks material sound.

The result is that the psychological conditions characteristic of written speech are very different from those of oral speech. Through oral speech, the child has achieved a rather high level of abstraction with respect to the object world. With written speech, the child is presented with a new task. He must abstract from the sensual aspect of speech itself. He must move to abstracted speech, to speech that uses representations of words rather than words themselves. In this respect, written speech differs from oral speech in the same way that abstract thinking differs from graphic thinking. This means that written speech cannot repeat the developmental stages of oral speech. The abstract nature of written speech -- the fact that it is thought rather than pronounced -- represents one of the greatest difficulties encountered by the child in his mastery of writing. Those who continue to assume that the critical problems are factors such as the underdevelopment of the small musculature and factors associated with the techniques of writing fail to see the root of the problem.

Written speech is more abstract than oral speech in other respects as well. It is speech without an interlocutor. This creates a situation completely foreign to the conversational speech the child is accustomed to. In written speech, those to whom the speech is directed are either absent or out of contact with the writer. Written speech is speech-monologue. It is a conversation with a white sheet of paper, with an imagi-

nary or conceptualized interlocutor. Still, like oral speech, it is a conversational situation. Written speech requires a dual abstraction from the child. It requires an abstraction from the auditory aspects of speech and an abstraction from the interlocutor. This is the second of the basic difficulties the school child encounters in his mastery of written speech. Speech that lacks real sound (speech that is only represented or thought and therefore requires the symbolization of sound -- a second order symbolization) will be more difficult than oral speech to the same degree that algebra is more difficult for the child than arithmetic. Written speech is the algebra of speech. The process of learning algebra does not repeat that of arithmetic. It is a new and higher plane in the development of abstract mathematical thought that is constructed over and rises above arithmetic thinking. In the same way, the algebra of speech (i.e., written speech) introduces the child to an abstract plane of speech that is constructed over the developed system of oral speech.

Moreover, *the motives that would cause one to resort to written speech are even less accessible to the child when he begins to learn to write.* As is true of any new form of activity, the motivation for speech and the need for it is fundamental to its development. The need for oral communication develops throughout infancy. It is a basic prerequisite for the first meaningful word. To the extent that this need has not matured, we find delays in speech development. When school instruction begins, however, the need for written speech is comparatively undeveloped. When he begins to write, the school child does not sense the need for this new speech function.

The relevance of the notion that motivation generally precedes activity to the special difficulties that the child encounters in the mastery of written speech is not limited to the ontogenetic domain. Every conversation and phrase is preceded by a speech motive. This motive is the source of the affective inducements and needs that feed the activity. With every moment, the situation that is inherent in oral speech creates the motivation for each turn of speech; it creates the motivation for each segment of conversation or dialogue. The need for something produces the request. The question creates the answer. The expression brings the retort and the failure to understand - the clarification. A multitude of similar relationships between speech and motive are fully determined by the situation inherent in real oral speech. Thus, oral speech is regulated by the dynamics of the situation. It flows entirely from the situation in accordance with this type of situational-motivational and situational-conditioning process. With written speech, on the other hand, we are forced to create the situation or -- more accurately -- to represent it in thought. The use of written speech presupposes a fundamentally different relationship to the situation, one that is freer, more independent, and more voluntary.

The child must act with more volition with written speech than with oral speech. This is a general thread that links the distinguishing characteristics of written speech. Even the sound form of the word must be differentiated in written speech, while with oral speech it is pronounced automatically and without any differentiation into separate sounds. In saying a word, the child is not conscious of how he pronounces the sound. He does not intentionally pronounce each separate sound. With written speech, however, he must become consciously aware of the word's structure. He must partition it and voluntarily recreate it in written signs.

We find an analogous situation with the child's activity in forming phrases. In writing, he constructs the phrase in the same voluntary and intentional way as he creates the word from separate letters. That is, the child's syntax is as voluntary as his phonetics. The semantic aspect of written speech also requires voluntary work on word meanings. It requires that they be arranged in a particular syntactic and phonetic sequence. This reflects the fact that written speech stands in a different relationship to

inner speech than does oral speech. While the development of external speech precedes the development of inner speech, written speech emerges only after the development of the latter. Written speech presupposes the existence of inner speech. According to Jackson and Head,[71] written speech is the key to inner speech. The transition from inner to written speech requires what we have called voluntary semantics, which is associated with the voluntary phonetics of written speech. The grammar of thought characteristic of inner and written speech do not coincide; the meaningful syntax of inner speech is completely different from that of either oral or written speech. Entirely different laws govern the construction of the whole and of meaningful units. In a certain sense, the syntax of inner speech is the polar opposite of that of written speech. The syntax of oral speech stands somewhere between these two poles.

Inner speech is maximally contracted, abbreviated, and telegraphic. Written speech is maximally expanded and formal, even more so than oral speech. Written speech does not contain ellipses while inner speech is filled with them. Syntactically, inner speech is almost entirely predicative. In oral (audible) speech, syntax becomes predicative where the subject and related parts of the sentence are known to the interlocutors. This is consistent with the nature and structure of inner speech. With inner speech, the subject -- indeed the whole conversational situation -- is known to the individual who is thinking. Here, speech consists almost entirely of predicates. We do not have to tell ourselves what this speech is about. That is always implied, forming the background of consciousness. This explains the predicative nature of inner speech. Even if inner speech were made audible to the outsider, only the speaker would understand it. No one else would know the mental field in which it flows. Inner speech is, therefore, completely idiomatic.

In contrast, written speech requires the situation to be established in full detail so it can be understood by the interlocutor. Written speech is the most expanded form of speech. Even things that can be omitted in oral speech must be made explicit in written speech. Written speech must be maximally comprehensible to the other. Everything must be laid out fully. This transition from a maximally contracted inner speech (i.e., from speech for oneself) to a maximally expanded written speech (i.e., to speech for the other) requires a child who is capable of extremely complex operations in the voluntary construction of the fabric of meaning.

The second basic characteristic of written speech (i.e., its greater *consciousness*) is closely linked with its *volitional nature*. Wundt noted that the intentional and conscious nature of written speech is among the most important features that distinguishes it from oral speech. In his view, the difference between the development of language and of writing is that the latter is directed by consciousness and intention almost from the outset. This is why change in sign systems can be voluntary (as in the development of cuneiform writing systems for example) while the processes involved in language change are always unconscious.

In our research, we were able to establish that this is as true of the ontogenesis of written speech as it is of its phylogenesis. From the very beginning, consciousness and intention direct the child's written speech. The child learns the signs of written speech and the use of these signs consciously and volitionally. In contrast, oral speech is learned and used unconsciously. Written speech forces the child to act more intellectually. It requires conscious awareness of the very process of speaking. The motives of written speech are more abstract, intellectualistic, and separated from need.

In summarizing this brief discussion of our study of the psychology of written speech, we can say that the mental functions which form written speech are fundamentally different from those which form oral speech. Written speech is the algebra of speech. It is a more difficult and a more complex form of intentional and conscious

speech activity. Two conclusions follow: (1) this explains the radical difference between the child's oral and written speech (this difference is a function of differences in the level of development required by activities that are spontaneous, involuntary, and without conscious awareness and those that are abstract, voluntary, and characterized by conscious awareness); and (2) *when instruction in written speech begins, the basic mental functions that underlie it are not fully developed; indeed, their development has not yet begun.* Instruction depends on processes that have not yet matured, processes that have just entered the first phases of their development.

This latter point is supported by research in other areas. Instruction in arithmetic, grammar, and natural science do not begin when the appropriate functions are mature. On the contrary, the immaturity of the required mental functions at the beginning of the instructional process is a general and basic law in all domains of school instruction. Since this emerges most clearly in the analysis of instruction in grammar, we will limit our discussion to this single issue in the present section. Our analysis of the acquisition of scientific concepts will be deferred to subsequent sections.

Since grammar would seem the least necessary or useful school subject for the child, the issue of the value of instruction in grammar is methodologically and psychologically complex. Arithmetic provides the child with new abilities. By acquiring knowledge of arithmetic, a child who once lacked the ability to add or divide now has this ability. Instruction in grammar does not seem to provide the child with new capacities in this sense. The child has the capacity to decline and conjugate before he comes to school. What does he learn from instruction in grammar? This is the argument that underlies the "agrammatical" movement which suggests that grammar should be removed from the list of school subjects because it is unnecessary, because it provides no new speech capacities. If we analyze instruction in grammar and written speech, however, we find that it has tremendous significance for the general development of the child's thought.

Of course, the child is able to decline and conjugate long before he arrives at school. For all practical purposes, he has already acquired the entire grammar of his native language. Nonetheless, while he declines and he conjugates, he does not know that he declines and conjugates. This activity has been acquired in a purely structural manner, in much the same way he has learned the phonetic constituents of the word. If you ask the young child to pronounce a specific combination of sounds such as "sk," he will not be able to do it. This kind of voluntary articulation is difficult for him. In the word "Moscow," however, he pronounces these same sounds freely and nonvolitionally. Within a defined structure, the sounds emerge spontaneously in the child's speech. Outside speech, however, these same sounds are not available to the child. *The child is able to pronounce a given sound, but he is not able to pronounce it volitionally.* This is the common characteristic of all the speech operations of the child who is on the threshold of school age.

This means that the child has certain speech capacities, but he does not know that he has them. These operations lack conscious awareness. This is reflected in the fact that the child possesses them only when they are used spontaneously or automatically, when they are used in situations where they are elicited by the structure of the situation. Outside this structure, the child is not able to do what he can within it. That is, he is not able to do volitionally, consciously, and intentionally what he is able to do without voluntary control. As a consequence, he has limited use of his capacities.

Once again, lack of conscious awareness and the nonvolitional nature of the child's capacities turn out to be two sides of a single phenomenon. This is characteristic of the child's grammatical skills such as his capacities to decline and conjugate. The child uses the correct case and the correct verb form in the structure of a particu-

lar phrase. He does not, however, consider the fact that such forms exist. He cannot, therefore, decline or conjugate a verb fully. The preschool child possesses all the basic grammatical and syntactic forms. He does not acquire fundamentally new grammatical or syntactic structures in school instruction. From this perspective, instruction in grammar is indeed a useless undertaking. What the child does learn in school, however, is conscious awareness of what he does. He learns to operate on the foundation of his capacities in a volitional manner. His capacity moves from an unconscious, automatic plane to a voluntary, intentional, and conscious plane. Instruction in written speech and grammar play a fundamental role in this process.

Given what we already know of the character of written speech, no elaboration is required to see the importance of this conscious awareness of speech -- this mastery of it -- for the mastery of written speech. The development of conscious awareness and mastery are both necessary for written speech. When learning to spell words that are spelled phonetically, the child gains conscious awareness that a word such as "fast" contains the sounds F-A-S-T, that is, he gains conscious awareness of his own activity in the production of sound; he learns to pronounce each separate element of the sound structure voluntarily. In the same way, when the child learns to write, he begins to do with volition what he has previously done without volition in the domain of oral speech. Thus, both grammar and writing provide the child with the potential of moving to a higher level in speech development.

Only two school subjects, writing and grammar, have been considered here. However, research on any of the basic school subjects would show the same thing: Thought has not fully matured when instruction begins. We can now make an even more interesting conclusion on the basis of our studies. If we consider the psychological aspects of school instruction, we will see that it constantly revolves around what are the basic new formations of the school age -- conscious awareness and mastery. We can show that the most varied subjects of instruction have a common foundation in the child's mind. Moreover, this common foundation is a basic new formation of the school age, a formation that develops and matures in the process of instruction itself. Its developmental cycle is not completed before this age. *The development of the psychological bases of school instruction do not predate instruction; they develop in an unbroken internal connection with it.*

2. Our second group of studies were concerned with the issue of the temporal relationship between the processes of instruction and development. Research has shown that instruction always moves ahead of development. The child becomes proficient in certain skills before he learns to apply them consciously and volitionally. There is always a divergence between school instruction and the development of the corresponding functions. These processes never run in parallel.

The educational process has its own sequence, logic, and complex organization. It progresses through lectures and excursions. In today's class there will be one lesson, in tomorrow's another. This process is regulated by programs and schedules. It would be a tremendous error to assume that there is a complete correspondence between the external structure of the educational process and the internal structure of the developmental processes that it brings to life. It would be a mistake to think that the pupil's failure in arithmetic in a given semester necessarily corresponds with the progress in his internal developmental semester. If we represent both the educational process and the development of the mental functions that are directly involved in that process as curves (as we have attempted to do in our experiments), we find that these curves never coincide. Their relationship is extremely complex.

We usually begin the teaching of arithmetic with addition and end with division. There is an internal sequence in the statement of all arithmetic knowledge and infor-

mation. From the developmental perspective, however, the various features and components of this process may have an entirely different significance. It may be that the first, second, third, and fourth components of arithmetic instruction are inconsequential for the development of arithmetic thinking. Some fifth component may be decisive. At this point, the developmental curve may rise sharply and begin to run ahead of the instructional process. What is learned thereafter may be learned in a entirely different way. Here, there is a sudden shift in the role of instruction in development. The child has finally understood something, finally learned something essential; a general principle has been clarified in this "aha experience." Of course, the child must learn the subsequent components of the program. In an important sense, however, they may already be contained in what he has learned. In each subject, there are essential, constituting concepts. If the course of development coincided completely with that of instruction, every point in the instructional process would have equal significance for development. The curves that represent instruction and development would coincide. Every point in the curve representing instruction would have a mirror image in the curve representing development. Research indicates that this is not the case. In both instruction and development, there are critical moments. These moments govern those which precede and follow it. These points of transition on the two curves do not coincide but display complex interrelationships. Indeed, as we said before, there could be no relationship between instruction and development if the two curves were to fuse.

Development has a different tempo than instruction. What we have here is a situation inherent in any scientific attempt to establish a relationship between two related processes that must be measured in accordance with different units of measurement.

The development of conscious awareness and volition cannot coincide with the school's program in grammar. The period required by the educational program for learning to decline substantive nouns will not necessarily coincide with that required for the internal development of the conscious awareness or mastery of speech. Development is not subordinated to the school program. It has its own internal logic. A given lesson in arithmetic will not correspond with a given stage of development, with the development of voluntary attention for example. Still, instruction in arithmetic may have a fundamental influence on the movement of attention from the domain of the lower mental functions to that of the higher. In the literal meaning of the word, instruction and development are incommensurable. In school, the child does not learn the decimal system as such. He learns to write numbers, add, multiply, and solve problems. Nonetheless, some general concept of the decimal system does develop.

The general implications of our second group of studies can be summarized in the following way: At the moment a given arithmetic operation or scientific concept is acquired, the development of this operation or concept is not completed. The curve representing its development does not correspond with that representing the school program. Instruction moves ahead of development.

3. The third group of studies dealt with an issue similar to that addressed by Thorndike in his experiments on the theory of formal discipline. However, our experiments were carried out with higher rather than elementary mental functions. Our experiments dealt with school instruction rather than with the discrimination of line segments or the magnitude of angles. In other words, we transferred the experiment to a domain where a meaningful connection might be expected between the subjects of instruction and the mental functions that play a role in them.

These studies have shown that the various subjects of school instruction interact with each other in the course of the child's development. Development is a much more unified process than would be indicated by Thorndike's experiments, where de-

velopment takes on an atomistic character. Thorndike's experiments indicated that the development of each bit of knowledge and each skill consists in the formation of independent chains of associations that cannot facilitate the development of other associative chains. Each process of development is independent and isolated. Each occurs in an identical manner in accordance with the law of associations. Our research has shown that the child's mental development does not occur in accordance with the system of school subjects in this way. Arithmetic does not result in the development of certain functions while written speech leads to the development of others. There is a common mental foundation to various aspects of these subjects. Conscious awareness and mastery emerge in the same way with instruction in grammar or written speech. They play a significant role in arithmetic instruction and will take a central position in our analysis of scientific concepts. *The child's abstract thinking develops in all his lessons.* Its development does not move in separate channels corresponding to the school subjects.

There is a process of instruction which has its own internal structure, it own sequence, and its own emerging logic. At the same time, in the head of each pupil, there is an internal network of processes which are called to life and motivated in school instruction. These have their own logic of development however. Among the basic tasks of the psychology of school instruction is to clarify this internal logic, the internal course of development that is called to life by a particular course of instruction. Three facts have been solidly established in our experiments: (1) there is significant commonality in the mental foundations underlying instruction in the various school subjects that is alone sufficient to insure the potential for the influence of one subject on the other (i.e., there is a formal aspect to each school subject); (2) instruction influences the development of the higher mental functions in a manner that exceeds the limits of the specific content and material of each subject. Once again, this provides support for the idea of a formal discipline which is different for each subject but common to all. In attaining conscious awareness of cases, the child masters a structure that is transferred to other domains that are not directly linked with cases or grammar; and (3) the mental functions are interdependent and interconnected. Because of the foundation which is common to all the higher mental functions, the development of voluntary attention and logical memory, of abstract thinking and scientific imagination, occurs as a complex unified process. The common foundation of all the higher mental functions is conscious awareness and mastery. The development of this foundation is the primary new formation of the school age.

4. Our fourth group of studies dealt with an issue that is new for contemporary psychology but fundamental to the problem of instruction and development in the school-age child.

Psychological research on the problem of instruction is usually limited to establishing the level of the child's mental development. The sole basis for determining this level of development are tasks that the child solves independently. This means that we focus on what the child has and knows today. Using this approach, we can establish only what has already matured. That is, we can determine only the level of the child's *actual* development. To determine the state of the child's development on this basis alone, however, is inadequate. The state of development is never defined only by what has matured. If the gardener decides only to evaluate the matured or harvested fruits of the apple tree, he cannot determine the state of his orchard. Maturing trees must also be taken into consideration. The psychologist must not limit his analysis to functions that have matured. He must consider those that are in the process of maturing. If he is to fully evaluate the state of the child's development, the psychologist must

consider not only the actual level of development but *the zone of proximal development.* How can this be accomplished?

When we determine the level of actual development, we use tasks that require independent resolution. These tasks function as indices of fully formed or fully matured functions. How, then, do we apply this new method? Assume that we have determined the mental age of two children to be eight years. We do not stop with this however. Rather, we attempt to determine how each of these children will solve tasks that were meant for older children. We assist each child through demonstration, leading questions, and by introducing the initial elements of the task's solution. With this help or collaboration from the adult, one of these children solves problems characteristic of a twelve year old, while the other solves problems only at a level typical of a nine year old. This difference between the child's mental ages, this difference between the child's actual level of development and the level of performance that he achieves in collaboration with the adult, defines the zone of proximal development. In this example, the zone can be expressed by the number "4" for one child and by the number "1" for the other. These children are not at the same level of mental development. The difference between these two children reflected in our measurement of the zone of proximal development is more significant than their similarity as reflected in their actual development. Research indicates that *the zone of proximal development has more significance for the dynamics of intellectual development and for the success of instruction than does the actual level of development.*

To explain this, we cite the well known fact that with collaboration, direction, or some kind of help the child is always able to do more and solve more difficult tasks that he can independently. What we have here is only an example of this general rule. An explanation, however, must go further. It must identify the causes that underlie this phenomenon. Rooted in traditional psychology, as well as in the everyday consciousness, is a view of imitation that assumes it is a purely mechanical activity. From this perspective, a solution that is not reached independently is not considered an index or symptom of the development of the child's intellect. It is assumed that the child can imitate anything. What I can do by imitation says nothing about my own mind. It cannot be used in assessing development. This view is false.

It is well established that the child can imitate only what lies within the zone of his own intellectual potential. If I am not able to play chess, I will not be able to play a match even if a chess master shows me how. If I know arithmetic, but run into difficulty with the solution of a complex problem, a demonstration will immediately lead to my own resolution of the problem. On the other hand, if I do not know higher mathematics, a demonstration of the resolution of a differential equation will not move my own thought in that direction by a single step. To imitate, there must be some possibility of moving from what I can do to what I cannot.

This allows us to introduce an addendum to what we said earlier concerning collaborative work and imitation. We said that in collaboration the child can always do more than he can independently. We must add the stipulation that he cannot do infinitely more. What collaboration contributes to the child's performance is restricted to limits which are determined by the state of his development and his intellectual potential. In collaboration, the child turns out to be stronger and more able than in independent work. He advances in terms of the level of intellectual difficulties he is able face. However, there always exists a definite, strictly lawful distance that determines the differential between his performance in independent and collaborative work.

Our research demonstrates that the child does not solve all unresolved problems with the help of imitation. He advances only up to a certain limit, a limit which differs

for different children. As our example indicated, this ceiling may be very low for one child and significantly higher for another. If an individual could imitate anything irrespective of the state of his development, both these children would have solved all the problems with equal facility. Of course, this was not the case. In collaboration, the child solves problems that are proximal to his level of development with relative ease. Further on, however, the difficulty grows. Ultimately, problems become too difficult to resolve even in collaboration. The child's potential for moving from what he can do to what he can do only in collaboration is the most sensitive index of the dynamics of development and the degree of success that will come to characterize the child's mental activity.

Kohler encountered this problem in his well known experiments on the chimpanzee where he asked whether animals have the ability to imitate the intellectual actions of other animals. Kohler considered the question of whether the rational, goal-oriented operations of the apes are not simply resolutions of problems that they have learned through imitation, resolutions completely inaccessible to the animals themselves. His experiments demonstrated that an animal's imitative potential is strictly limited by his intellectual potential. In other words, the ape (i.e., the chimpanzee) can meaningfully carry out through imitation only what he can carry out independently. Imitation does not move the chimpanzee further along in the domain of intellectual operations. Of course, through training, the ape can learn to carry out much more complex operations than would have been accessible to its own mind. Here, however, the operation is carried out automatically and mechanically as a meaningless habit. It does not constitute a rational and meaningful solution of a problem. Comparative psychology has established several indices that allow us to distinguish intellectual, meaningful imitation from automatic copying. In the first case, the resolution of a problem is learned suddenly -- once and forever. It does not require repetition. The error curve falls steeply and suddenly from one hundred percent to zero. Every indication of an independent, intellectual solution is manifested. This solution is attained as a consequence of grasping the structure of the field, of grasping the relationships among objects. With training, however, learning proceeds by trial and error. The learning curve representing mistaken solutions falls slowly and steadily. Learning requires frequent repetition. The training process manifests no meaningfulness and no understanding of structural relations. It is realized blindly and without structure.

This fact is of fundamental significance for the psychology of instruction. It is significant that in none of the three theories of instruction that we have reviewed in this chapter is any fundamental distinction made between the instruction of animals and the instruction of people. The same explanatory principle is applied to training and instruction. Even on the basis of what we have said here, however, it is clear that there is a fundamental difference between these processes. Not even the most intelligent animal can develop his intellectual capacities through imitation or instruction. He cannot learn anything that is fundamentally new. He can learn only through training.

If we consider instruction in this specifically human sense, animals cannot be instructed.

In contrast, development based on collaboration and imitation is the source of all the specifically human characteristics of consciousness that develop in the child. Development based on instruction is a fundamental fact. Therefore, a central feature for the psychological study of instruction is the analysis of the child's potential to raise himself to a higher intellectual level of development through collaboration, to move from what he has to what he does not have through imitation. This is the significance of instruction for development. It is also is the content of the concept of the zone of proximal development. Understood in a broad sense, imitation is the source of in-

struction's influence on development. The child's instruction in speech, and school instruction generally, is largely a function of imitation. In school, the child receives instruction not in what he can do independently but in what he cannot yet do. He receives instruction in what is accessible to him in collaboration with, or under the guidance of, a teacher. This is a fundamental characteristic of instruction. Therefore, the zone of proximal development -- which determines the domain of transitions that are accessible to the child -- is a defining feature of the relationship between instruction and development.

What lies in the zone of proximal development at one stage is realized and moves to the level of actual development at a second. In other words, what the child is able to do in collaboration today he will be able to do independently tomorrow. Instruction and development seem to be related in the same way that the zone of proximal development and the level of actual development are related. The only instruction which is useful in childhood is that which moves ahead of development, that which leads it. However, it is only possible to teach a child when he is able to learn. Instruction is possible only where there is a potential for imitation. This means that instruction must be oriented to the lower threshold of the developmental cycle which has already occurred. Still, development depends not so much on matured as maturing functions, since it always begins with what has not yet matured in the child. The potentials for instruction are determined by the zone of proximal development. Returning to our example, we can say that the potentials for instruction will be different with these two children even though their mental ages are identical. Their potentials for instruction will be different because the zones of their proximal development are so different. As the research cited above has shown, any subject of school instruction always builds on a foundation that has not yet fully matured.

It could be argued that if written speech requires volition, abstraction, and other functions that have not yet matured in the school child, we need to delay instruction until these functions begin to mature. Practical experience demonstrates, however, that instruction in writing is among the most important subjects in the child's early school career and that it elicits the development of functions that have not yet matured. Thus, when we say that instruction should rely on the zone of proximal development rather than on mature functions, we are not prescribing anything new for the school. We are simply freeing ourselves from an old delusion that implies that development must complete its cycles for instruction to move forward. This perspective requires a fundamental change in the kinds of pedagogical conclusions that should be drawn from psychological research. Psychologists have focused on the question of whether a child is sufficiently mature for instruction in reading or arithmetic. Of course, this question retains its validity. It is important to determine the lower threshold of instruction. The issue is not exhausted by this question however. It is equally important to determine the upper threshold of instruction. Productive instruction can occur only within the limits of these two thresholds. Only between these thresholds do we find the optimal period for instruction in a given subject. *The teacher must orient his work not on yesterday's development in the child but on tomorrow's.* Only then will he be able to use instruction to bring out those processes of development that now lie in the zone of proximal development.

It is well known that when the complex system dominated school instruction it was said to be based on "pedagogical foundations." It was argued that this system corresponded to the characteristics of the child's thinking. The statement of the issue here was false in that it was based on the assumption that instruction must be oriented on yesterday's development, on the characteristics of the child's thinking that have already matured. The complex system led to the reinforcement of that which the child

must leave behind with his arrival at school. The orientation was towards the thinking that the child is able to do independently. No consideration was given to the child's potential to move from what he is able to do to what he is not. The state of development was evaluated in the tradition of the foolish gardener, the gardener who considers only the fruit that has ripened. No consideration was given to the fact that instruction must carry development forward. No consideration was given to the zone of proximal development. The orientation was toward the path of least resistance, toward the child's weakness rather than his strength.

It is important to recognize that the forms of thinking which correspond to the complex system are those of the child who comes to school with functions that matured during the preschool age. In introducing the complex system into the school, we are introducing a system of instruction compatible with the intellect of the preschooler. For the first four years of school instruction, we are reinforcing the weakest aspects of the preschooler's thinking. This system of instruction does not lead the child's development forward but rides its tail.

Having concluded this account of our research, we can now attempt to outline the perspective on the relationship between instruction and development that emerges from it.

We have seen that instruction and development do not coincide. They are two different processes with very complex interrelationships. *Instruction is only useful when it moves ahead of development.* When it does, it *impells or wakens a whole series of functions that are in a stage of maturation lying in the zone of proximal development.* This is the major role of instruction in development. This is what distinguishes the instruction of the child from the training of animals. This is also what distinguishes instruction of the child which is directed toward his full development from instruction in specialized, technical skills such as typing or riding a bicycle. The formal aspect of each school subject is that in which the influence of instruction on development is realized. Instruction would be completely unnecessary if it merely utilized what had already matured in the developmental process, if it were not itself a source of development.

Therefore, instruction is maximally productive only when it occurs at a certain point in the zone of proximal development. Many modern educators (i.e., Fortune, Montessori, and others) refer to this as a sensitive period. The eminent biologist, de Vries[72], used the phrase "sensitive period" to designate a period of ontogenetic development he identified in his studies. During these periods, he found that the organism is particularly sensitive to particular types of influences. At a critical point, the influence may elicit profound changes that have an impact on the whole of development. At another point in the developmental process, these same conditions may have no influence on development or they may even have an effect that is the opposite of what they would have had during the sensitive period. This concept of sensitive periods largely coincides with we have in mind when we speak of optimal periods for instruction. There are, however, two differences between these concepts: (1)We have attempted to determine the nature of these periods not only empirically but experimentally and theoretically and have found the explanation for sensitivity to a specific type of instruction in the concept of the zone of proximal development (this has provided us with the potential to identify these periods). (2) Montessori and others tend rely on a direct biological analogy between their concepts of sensitive periods; they tend to equate the sensitive periods identified by de Vries in his studies of the lower animals and those that we find in complex human developmental processes such as those involved in the development of written speech.

In contrast, our research demonstrates that these sensitive periods are associated with the social processes involved in the development of the higher mental functions. These mental functions are an aspect of the child's cultural development and have their source in collaboration and instruction. Montessori's findings are valid. She demonstrated, for example, that with instruction in writing involving children as young as four-and-a-half and five years of age we find a fruitful, rich, and spontaneous usage of written speech that is not found when instruction begins later. Montessori refers to the abundant, explosive display of written speech that is observed at this age as "explosive writing." This is the basis for her conclusion that this is an optimal or sensitive period for writing instruction.

We find similar situations with any subject of instruction that has a sensitive period. The critical question concerns the nature of these sensitive periods however. During a sensitive period, certain conditions -- particularly certain types of instruction -- can influence development. This is because the corresponding cycle of development is not yet complete. When this cycle of development is complete, these same conditions may have no significant effect on development. For a given period to be sensitive to specific conditions, the corresponding processes of development must not have been completed. This coincides with the empirical data found in our research.

When we observe the child's development and instruction in school, it becomes apparent that each subject demands more than the child is capable of, leading the child to carry out activities that force him to rise above himself. This is always the case with healthy school instruction. The child begins to learn to write when he does not yet have the mental functions that are required for written speech. It is for precisely this reason that instruction in written speech calls these functions to life and leads their development. This is true of all productive instruction. The incompetent child in a group of competent children will be delayed in his development and in the relative success of his mental activity. So will the competent child in a group of incompetent children. For one of these children the problem lies in the fact that instruction is too difficult -- for the other in the fact that it is too easy. These opposing conditions lead to the same result. In both cases, instruction occurs outside the zone of proximal development, below it in one case and above it in the other. It is as fruitless to teach the child what he is not able to learn as it is to teach him what he can already do independently.

We can identify characteristics of instruction and development that are unique to the school age, since instruction and development do not begin when the child comes to school. Instruction occurs on all levels of the child's development. As we shall see in the following section, however, instruction takes on forms that are specific to each age level. Further, at each of these levels, instruction has a unique relationship to development.

At this point, we will limit ourselves to a review of the general implications of what we have said. In our discussion of written speech and grammar, we have seen that there is a common foundation to the mental aspect of instruction in the basic school subjects. All the major mental functions that actively participate in school instruction are associated with the important new formations of this age, that is, with conscious awareness and volition. These are the features that distinguish all the higher mental functions that develop during this period. Thus, the school age is the optimal period for instruction. It is a sensitive period for those subjects that depend on conscious awareness or volition in the mental functions. Consequently, instruction in these subjects provides the ideal conditions for the development of the higher mental functions which are in the zone of proximal development during this period. Instruction has a decisive influence on the course of development because these func-

tions have not yet matured at the beginning of the school age and because instruction organizes their further development and partially determines their fate.

It is important to stress, however, that the same can be said of the development of scientific concepts. The basic characteristic of their development is that they have their source in school instruction. Therefore, the general problem of instruction and development is fundamental to the analysis of the emergence and formation of scientific concepts.

5

We will begin with the analysis of a basic fact which has been established through the comparative study of the school child's scientific and everyday concepts. A natural first step in any attempt to clarify the unique characteristics of scientific concepts would be to compare them with the child's everyday concepts. In taking this approach, we take the path from the known to the unknown. The child's everyday concepts have been extensively studied. The desire to see how they compare with scientific concepts is natural. To do this, we need to construct what are structurally identical experimental tasks that can be based on either scientific or everyday concepts. As we anticipated, this type of research leads to the finding that these two kinds of concepts do not manifest identical levels of development. Depending on whether the operation is carried out on the basis of scientific or everyday concepts, the child will manifest different capacities to grasp relationships of causation and dependency or relationships of implication. Comparative analysis of scientific and everyday concepts within a single age group indicates that -- with an appropriate educational program -- the development of scientific concepts outstrips that of spontaneous concepts. In scientific concepts, we encounter higher levels of thinking than in everyday concepts. In a task involving the completion of a sentence cut off at the word "because" or "although," the rate of success for scientific concepts is consistently higher than it is in tasks based on everyday concepts (Figure 2).

This finding requires clarification. How do we explain the increased levels of successful task performance characteristic of problems based on scientific concepts?

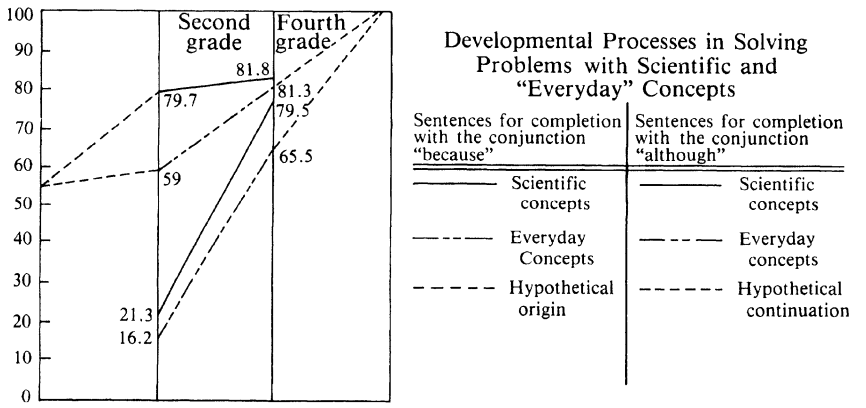

Figure 2. Curves of development for everyday and scientific concepts.

First, it might be argued that establishing causal dependencies in the domain of scientific concepts is easier for child because of his school knowledge; that is, it might be argued that his difficulty with similar problems based on everyday concepts is a function of inadequate knowledge. This explanation must be rejected immediately. Research methods excluded any potential for influence from this factor. Piaget had selected materials that excluded inadequacy of knowledge as a factor in the child's resolution of the problem. There is no question that the objects and relationships in Piaget's experiments (and in our own) are familiar to the child. The task with which the child is faced is that of completing phrases that are taken from his own everyday speech. The phrases in the experiments have simply been broken off in the middle and therefore require supplementation. Similar phrases, that are properly constructed, are encountered constantly in the child's spontaneous speech. The inadequacy of this explanation becomes particularly apparent when one considers that performance improves when scientific concepts are incorporated into the task. The child performs better on tasks based on scientific concepts (i.e., tasks that require the establishment of causal dependencies between facts and concepts from the social sciences) than on tasks that require the establishment of similar relationships between concepts and facts from his everyday experience. It seems unlikely that this is a function of the child's familiarity with the material involved, that he is less familiar with falling off a bicycle or the destruction of a ship than with class struggle, exploitation, or the Paris Commune. Clearly, the child has greater experience and knowledge of the objects and events represented by everyday concepts.

To explain this phenomenon, we must clarify the nature of the difficulty the child has in finishing a phrase such as that mentioned above. There is only one answer to this question. This task requires the child to do with conscious awareness and volition what he does spontaneously and without volition many times each day. The child uses the conjunction "because" correctly. If a child of eight or nine years saw a bicyclist fall in the street, he would never say that the bicyclist fell and broke his leg because they took him to the hospital. However, this is precisely the kind of thing that was said in the experiments. We have discussed the differences between volitional and nonvolitional modes of carrying out an operation. The child who uses the conjunction "because" irreproachably in his spontaneous speech may still lack conscious awareness of the concept. He uses this relationship in speech earlier than he acquires conscious awareness of it. The voluntary use of structures that he has mastered in appropriate situations of use is still inaccessible to him. The child lacks something that is critical for the correct resolution of these problems; he lacks conscious awareness and volition in the use of his concepts.

We must now ask what kinds of operations the problems which include materials that were taken from the social sciences demand from the child. Here, the child tends to complete the phases in the following way: "In the USSR it is possible to have a planned economy because there is no private property; all the land, factories, and power stations are in the hands of the workers and peasants." Assuming this question has been addressed in the educational program, the child knows the appropriate causal relationship. Of course, he also knows why the ship sinks and why the bicyclist falls. What is it that he does when he answers this question taken from the social sciences?

We think that the operation that the school child carries out in solving this problem can be explained in the following way. First, the operation has a history. It was not constructed during the experiment. The experiment can be seen as a final stage in a long process that can only be understood in connection with those that precede it. The teacher, working with the school child on a given question, explains, informs, in-

quires, corrects, and forces the child himself to explain. All this work on concepts, the entire process of their formation, is worked out by the child in collaboration with the adult in instruction. Now, when the child solves a problem, what does it requires of him? It requires the ability to imitate and solve the problem with the help of teacher even though we do not have an actual situation of collaboration at this moment. The situation lies in the past. Here, the child must make independent use of the results of that earlier collaboration.

The fundamental difference between the problem which involves everyday concepts and that which involves scientific concepts is that the child solves the latter with the teachers help. When we say that the child acts on the basis of imitation, we do not mean that he looks another person in the eye and imitates him. If today I see something and tomorrow do it, I do it on the basis of imitation. When the school child solves a problem at home on the basis of a model that he has been shown in class, he continues to act in collaboration, though at the moment the teacher is not standing near him. From a psychological perspective, the solution of the second problem is similar to this solution of a problem at home. It is a solution accomplished with the teacher's help. This help -- this aspect of collaboration -- is invisibly present. It is contained in what looks from the outside like the child's independent solution of the problem.

We find, then, that two fundamentally different operations are demanded of the child in his performance on these problems. In a problem involving everyday concepts he must do with volition something that he does with ease spontaneously. In a problem involving scientific concepts, he must be able to do in collaboration with the teacher something that he has never done spontaneously. This is the only explanation of the differences in the performance levels on these two types of problems. We know that the child can do more in collaboration than he can independently. If it is true that the solution of social science problems is a covert form of collaboration, it becomes apparent why successful performance on these problems outstrips performance on problems that are based on everyday concepts.

We can now discuss a second important finding: The problems involving the conjunction "although" produce an entirely different pattern of performance in children in this same school grade. Here, the curves representing the successful resolution of problems based on scientific concepts and everyday concepts merge. This can be explained by the fact that the category of adversative relationships matures later in the child's spontaneous thinking than that of causal relationships. Spontaneous concepts in this domain have not yet matured enough for scientific concepts to rise above them. As we have noted, one can gain conscious awareness only of what one has; one can subordinate only those functions that are active. Since at this age the child has worked out the spontaneous application of the concept "because," he can become consciously aware of it and use it voluntarily in collaboration. However, if he has not mastered the relationships expressed by the conjunction "although" in his spontaneous thinking, he cannot gain conscious awareness of it in his scientific thinking. He cannot gain conscious awareness of what he does not have. He cannot master functions that are absent. In this situation, the curve representing successful solution of problems based on scientific concepts will be as low as that representing everyday concepts.

A third important finding is that the curve representing correct performance on tasks involving everyday concepts rises rapidly and eventually approaches the level representing problems based on scientific concepts. Ultimately, the two curves merge. Everyday concepts overtake scientific concepts, attaining the same level of development. The possibility that the mastery of scientific concepts influences this development in the child's spontaneous concepts is obvious. Everyday concepts are restruc-

tured under the influence of the child's mastery of scientific concepts. This becomes more convincing when we realize that the process involved in the formation and development of concepts must be structural in nature. This means that when the child masters the structure that is associated with conscious awareness and mastery in one domain of concepts, his efforts will not have to be carried out anew with each of the spontaneous concepts that were formed prior to the development of this structure. Rather, in accordance with basic structural laws, the structure is transferred to the concepts which developed earlier.

This assertion is supported by a fourth research finding: The relationship between everyday and scientific concepts with which we are familiar from our data on causal relationships is found in the category of adversative relationships with fourth grade children. There is a sharp difference between the curves representing successful performance on the two types of problems. Performance levels on problems based on scientific concepts again outstrip those associated with everyday concepts. Somewhat later, we again find rapid improvement in the level of performance on problems based on everyday concepts. This level quickly approaches that characteristic of performance associated with scientific concepts. Again, the two curves ultimately fuse. Thus, performance levels on tasks based on scientific and everyday concepts manifest the same regularities and relationships when the operations involve the conjunction "although" as they did when the operations involved the conjunction "because." There is, however, a two year delay. This supports our contention that these regularities -- though based on the description of particular concepts -- are general laws. They are not dependent on the year in which they occur or the type of operations with which they are connected.

These findings seem to allow us to clarify the most important aspects of a question of great interest to us, namely, the question of the relationship between scientific and everyday concepts in the first moments of the development of a given system of knowledge. They allow us to clarify the key point in the development of the various kinds of concepts with a certain degree of certainty. Relying on what we know about the natures of these kinds of concepts, we can hypothetically represent the curve of development of spontaneous and nonspontaneous concepts by moving from this key point.

These findings lead to the conclusion that *the development of scientific and spontaneous concepts take opposite paths.* We can now answer the question we raised earlier concerning how concepts such as "brother" and "exploitation" develop by saying that they develop in reverse directions.

This is a key point of our hypothesis.

The child gains conscious awareness of spontaneous concepts at a comparatively late point in the developmental process. His abilities for the verbal formulation and definition of concepts and his volitional use of the concept in establishing complex logical relationships with other concepts are not present in the initial stages of the developmental process. The child knows things. He has a concept of the object. What the concept itself represents remains vague for the child however. He has a concept of the object and is consciously aware of the object that is represented in the concept. He is not, however, consciously aware of the concept itself. He does not have conscious awareness of the act of thought that allows him to represent the object. In contrast, the development of scientific concepts begins with that which remains most underdeveloped in the spontaneous concept over the whole of the school age. It begins with work on the concept itself. It begins with work on the concept's verbal definition, with operations that presuppose the nonspontaneous application of this concept.

Scientific concepts begin their life at a level that the development of the child's spontaneous concepts has not yet reached. Work on the new scientific concept in instruction requires the very operations and relationships that are impossible for the child of this age. (Piaget has shown that even a concept such as "brother" manifests this limitation up to the age of eleven or twelve years).

The strengths and the weaknesses of everyday and scientific concepts differ. The strength of the school child's concept of "brother" is that it has undergone a long path of development and that his concept exhausts the greater part of the empirical content of the concept. This is precisely the weakness of his scientific concept. The strength of the scientific concept (i.e., concepts such as "Archimedes' law" or "exploitation") also turns out to be the weakest aspect of the everyday concept. The child has outstanding knowledge of what a brother is and this knowledge is saturated with experience. However, when he must solve an abstract problem such as those we find in Piaget's experiments (e.g., the problem about "the brother of a brother"), the child becomes confused. He is powerless to operate with this concept in a nonconcrete situation. This was demonstrated clearly in Piaget's work.

When the child learns a scientific concept, he quickly begins to master the operations that are the fundamental weakness of the everyday concept. He easily defines the concept, applies it in various logical operations, and identifies its relationships to other concepts. We find the weakness of the scientific concept where we find the strength of the everyday concept, that is, in its spontaneous usage, in its application to various concrete situations, in the relative richness of its empirical content, and in its connections with personal experience. Analysis of the child's spontaneous concept indicates that he has more conscious awareness of the object than of the concept itself. Analysis of his scientific concept indicates that he has more conscious awareness of the concept than of the object that is represented by it. Therefore, the threat to satisfactory concept development differs fundamentally for scientific and everyday concepts.

Examples can easily be found that support this assertion. In answer to the question of what a revolution is, third grade students who had just covered the period from 1905 to 1917 answered that: "Revolution is where the oppressed class wages war with the oppressing class." It is called a civil war. The citizens of a single country wage war against each other." The development of the child's consciousness is reflected in these answers. We find class criteria in them. However, the depth and fullness of the student's *conscious awareness* of this material is qualitatively different than that of adults.

This assertion can be clarified by the following example:

[Student] "Serfs were peasants who were the property of the landowners."
[Adult] "What was the life of the landowners like under serfdom?"
[Student] "Very good. They were all rich. They had ten story houses, many rooms, and were all well-dressed. They had electricity."

Here we can see the child's unique though simplified understanding of serfdom. It is more a representation or image than a scientific concept in the true sense of the word. The situation is completely different with a concept such as "brother." The child's incapacity to rise above the situational meaning of this word, his inability to approach the concept "brother" as an abstract concept, and his incapacity to avoid logical contradictions while operating with it, are the dangers present in the development of everyday concepts.

The developmental paths taken by the child's spontaneous and scientific concepts can be schematically represented as two lines moving in opposite directions. One

moves from above to below while the other rises from below to above. If we designate the earlier developing, simpler, and more elementary characteristics as lower and the later developing, more complex characteristics (those connected with conscious awareness and volition) as higher, we can say that *the child's spontaneous concepts develop from below to above, from the more elementary and lower characteristics to the higher, while his scientific concepts develop from above to below, from the more complex and higher characteristics to the more elementary.* This difference in the development of scientific and everyday concepts is closely associated with their different relationships to the object, an issue we discussed earlier.

The birth of the spontaneous concept is usually associated with the child's immediate encounter with things, things that are often explained by adults but are nonetheless real things. Only through a long developmental process does the child attain conscious awareness of the object, of the concept itself, and the capacity to operate abstractly with the concept. In contrast, the birth of the scientific concept begins not with an immediate encounter with things but with a mediated relationship to the object. With the spontaneous concept, the child moves from the thing to the concept. With the scientific concept, he is forced to follow the opposite path -- from the concept to the thing. It is no surprise, then, that the strength of one type of concept is the weakness of the other. In his earliest school lessons, the child learns to establish logical relationships between concepts. The movement of this concept, is inward. It clears a path to the object and connects itself to the child's experience, absorbing it. Both types of concepts are located in one and the same child and at more or less the same level of development. In the thinking of the child, one cannot separate the concepts that he acquires in school from those that he acquires at home. Nonetheless, these concepts have entirely different histories. One concept reaches the level it has attained while having undergone a certain portion of its development from above. The other reaches this level having completed the lower portion of its developmental path.

Thus, while scientific and everyday concepts move in opposite directions in development, *these processes are internally and profoundly connected with one another.* The development of everyday concepts must reach a certain level for the child to learn scientific concepts and gain conscious awareness of them. The child must reach a threshold in the development of spontaneous concepts, a threshold beyond which conscious awareness becomes possible.

The child's concepts of history, for example, begin their development only when his everyday concept of the past is sufficiently differentiated, only when his life and the life of those near to him are placed in the framework of an initial abstraction of the "before and now" in his consciousness.

However, as is indicated by the experiments discussed above, everyday concepts are also dependent on scientific concepts. The scientific concept has undergone that part of development which still faces the everyday concept. It is with the scientific concept that a series of operations that are beyond the child when he is operating with concepts such as "brother" begin to emerge. This cannot remain without significance for the portion of the developmental path that remains for the everyday concept. Having already traveled the long path of development from below to above, everyday concepts have blazed the trail for the continued downward growth of scientific concepts; they have created the structures required for the emergence of the lower or more elementary characteristics of the scientific concept. In the same way, having covered a certain portion of the path from above to below, scientific concepts have blazed the trail for the development of everyday concepts. They have prepared the structural formations necessary for the mastery of the higher characteristics of the everyday concept.

The scientific concept grows downward through the everyday concept and the everyday concept moves upward through the scientific. In this assertion, we are only stating our experimental findings in more general terms. Let us review these findings. The everyday concept must reach a certain level of spontaneous development for the superior scientific concept to emerge. As we have seen, this potential is present for the concept "because" by the second grade while for the concept "although" it only emerges in the fourth grade. Everyday concepts, however, move quickly along the upper section of the path which was blazed by scientific concepts. In this process, they are restructured in accordance with the structures prepared by the scientific concept. This is reflected in the sharp upward movement in the curve representing everyday concepts to the level of that representing scientific concepts.

We can now state our findings in more general terms. *The strength of the scientific concept lies in the higher characteristics of concepts, in conscious awareness and volition.* In contrast, this is the weakness of the child's everyday concept. The strength of the everyday concept lies in spontaneous, situationally meaningful, concrete applications, that is, in the sphere of experience and the empirical. The development of scientific concepts begins in the domain of conscious awareness and volition. It grows downward into the domain of the concrete, into the domain of personal experience. In contrast, the development of spontaneous concepts begins in the domain of the concrete and empirical. It moves toward the higher characteristics of concepts, toward conscious awareness and volition. The link between these two lines of development reflects their true nature. This is *the link of the zone of proximal and actual development.*

It is indisputable that conscious awareness and the volitional use of concepts (i.e., the characteristics of the school child's spontaneous concepts that remain underdeveloped) lie entirely within the school child's zone of proximal development. They emerge or become actual in his collaboration with adults. This is why the development of scientific concepts presupposes a certain level in the development in spontaneous concepts, in connection with which conscious awareness and volition emerge in the zone of proximal development. Scientific concepts restructure and raise spontaneous concepts to a higher level, forming their zone of proximal development. What the child is able to do in collaboration today, he will be able to do independently tomorrow.

Thus, the development of scientific concepts does not coincide with that of spontaneous concepts. Precisely because of this, there exist extremely complex relationships between them. If scientific concepts simply repeated the developmental history of spontaneous concepts, these relationships would not be possible. The links between the two processes and the tremendous influence they have on one another is possible because their development takes such different paths.

If the development of scientific concepts repeated that of spontaneous concepts, the acquisition of a system of scientific concepts would contribute only an increase or broadening of the circle of concepts, only an enrichment of the child's vocabulary. However, our theory and research indicate that scientific concepts provide a segment of development which the child has not yet passed through; they indicate that the scientific concept moves ahead into a zone where the corresponding potentials have not yet matured in the child. This allows us to begin to understand that instruction in scientific concepts plays a decisive role in the child's mental development.

Before we discuss the influence of scientific concepts on the child's general mental development, we will reconsider the analogy between this process and that of learning a foreign language. As this analogy indicates, the developmental path we have outlined for scientific concepts is only a single instantiation of a much broader group of developmental processes that have their source in systematic instruction.

The child learns a foreign language in school differently than he learns his native language. He does not begin learning his native language with the study of the alphabet, with reading and writing, with the conscious and intentional construction of phrases, with the definition of words, or with the study of grammar. Generally, however, this is all characteristic of the child's first steps in learning a foreign language. The child learns his native language without conscious awareness or intention; he learns a foreign language with conscious awareness and intention. The development of the native language moves from below to above; the development of the foreign language moves from above to below. With the native language, the lower, more elementary characteristics of speech arise first. Its more complex forms develop later in connection with conscious awareness of its phonetic structure, its grammatical forms, and its volitional use. With a foreign language, it is the higher, more complex characteristics of speech that develop first, those that are associated with conscious awareness and intention. The more elementary characteristics of speech, those associated with the spontaneous and free use of speech, development later.

Thus, intellectualistic theories of speech development such as Stern's, theories which assume that the development of speech begins with the mastery of language principles or the relationship between sign and meaning, apply only to the learning of foreign languages. Further, *the strength of the child's foreign language is the weakness of his native language*. Moreover, where the native language is strong, the foreign language is weak. The child's use of the grammatical forms of his native language is impeccable. He does not, however, have conscious awareness of his use of these forms. He declines and conjugates but is not consciously aware that he does this. He is generally not able to determine the gender, case, or grammatical form that he applies correctly in a given phrase. In the foreign language, however, the child is able to distinguish words of masculine and feminine genders. From the outset, he has conscious awareness of the proper declinations and grammatical modifications.

The same is true of phonetics. The child's use of the auditory aspect of his native language is beyond reproach, but he does not consider the kinds of sounds he is pronouncing. As a consequence, it is extremely difficult for him to sound out the word, to partition it into its component sounds. With the foreign language, however, he does this with ease. In his native language, his written speech lags significantly behind his verbal speech. In the foreign language, however, this is generally not the case. Indeed, the child's written language is often more advanced than his verbal language. Once again, the weaker aspects of the native language are the stronger aspects of the foreign and vice versa. The spontaneous use of phonetics (what is called pronunciation) is a extremely difficult for the school child who is learning a foreign language. Free, lively, spontaneous speech characterized by the rapid and correct application of grammatical structures is attained only with extreme difficulty and only near the end of the developmental process. The development of the native language begins with the free and spontaneous use of speech and ends with conscious awareness and mastery of the speech forms. In contrast, the development of the foreign language begins with conscious awareness and volitional mastery of language and culminates in free, spontaneous speech. The two developmental processes move in opposite directions.

As is true of the development of scientific and spontaneous concepts, however, there is *a mutual dependence* between these two paths of development. The conscious and intentional learning of a foreign language is obviously dependent on a certain level of development in the native language. The child already possesses a system of meanings in the native language when he begins to learn a foreign language. This system of meanings is transferred to the foreign language. Once again, however, the process of learning a foreign language clears the path for the acquisition of higher forms

of the native language. Learning a foreign language allows the child to understand his native language as a single instantiation of a linguistic system. As a consequence, *the child acquires a potential for generalizing the phenomena of his native language* and for gaining conscious awareness of his speech operations and mastering them. In the same sense that algebra represents the generalization, conscious awareness, and mastery of arithmetic operations, the development of a foreign language represents an abstraction of linguistic phenomena and the conscious awareness of speech operations. It represents the translation of speech operations to the higher plane of conscious awareness and volitional speech. This is what Goethe meant when he said that he who does not know at least one other language does not fully know his own.

Our discussion of this analogy was motivated by three considerations. First, this discussion has helped us clarify and support the notion that the dynamics of the development of what seem to be identical structures at different ages and under different conditions may -- indeed must -- differ radically in functional-psychological terms. In essence, there are only two possibilities for explaining the relationship between the development of verbal and written speech, between native and foreign languages, between the logic of action and the logic of thought, and between graphic logic and the logic of verbal thinking. These two possibilities are mutually exclusive. The first type of explanation relies on *the law of displacement*. Here it is assumed that processes of development that have occurred at earlier stages are repeated or reproduced with the development of more advanced functions; the basic difficulties encountered in earlier processes of development are manifested once again at the higher level. This approach has been applied frequently by psychologists in resolving the problems mentioned above. Recently, Piaget has renovated this approach and used it as his ace in the hole. The second type of explanation provides the basis for our hypothesis of *the zone of proximal development*. This form of explanation is based on the notion that analogous systems in higher and lower domains develop in contrasting directions. This is the law of interconnections between higher and lower systems in development. This law was discovered, and has been supported, through our studies of the development of spontaneous and scientific concepts, native and foreign languages, and verbal and written speech. Later, we will attempt to apply it to Piaget's analysis of the development of graphic logic and the logic of verbal thinking as well as to his theory of verbal syncretism.

On this level, our experiment on the development of scientific and spontaneous concepts is an "experimentum crucis" in the full sense of the phrase. It permits a final resolution of the dispute between these two mutually exclusive explanations. Two things must be demonstrated. First, we must *show that the learning of a scientific concept differs from the learning of a everyday concept in much the same way that foreign language learning in school differs from learning a native language*. Second, we must *show that relationship between the development of the two types of concepts are much the same as the relationships between the processes of foreign and native language development*. It also important for us to show that scientific concepts are as inadequate in some contexts as everyday concepts are in scientific contexts, and that this pattern corresponds with the fact that the strengths and weaknesses of native and foreign languages are manifested in different contexts.

The second reason we have used this analogy is that there is more than an accidental correspondence between these two developmental processes. Their similarity is not merely a formal one. These two processes have a profound internal kinship which kinship explains the remarkable correspondence between the dynamics of their development. If we focus on the mental nature of the development of these two processes, we find that they represent the development of two aspects of a single process, the de-

velopment of two aspects of the process of verbal thinking. In foreign language learning, the external, sound, and phasal aspects of verbal thinking are the most prominent. In the development of scientific concepts, the semantic aspects of this process come to the fore. To a limited extent, learning a foreign language also requires mastering the semantic aspect of foreign speech, just as the development of scientific concepts requires the mastery of the scientific language (i.e., the mastery of scientific symbolism). This is particularly important in learning terminology and symbolic systems, as in arithmetic for example. The analogy we have developed should have led us to expect this from the outset. However, the development of these two aspects of speech, the phasal and the semantic, do not simply parallel one another; each process has its unique dynamics. Like any analogy, ours has its limits. The learning of the foreign and native language have certain similarities to the development of scientific and everyday concepts, but the two sets of processes also differ profoundly in many respects.

This leads directly to the third consideration that brought us to explore this analogy. As is known, the learning of a foreign language in school presupposes a developed system of meanings in the native language. In learning the foreign language, the child does not develop the semantic aspect of speech anew. He does not form new word meanings or learn new concepts of objects. He learns new words which correspond point for point with the system of concepts that he has already acquired. As a consequence, an entirely *new* relationship of word to object emerges, a relationship which is different from that which we find in the native language. When the child learns the foreign word, it is not related to the object in a direct or immediate way. This relationship is mediated by the words of the native language. Our analogy remains in force here because this occurs in the development of scientific concepts as well. The scientific concept is not related to its object directly. Once again, this relationship is *mediated* by existing concepts.

We can extend this analogy further. The mediating role played by the words of the native language in establishing the relationship between the foreign word and the object results in *significant developments in the semantic aspect* of the native language. Because it can now be expressed in two different words from different languages, the meaning of the word or concept is torn from its immediate connection with the phonological form of the word in the native language. Word meaning is thus differentiated from the sound aspect of speech and acquires a degree of independence. As a consequence, the child gains conscious awareness of the meaning as such. The mediation of the relationship between the scientific concept and the object by the everyday concept has similar results. As we will see in more detail later, *the everyday concept acquires a whole series of new relationships with other concepts as it comes to stand between the scientific concept and its object.* Its relationship with the object is also transformed in this process.

Problems arise, however, if we attempt to extend this analogy further. In learning a foreign language, a system of developed meanings is given from the outset in the native language. This existing system is a prerequisite for the development of the new system. In the development of scientific concepts, on the other hand, *the system emerges only with the development of the scientific concept and it is this new system that transforms the child's everyday concepts.* This difference is more critical than the kinship between these processes because it identifies what distinguishes the development of scientific concepts from the development of other new forms of speech such as foreign languages or writing. This system which emerges with the scientific concept is fundamental to the entire history of the development of the child's real concepts. It is

a chapter of that history that is inaccessible to research based on the analysis of artificially or experimentally formed concepts.

6

We turn now to the central problem of our research, the problem of system.

There is no question that any concept is a generalization. Up to this point, however, we have been dealing with separate, isolated concepts. We must now ask *what kinds of relations there are between concepts*. How is the individual concept -- this stitch that we tear away from a living integral fabric -- intertwined and interwoven with the system of concepts present in the child? Only within such a system can the concept arise, live, and develop. The concept does not emerge in the child's mind like a pea in a sack. Concepts do not lie alongside one another or on top of one another with no connections or relationships. If this were the case, thought operations requiring the co-relation of concepts would be impossible, as would the child's world view and the entire complex life of his thought. Moreover, without well-defined relationships to other concepts, the concept's existence would be impossible. In contrast to what is taught by formal logic, the essence of the concept or generalization lies not in the impoverishment but in the enrichment of the reality that it represents, in the enrichment of what is given in immediate sensual perception and contemplation. However, this enrichment of the immediate perception of reality by generalization can only occur if complex connections, dependencies, and relationships are established between the objects that are represented in concepts and the rest of reality. By its very nature, each concept presupposes the presence of a certain system of concepts. Outside such a system, it cannot exist.

The study of concept systems at each stage of childhood shows that relationships of generality (i.e., differences and relationships of generality: for example, plant, flower, and rose) are the most basic, natural, and common type of relationship among meanings or concepts. It is in this relationship that the nature of the concept is most clearly reflected. Each concept is a generalization. Therefore, the relationships between concepts are *relationships of generality*. The study of these relationships has long been among the central problems of logic and the logical aspect of this issue has been adequately developed. The genetic and psychological problems associated with it have not been adequately developed however. It is generally the logical relationship of the general to the particular that has been studied. What needs to be studied is the genetic and psychological relationships among these types of concepts. This opens up the grandest and most complete problem of our research.

In the development of concepts, the child does not follow the logical path from the more specific to the more general. The child learns the word "flower" earlier than he learns the word "rose"; he learns the more general before the more specific. What are the laws that govern this movement of concepts from the general to the specific and from the specific to the general? What laws govern this movement which occurs as concepts develop and function in the child's actual living thought? Until recently, this question has remained unanswered. In our research on the child's actual concepts, we have attempted to identify the most basic laws in this domain.

First of all, we were able to show that *generality* (i.e., the difference of generality) *does not coincide with the levels of structural generalization* that we identified in our experimental studies of concept formation (i.e., the levels associated with syncretic concepts, complexes, preconcepts, and true concepts).

First, concepts of different levels of generality are possible within any given structure of generalization. For example, concepts with different levels of generality (e.g., "flower" and "rose") may be present at the stage of complexes. It must be stipulated, of course, that each relationship of generality such as "flower-rose" will have a different nature for each structure of generalization (for the structures characteristic of complexes and preconcepts for example).

Second, concepts with the same level of generality may be present within different structures of generalization. For example, the concept of "flower" may have a general meaning that allows it to represent all species of flowers whether the structure is that of complexes or concepts. Of course, we must stipulate again that the identity of this generality is only a logical or object identity, not a psychological one. The relationship of generality that links "flower" and "rose" will differ depending on whether the structure is that characteristic of complexes or concepts. This relationship will be more concrete for the two year old. Here, it is as though the more general concept stands alongside the more specific and acts as a substitute for it. For the eight year old, one concept stands over the other; the more general concept includes the more specific.

Thus, there is no direct correspondence between relationships of generality and the structure of generalization. The two are not entirely foreign to each other nor entirely unconnected with one another. There is a complex mutual dependency between them. This dependency becomes accessible to research only when we recognize the absence of any direct correspondence between them, since no such relationship would be impossible if such a correspondence existed. Concepts that are identical with respect to generality may exist in different structures of generalization. Similarly, concepts that differ in their generality may exist within a single structure of generalization. Nonetheless, for each structure of generalization, there will be different relationships of generality. This will be the case both when the concepts appear to be identical in logical terms and when they appear to be different.

The basic finding of our research is that relationships of generality between concepts are closely associated with the structure of generalization (i.e., they are closely associated with the stages of concept development that we studied in our experimental research). *Each structure of generalization (i.e., syncretic, complexes, preconcepts, and concepts) corresponds with a specific system of generality and specific types of relationships of generality between general and specific concepts.* Each structure of generalization has a characteristic degree of unity, a characteristic degree of abstractness or concreteness, and characteristic thought operations associated with a given level of development of word meaning.

An example may help clarify this point. In our experiments, a child who rarely spoke learned the meanings of five words (i.e., chair, table, cabinet, couch, bookcase) with no particular difficulty. He clearly would have been able to extend the series. However, he could not learn the word "furniture." Though the child could easily learn any word from the series of subordinate concepts, this more general word was impossible for him. Learning the word "furniture" represented something more than the addition of a sixth word to the five that the child had already mastered. It represented the mastery of the relationship of generality. The mastery of the word "furniture" represented the mastery of the child's first higher concept, a concept that would include a series of more specific subordinate concepts. This meant that the child would have to master a new type of relationship between concepts, a vertical rather than horizontal relationship.

This child was able to learn a new series of words (i.e., shirt, cap, fur coat, boots, and pants) but not to go beyond this by learning the word "clothes." *At a certain stage in the development of word meaning in the child, this kind of vertical movement involving*

these kinds of relationships of generality between concepts is generally inaccessible to the child. Concepts lie in a single series that lacks hierarchical relationships. The relationship of these concepts to the object is immediate. They are differentiated entirely in terms of their image. The objects represented in them are differentiated in much the same way. This can be seen in the child's autonomous speech, a transitional stage of speech development between the child's preintellectual babbling and the mastery of adult language.

With a concept system which has a structure where the only relationships possible are those that exist between the objects that are reflected in the concepts, the child's verbal thinking will clearly be governed by the logic of graphic thinking. Since the only possible relationships between these concepts are object relationships, it would be more accurate to say that no verbal thinking is possible. At this stage, verbal thinking is dependent on graphic object thinking. This clearly identifiable structure of the concept system, and the limitations of the thought operations associated with it, allows us to isolate this as a special, pre-syncretic stage in the development of word meaning. This is why the appearance of the first higher concept (e.g., a concept such as "furniture" or "clothes" that subordinates a series of existing words) is such an important symptom of the development of the meaningful aspect of the child's speech. It is no less important in this respect than the appearance of the first meaningful word. With subsequent stages of concept development, relationships of generality begin to be formed. With each level of development, we find a unique system of relationships.

This is a general law. It provides the key to studying the genetic and psychological relationships between the general and the specific in the child's concepts. For each stage of generalization, there is a corresponding system of relationships and generality. General and specific concepts are ordered in a genetic series in correspondence with this system. Thus, in concept development, the movement from the general to the specific or from the specific to the general is different for each stage in the development of meaning depending on the structure of generalization dominant at that stage. With the transition from one stage to another, there is a change in the system of generality and the genetic order of the development of higher and lower concepts.

With the higher stages in the development of word meaning -- the higher stages in the development of relationships of generality -- a phenomenon of fundamental significance for all our thinking emerges. This phenomenon is defined by the law of concept equivalence. The law of concept equivalence says that *any concept can be represented through other concepts in an infinite number of ways.* This law requires some explanation.

Imagine that all concepts are distributed at certain longitudes like the points of the earth's surface between the North and South Poles. Concepts are distributed between poles ranging from an immediate, sensual, graphic grasping of the object to the ultimate generalization (i.e., the most abstract concept). The *longitude of a concept* designates the place it occupies between the poles of extremely graphic and extremely abstract thought about an object. Concepts would then be differentiated in longitudinal terms depending on the degree to which the unity of concrete and abstract is represented in each concept. Imagine further that the globe symbolizes for us all reality which is represented in concepts. We can then use *the concept's latitude* to designate the place it occupies among other concepts of the same longitude -- concepts that correspond to other points of reality -- just as the geographical latitude designates a point on the earth's surface in the degrees of the earth's parallels.

The concept's longitude represents the nature of the act of thought itself; it represents the way that the object is grasped in the concept in terms of the way that the concrete and the abstract are united in it. The concept's latitude represents its relation-

ship to the object, the link between the concept and a particular point in reality. Together, its longitude and latitude represent both the act of thought and the object with which it is associated, that is, they represent the nature of the concept itself. Thus, they include all the relationships of generality in the domain of a given concept. They include relationships along the horizontal and along the vertical, that is, relationships to subordinated concepts and to higher and lower concepts in correspondence with a particular stage of generality. We will refer to the concept's place in the system of concepts, as defined by its longitude and latitude, as its *measure of generality*.

The use of this metaphor requires one stipulation if a fundamental misunderstanding is to be avoided. In geography, the relationships between longitude and latitude are lineal. Two lines cross at only a single point, with the meridian and parallel determining their position. This language of lineal relationships is not adequate to express the more complex relationships characteristic of the concept system. The content of the concept that is higher in its longitude is also broader. It incorporates a whole section of the lines of latitude of its subordinate concepts which require a whole series of points to designate it.

The measure of generality is the foundation for the relationship of the concept to all other concepts. It determines the potential for transitions from one concept to another and permits the establishment of an infinite number of relationships between them. This is the foundation of concept equivalence.

To clarify this idea, we will consider two extreme cases. On the one hand, we have the child's autonomous speech. Here relationships of generality among concepts are impossible. On the other, we have the developed scientific concept -- the concept of number as it develops through arithmetic instruction for example. In the first case, concept equivalence is not possible. The concept cannot be expressed through other concepts. It can be expressed only by itself. The concept of any number in any system of calculation, on the other hand, can be expressed in an infinite number of ways. This reflects both the infinite nature of the number series itself and the fact that all of a number's possible relationships to other numbers are given in its concept. Thus, the number one can be expressed as 1,000,000 minus 999,999 or, more generally, as the difference between any two adjacent numbers. It can also be expressed as any number divided by itself or in an infinite number of other ways. This is a pure example of the law of concept equivalence.

In the child's autonomous speech, the concept does not have equivalents. This is because it does not have relationships of generality with other concepts. There are no relationships of longitude and latitude among them. There are no differing measures of generality which allow movement from one concept to another.

The law of equivalence is unique for each stage in the development of generalization. Concept equivalence is directly dependent on the relationships of generality between concepts and, as we have seen, the later are different for each structure of generalization. *Each structure of generalization, then, determines the potential for concept equivalence within its domain.*

The measure of generality determines the way that any concept functions. As phenomenological research shows, this is also true of the experience of concepts. When we name a particular concept (e.g., "mammal"), the networks of latitude and longitude place us at a specific point. In our thought, we have, in effect, occupied a definite position. We have received an initial point of orientation and we experience a readiness to move in any direction from this point. Any concept arising in isolation in consciousness forms a group of predispositions toward particular movements of thought. Therefore, a concept is represented in consciousness as a figure against the ground that is provided by the relationships of generality that correspond to it. From

this ground, we select the required path for the movement of thought. In functional terms, then, the measure of generality *determines the set of possible operations of thought available for a given concept.* As is shown by research on children's concept definitions, these definitions are the direct expression of the laws of concept equivalence governing a given stage of the development of word meaning. In precisely the same way, any operation (i.e., any attempt to compare or establish identity or difference between two thoughts), judgment, or deduction presupposes a definite structural movement along the network of lines of longitudinal and relationships of latitude between concepts.

Where there is a pathological disintegration of concepts, there is a disturbance in the measure of generality and a disintegration of the unity of abstract and concrete in word meaning. Concepts lose their measure of generality and their relationship to other concepts (i.e., those that are higher, lower, and within their own series). The movement of thought begins to occur in a broken, incorrect, and inconsistent line. Thought becomes alogical and unrealistic to the extent that neither the act through which the concept grasps the object nor the relationship of the concept to the object any longer form a unity.

As the relationships of generality change with each new structure of generalization in the process of development, they elicit changes in all the operations of thinking accessible to the child. In particular, the long established independence of the word from the remembered thought increases with the development of relationships of generality and concept equivalence. The young child is completely reliant on the literal expression of the meaning that he learns. To a great extent, the school child already reproduces complex meaningful content independently of the particular verbal expression where he learned it. As relationships of generality develop, there is an increase in the concept's independence from the word. Meaning becomes increasingly independent of the form in which it is expressed. In general terms, there is an increasing freedom of the operations of meaning from their verbal expression.

We have long searched for a reliable way to identify the structures of generalization that characterize the meanings of the child's actual words, for a bridge that would allow us to move from the study of experimental concepts to the analysis of actual concepts. By establishing this connection *between the structure of generalization and relationships of generality*, we have found the key to this critical problem. By studying a concept's relationships of generality, by studying its measure of generality, we obtain the most reliable index of the structure of generalization of actual concepts. There is a meaning which stands in definite relationships of generality with other meanings. It has a specific measure of generality. The nature of the concept (i.e., whether it is syncretic, complexive, or preconceptual) is most fully revealed in the concept's relationships to other concepts. By studying the child's actual concepts (i.e., concepts such as "bourgeois," "capitalist," "landowner," or "kulak"), we can establish the specific relationships of generality that govern each stage of development from syncretic concepts to true concepts. This not only allows us to rebuild the bridge between the study of experimental and actual concepts but allows us to investigate characteristics of the structure of generalization that cannot be studied in an artificial experiment.

The most that the artificial experiment can provide is a general genetic scheme of the basic stages of concept development. The analysis of the child's actual concepts made it possible for us to study little known characteristics of syncretic concepts, complexes, and preconcepts; it made it possible to establish that in each of these spheres of thinking there is a different relationship between the concept and the object. The object is also grasped by a different act of thought. Thus, the two basic features that characterize the concept manifest their differences in the transition from one stage to

the next. This implies that the nature of these concepts and all their characteristics differ. A different relationship to the object implies differences in the connections and relationships that are possible among the objects in thought. A different act of grasping the object in thought implies different connections among thoughts, that is, different kinds of mental operations. In each of these spheres, we find characteristics that are a function of the nature of the concept: (1) there is a different relationship to the object and to the meaning of the word; (2) there are different relationships of generality; and (3) there is a different set of possible operations.

However, this investigation of the child's actual concepts represents more than a bridge between the study of experimental and actual word meaning, more than a way of identifying new characteristics of concepts. This research has filled a fundamental gap in previous research. As a consequence, it allowed us to reevaluate the theoretical significance of that research.

In our earlier research, the relationship of the word to the object was analyzed anew with each stage in concept development (i.e., with the stages characterized by syncretic concepts, complexes, and true concepts). We ignored the fact that *each new stage in the development of generalization depends on the generalizations found in the preceding stages*. A new stage of generalization arises on the foundation provided by the previous stages. It does not emerge from a direct generalization of objects by thought, but from the generalization that was generalized in the previous structure of objects. It arises as a generalization of generalizations, not as a new mode of generalizing isolated objects. The results of previous efforts of thought which are expressed in the generalizations that dominate previous stages do not come to naught. They are included in the new work of thought. They are prerequisites for it.*

As a consequence, our earlier research could not establish either the self-movement inherent in the development of concepts or the *internal connections* among the various stages of development. In retrospect, it is clear that we should be criticized because we provided for the self-development of concepts while simultaneously deriving each new stage from a new external cause. The fundamental weakness of our previous research lies in the absence of any real self-development, in the absence of any real connection between the stages of development. This shortcoming was a function of the very nature of the experiment. It excluded any possibility of identifying the connections between the stages of concept development (i.e., of clarifying the nature of the transitions from one stage to the next) or of discovering the relationships of generality. This is reflected the fact that: (1) the experimental method required the subject to do away with the work he had done after each incorrect resolution -- (destroying the previously formed generalization and beginning work anew with the generalization of distinct objects) and; (2) isolated from the experimental context, the concepts stood at the level of development characteristic of the child's autonomous speech; that is, they could be co-related along the horizontal plane but they could not be differentiated along lines of longitude. As a consequence, we inherently saw these stages as moving along on a single plane rather than as forming a spiral based on a series of connected and ascending circles.

By studying the development of actual concepts, however, we were immediately provided with a possibility of filling this gap. An analysis of the development of the preschooler's general representations (which correspond to the experimental concepts that we call complexes) indicated that general representations -- as a higher stage in the development of word meaning -- emerge not from the generalization of isolated

* This idea is illustrated by the gradual development of concepts of history from the initial generalizations of "before" and "now" and the gradual development of sociological concepts from the initial generalizations of "among them" and "among us."

representations but from generalized perceptions. That is, they emerge from the generalizations that dominated the previous stage. This conclusion, which we were able to make on the basis of our experimental research, solved the whole problem. In our study of arithmetic and algebraic concepts, we established an analogous relationship between new generalizations and those that precede them. Here, in studying the transition from the school child's preconcepts to the adolescent's concepts, we were able to establish what is in essence the same thing that we established in previous research on the transition from generalized perception to general representations (i.e., from syncretic concepts to complexes).

A new stage in the development of generalization is achieved only through the reformation -- not the nullification -- of the previous stage. The new stage is achieved through the generalization of the system of objects already generalized in the previous stage, not through a new generalization of isolated objects. The transition from preconcepts (e.g., the school child's arithmetic concept) to true concepts (e.g., the adolescent's algebraic concept) occurs through the generalization of previously generalized objects.

The preconcept is an abstraction of the number from the object and, based on this, a generalization of the object's numerical characteristics. The concept is an abstraction from the number and, based on this, a generalization of the relationships between numbers. The abstraction and generalization of ones own thought differs fundamentally from the abstraction and generalization of things. It does not constitute further movement in the same direction. It is not the completion of the initial process of abstraction and generalization. It is the beginning of a new direction in the movement of thought, a transition to a new and higher plane of thought. The generalization of ones own arithmetic operations and arithmetic thought is something different and something more advanced than the generalization of the numerical characteristics of objects that underlies the arithmetic concept. Nonetheless, the new concept or generalization arises on the foundation provided by the earlier one. This difference emerges clearly in the fact that the growth of algebraic generalizations is accompanied by a growth in the freedom of operations. The process involved in the liberation from links with the numerical field occurs differently than the process involved in the liberation from links with the visual field. The growth in freedom that occurs with the emergence of the algebraic generalization is explained by the potential for reverse movement from the higher stage to the lower that is inherent in the higher generalization; *the lower operation is already viewed as a special case of the higher.*

Arithmetic operations are preserved even after algebra is learned. This naturally leads to the question of what differentiates the arithmetic concept of the adolescent who has mastered algebra from that of the school child who has not. Research indicates that the adolescent views the arithmetic concept as a special case of the more general algebraic concept. Research also indicates that operations with the arithmetic concept become freer. Because of its independence from particular arithmetic expressions, it is applied in accordance with a more general formula.

With the young school child, the arithmetic concept is the final level. There is nothing beyond it. Therefore, movement within these concepts is always linked to the conditions of a specific arithmetic situation. The young school child cannot rise above this situation. The adolescent can. The adolescent's superior ability in this respect is a function of his mastery of the higher order algebraic concept. We observed a similar phenomenon in studies of the transition from the decimal system to other systems of numeration. The child learns to act with the decimal system before he becomes consciously aware of it. At this stage, the child has not mastered the system; he is bound to it.

Conscious awareness of the decimal system (i.e., the generalization that leads to an understanding of the decimal system as a particular kind of numerical system) leads to a potential for voluntary action in it or in any other numerical system. The criteria of consciousness lies in the potential for moving freely to another system. This represents the generalization of the decimal system, the formation of a general concept of numerical systems. Therefore, the transition to another system is a direct index of the generalization of the decimal system. The child moves from the decimal system to a base five system differently before he has a general formula for doing this than after he has such a formula. In this way, research consistently indicates the existence of connections between higher and lower forms of generalization and of connections to the object through these lower forms.

We must add that this research on the child's actual concepts led to the identification of the final link in the chain of transitions from one stage to another which we are concerned with here. Earlier, we spoke of the link between syncretic concepts and complexes in the transition from early childhood to the preschool age. We also discussed the link between preconcepts and concepts in the transition from the school child to the adolescent. Our research on scientific and everyday concepts casts light on a middle link that we have been unable to make up to this point. As we shall see, it permits us to identify the same type of dependency in the transition from the preschooler's general representations to the school child's preconcepts. Thus, the issue of the links and transitions between the various stages of concept development is completely resolved. We have resolved the question of the self-movement of developing concepts. This question was beyond our grasp in our earlier research.

The study of the child's actual concepts, however, has contributed still more. It not only allowed us to clarify the nature of *inter-stage* movements in concept development, but permitted us to address the issue of *intra-stage* movements (i.e., transitions within a single stage). For example, it allowed us to study the transitions from one type of complexive generalization to another more advanced type. Even here, the principle of the generalization of generalizations remains in force, though it is expressed differently. With transitions from one phase to the next within a single stage, the relationship to the object characteristic of the previous phase is preserved. The entire system of relationships of generality is not radically reconstructed in the way it is with the transition from one stage to the next. In the transition from one stage to another, there is a sharp restructuring of the relationship between the concept and the object as well as a restructuring of the relationships of generality between concepts.

These studies also led us to reconsider the issue of how the transition from one stage to another occurs in the development of meaning. The first study led to the assumption that the new structure of generalization simply nullified or displaced that which preceded it. The previous work of thought was reduced to naught. This implied that the transition to a new stage requires the re-formation of all word meanings that existed with the previous structure. This, of course, would be a truly Sisyphean labor!

This new research, however, indicates that this transition occurs in another way. The new structure of generalization is first formed by the child on the basis of only a few concepts. These concepts are usually newly acquired, through instruction for example. When this new structure has been mastered, the child can reconstruct or reform the structure of all previously existing concepts on this foundation. The previous labor of thought does not just drop away. The concept is not recreated with each new stage. Each meaning is not itself required do all the work involved in the rebuilding of the structure. As is true of all structural operations in thinking, new principles are mastered on the basis of several concepts. These are then transferred through structural laws to the entire domain of concepts.

We have seen that the new structure of generalization to which the child is led through instruction creates the potential for his thought to move to new and higher planes of logical operations. Since the existing concepts are drawn into these operations of thinking, their structure is also changed.

Finally, this investigation of the child's actual concepts helped us to resolve an additional significant question that was posed for the theory of thinking long ago. It has been known since the work of the Wurzburg school that the connections which determine the movement and flow of concepts are nonassociative. For example, Buhler demonstrated that remembering a thought or reproducing it occurs in accordance with meaningful connections rather than in accordance with the laws of association. However, we have still not resolved the question of how it is that connections determine the flow of thought. These connections have been described phenomenologically and extrapsychologically (e.g., as the connection of the goal and the means). In structural psychology, an attempt was made to define these connections structurally, but this definition has two fundamental deficiencies:

1. Given this definition, the connections of thinking are fully analogous to those of perception, memory, and all other functions. All are subordinated to structural laws. There is nothing new, higher, or unique to the connections of thinking when they are compared with the connections of perception and memory. The movement and coupling of concepts in thinking becomes incomprehensible. We cannot say how they differ from the structural coupling characteristic of perception and memory. Structural psychology repeats the mistake made by associative psychology. It too begins with the identification of the connections characteristic of perception, memory, and thinking. It fails to see what is specific to thinking. Traditional psychology began with the same two principles. With structural psychology, the principle of association is merely replaced by the principle of structure. The mode of explanation remains the same. In this respect, structural psychology took a step backward from the positions of the Wurzburg school. The Wurzburg school had established that the laws of thinking are not identical to those of memory, that thinking is a special type of activity governed by unique laws. For structural psychology, thinking does not have its own special laws. Structural psychology attempts to explain thinking on the basis of the same laws that govern the domains of perception and memory.
2. The reduction of the connections in thinking to structural connections and their identification with the connections characteristic of perception and memory excludes any possibility for the development of thinking or for understanding thinking as a higher and unique form of activity. This identification of the laws of thought with the laws of memory directly contradicts our findings concerning the emergence of new and higher types of connections between thoughts with each new stage of concept development.

As we have seen, there are no relationships of generality among concepts in the child's autonomous speech (i.e., in the first stage of concept development). As a consequence, the only connections between concepts that are possible are those that can be established in perception. At this stage, thinking as an activity independent of perception is impossible. Thinking as such becomes possible only with the development of structures of generalization and with the emergence of increasingly complex relationships of generality among concepts. With the development of this structure of generalization, there is also a gradual spreading of the connections and relationships

that form it. Finally, there is a transition to new and higher types of connections and movements among concepts. This fact cannot be explained on the basis of structural theory and its itself an adequate foundation for rejecting it.

We must ask, then, how these connections that are specific to thinking determine the movement and coupling of concepts. What is the nature of this "connection in accordance with meaning?" To answer these questions, we must move beyond the study of isolated concepts; we must move beyond the study of the single stitch to the investigation of the fabric of thought. With this, it becomes apparent that concepts are connected not by associative threads or in accordance with the structural principles of perceived or represented images but in accordance with their essential nature, *in accordance with relationships of generality.*

The definition of concepts, their comparison and differentiation, the establishment of logical relationships among them -- all these operations of thought occur through the lines that connect concepts by relationships of generality, through the lines that determine the potential paths of movement from one concept to the next. The act of defining a concept is based on the law of concept equivalence which presupposes the possibility of this kind of movement from one concept to another. In this process, the longitude and latitude inherent in the concept to be defined -- the measure of generality that determines the act of thought contained in the concept and its relationship to the object -- is expressed through its connection with other concepts. In turn, these concepts have their own longitudes and latitudes, their own measures of generality that contain acts of thought and relationships to the object. Taken as a whole, however, the longitude and latitude of these concepts are the equivalent of the concept that has been defined. The comparison or differentiation of concepts also presupposes their generalization and movement along the lines representing relationships of generality to a higher concept that subordinates the concepts which are being compared. In the same way, the establishment of logical relationships among concepts which we find in the processes of judgment or deduction requires movement in accordance with these relationships of generality along the horizontal and vertical axes of the concept system.

An example of productive thinking may clarify this point. Wertheimer demonstrated that the common syllogism -- as represented in textbooks of formal logic -- does not belong to the domain of productive thought. With the syllogism, we ultimately arrive at what was known from the outset. Nothing is contained in the conclusion that was not contained in the premises. For the emergence of the truly productive act, for the emergence of thought that leads to something entirely new, that which constitutes our analytic problem and is part of structure "A" must unexpectedly enter structure "B". The destruction of the structure where the problematic point originally emerged and the transfer of this point to a completely different structure is the basic requirement for productive thinking. How is it possible that "X" (i.e., the problem that was an element in structure "A") can simultaneously enter structure "B"? Obviously, it becomes necessary to go beyond the limits of the existing structural dependencies. The problematic point must be torn from the structure where it is given in our thought. It must then be included in the new structure. Research indicates that this is realized through movement along the lines of the relationships of generality. It is realized through movement to a higher measure of generality, to a higher concept that stands above the subordinate structures "A" and "B". It is as if we are raised above concept "A" and then lowered to concept "B". This unique mode of overcoming structural dependencies is possible only as a consequence of the presence of definite relationships of generality among concepts.

We know, however, that to each structure of generalization there corresponds a specific system of relationships of generality. This is because generalizations of a given structure must exist in a given system of relationships of generality. Consequently, to each structure of generalization, there corresponds a specific system of logical operations of thinking that are possible for that structure. This is among the most important laws of the psychology of concepts. It indicates the unity of the structure and function of thinking, the unity of the concept and the operations which are possible for it.

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We can now attempt to clarify the differences between scientific and everyday concepts in light of our findings. The key difference in the psychological nature of these two kinds of concepts is a function of the presence or absence of a system. Concepts stand in a different relationship to the object when they exist outside a system than when they enter one. The relationship of the word "flower" to the object is completely different for the child who does not yet know the words rose, violet, or lily than it is for the child who does. Outside a system, the only possible connections between concepts are those that exist between the objects themselves, that is, empirical connections. This is the source of the dominance of the logic of action and of syncretic connections of impressions in early childhood. Within a system, relationships between concepts begin to emerge. These relationships mediate the concept's relationship to the object through its relationship to other concepts. A different relationship between the concept and the object develops. *Supra-empirical connections between concepts become possible.*

It could be demonstrated that all the characteristics of the child's thought identified by Piaget, characteristics such as syncretism, insensitivity to contradiction, and the tendency to place things alongside one another, stem from the extrasystemic nature of the child's concepts. As we have seen, Piaget himself understands that the essential difference between the child's spontaneous concept and the concept of the adult is the extrasystemic nature of the first and the systemic nature of the second. This is why Piaget argues that to discover the child's spontaneous concepts, his statements must be freed from any trace of a system. The principle on which Piaget bases this argument is valid. Spontaneous concepts are by nature extrasystemic. The child, says Piaget, is not systematic. His thought is insufficiently connected or deductive and the need to avoid contradiction is generally absent. He tends to place judgments together in a series rather than synthesizing them. He is satisfied with syncretic schemes instead of analysis. In other words, the child's thought is more similar to a collection of lines flowing from the action or day-dream than it is to the adult's thought (thought which is systematic and characterized by conscious awareness). Thus, in Piaget's view, the absence of a system is an essential feature of the spontaneous concept. Piaget, however, does not understand that the nonsystemic nature of these concepts is not simply one of many features of the child's thought, but the *root* that gives rise to all the characteristics of the child's thinking that Piaget identifies.

All these characteristics stem from the extrasystemic nature of spontaneous concepts. Each of these characteristics -- and the group as a whole -- can be explained in terms of the relationships of generality characteristic of the complexive system of spontaneous concepts. The system of relationships of generality inherent in the complexive structure of the preschooler's concepts is the key to the entire phenomenon described and studied by Piaget.

We have begun work on a study devoted to precisely this issue. In the present context, however, we will address it only schematically. First, the inadequacy of the connectedness of the child's thought is a direct expression of an inadequate development of the relationships of generality among concepts. The inadequate nature of the child's deductions, in particular, stems from an underdevelopment of the connections among concepts along the longitudinal axis representing the relationships of generality.

We can also show that the absence of need to avoid contradiction inherently appears where individual concepts are not subordinated to a single superordinate concept. For contradiction to be sensed, the two contradictory judgments must be viewed as particular cases of a single, more general concept. As we have seen, this type of relationship among concepts is absent where concepts are not included in some system. It is, indeed, impossible.

In Piaget's experiments, the child maintains that a bead sinks because it is small at one point, while he claims it sinks because it is large at another. If we consider what occurs in our own thinking when we sense a clear contradiction between these two judgments, we can identify the source of the child's inability to sense this contradiction. The contradiction is noticed when the concepts expressed in the contradictory judgments are included in the structure of a single superordinate concept. It is at this point that we sense that we have expressed two contradictory judgments about one and the same thing. Due to the underdevelopment of the relationships of generality in the child, however, the two concepts cannot possibly be unified within the single structure of a higher concept. The result is that the child expresses two mutually exclusive judgments. From his perspective, however, these judgments relate to two different things. In the logic of the child's thought, the only relationships among concepts that are possible are those that exist among the objects themselves. Thus, the child's judgment is purely empirical in nature. This logic of perception does not know contradiction. Within this framework, the child is expressing two equally correct judgments. They are contradictory from the perspective of the adult but not from that of the child. The contradiction exists for the logic of thought but not for the logic of perception. The child can support his statements by citing obvious and irrefutable observations. In our own experiments, when we attempted to make children aware of this contradiction, they often responded by saying: "I saw it myself." Of course, the child actually did see the small bead sink at one point while he saw the large bead sink at another. The thoughts that underlie his judgments can be reduced to the following: "I saw that the small bead sank." "I saw that the large bead sank." The "because" that appears in the child's answer to the experimenter's question does not represent the establishment of a causal dependency. Such a causal dependency is incomprehensible to the child. It is, rather, related to the use of "because" that we encountered in our experiments based on the phrases that required completion, a use of the term characterized by a lack of conscious awareness or the capacity for volitional use.

The child's tendency to place concepts alongside one another is the inevitable expression of the absence of the movement of thought between concepts of higher and lower measures of generality. Likewise, the child's syncretic schemes are a characteristic expression of the dominance of empirical connections and the logic of perception in his thinking. The child takes the connections between his impressions for the connections between things.

Our research indicates that these phenomena are not characteristic of the child's scientific concepts. His scientific concepts are not subordinated to these laws. They restructure these phenomena. The structure of generalization governing each stage of concept development determines the corresponding system of relationships of gener-

ality among concepts. As a consequence, it also determines the operations of thinking that are possible at a given stage. This discovery of the common source of all the characteristics of the child's thought described by Piaget leads to a fundamental reassessment of Piaget's explanation of them. The source of these characteristics is not the egocentrism of the child's thought (i.e., what Piaget saw as a compromise between the logic of dreams and the logic of action). Their source lies in the unique relationships of generality among concepts that are characteristic of thought that has been woven from spontaneous concepts. It is not that the child's concepts stand further from real objects than the adult's. It is not that they are saturated with an autonomous autistic thinking. The key is that they stand in a different relationship to the object than the adult's -- a closer and more immediate relationship.

As a consequence, the laws that govern this unique form of thought pertain only to the domain of spontaneous concepts. Even as they emerge, the scientific concepts of one and the same child will have different characteristics, characteristics which bear witness to their different natures. Arising from above, from the womb of other concepts, they are born through relationships of generality among concepts that are established in the process of instruction. By their very nature, scientific concepts include something of these relationships, some aspect of a system of concepts. The formal discipline of these scientific concepts is manifested in the complete restructuring of the child's spontaneous concepts. This is why the scientific concept is of such extraordinary importance for the history of the child's mental development.

All this is contained in covert form within Piaget's own theory. By accepting these positions, we not only eliminate our confusion concerning his findings but are able to provide an adequate explanation for them. As a consequence, Piaget's whole system is exploded from within by the great force of the data that are packed within it, by data which were bound by the chains of erroneous thought. As we have seen, Piaget cites Claparede's law of conscious awareness. This law says that the more spontaneous the use of a concept, the less it will be characterized by conscious awareness. Consequently, spontaneous concepts -- because they are spontaneous -- will be characterized by a lack of conscious awareness and be unsuitable for voluntary use. Further, we have seen that the lack of conscious awareness means that generalization will also be absent. It means that the system of relationships of generality is underdeveloped. Thus, *spontaneity and a lack of conscious awareness of concepts, spontaneity and the extrasystemic nature of concepts, are synonymous.* Correspondingly, nonspontaneous scientific concepts, because of what makes them nonspontaneous, will be characterized from the outset by conscious awareness. From the outset, they will be characterized by the presence of a system. Our entire dispute with Piaget on this issue can be reduced to a single question: Do systemic concepts force out extrasystemic concepts, taking their place in accordance with the principle of substitution, or do they develop on the foundation provided by extra-systemic concepts by creating a definite system within the existing domain of concepts? The system is the cardinal point around which the whole history of concept development in the school age revolves. It is the new formation that arises in the child's thinking as part of the development of his scientific concepts. It raises his mental development to a higher stage.

The existence of this system that is introduced into the child's thinking with the development of scientific concepts helps to clarify the general theoretical issue of the nature of the relationships that exist between the development of thinking and the acquisition of knowledge (i.e., the relationships that exist between instruction and development). As we have said, Piaget divorces the two processes. In his view, the concepts that the child learns in school have no significance for research on the child's thought. The characteristics of the child's thought are lost in the characteristics of adult think-

ing with this concept. Therefore, Piaget pursues the study of thinking outside the context of instruction. He proceeds from the assumption that what develops in the child in the process of instruction is of no interest for those who are concerned with the development of the child's thought. For Piaget, instruction and development are incommensurable processes. They are entirely independent and unrelated.

Underlying this perspective is a rupture between the analysis of structure and function in the study of thought which has a long history in psychology.

In psychology, the earliest studies of thinking dealt only with its content. It was assumed that those who are more advanced in their mental development differed from those who are less advanced primarily in the quantity and quality of representations and the number of connections among these representations. The operations involved in thinking were assumed to be identical at different developmental stages. Thorndike's book on the measurement of intellect is a recent attempt to defend this thesis on a grand scale. Thorndike argues that the development of thinking consists primarily of the formation of new connections between isolated representations. He assumes that a single, unbroken curve can be used to represent the entire process of mental development, a process that begins with the earthworm and culminates in the thinking of the contemporary American student. There are few psychologists today who would want to defend such a thesis.

As is often the case, the reaction against this perspective led to an exaggerated movement in the other direction. It was argued that representations are merely the material of thought, that they play no decisive role in it. Research was focused on the operations of thinking -- on its functions. The process that occurs in a man's mind when he thinks became the central concern. This perspective was taken to its logical extreme by the Wurzburg school with their conclusion that objects that represent external reality (including the word) play no role in thinking. From this perspective, thinking is a purely spiritual act which consists of a purely abstract, nonsensual grasping of abstract relationships. On the basis of their experimental work, researchers who have pursued these ideas have proposed many practical ideas. They have also enriched our conception of the unique nature of intellectual operations. The question of how reality is reflected or generalized in thinking, however, has simply been ignored.

The one-sidedness and fruitlessness of this perspective has become increasingly apparent. There is now renewed interest in the material of thought (once the sole object of investigation). It is becoming clear that functions depend on the structure of that which is thought. Any act of thought must somehow establish a connection between the various aspects of reality which are represented in consciousness. The way that this reality is represented in consciousness cannot be without some significance in determining the operations of thinking that will be possible. In other words, the various functions of thinking are inevitably dependent on that which functions, is moved, and is the foundation of this process.

Stated yet more simply, the functions of thinking depend on the structure of thought itself. The character of the operations accessible for a given intellect depend on the structure of the thought that functions. Piaget's work is an extreme expression of this renewed interest in the structure of thought. Piaget, however, takes this interest in structure to an extreme. Like contemporary structural psychologists, he maintains that the functions themselves do not change in the course of development. It is the structures that change. It is this change in the structure that leads to the acquisition of new characteristics by the functions. This return to the analysis of the internal structure of the child's thought, to the analysis of its content, is fundamental to Piaget's work.

However, even Piaget does not resolve the basic problem, since he fails to eliminate the rupture between structure and function in thought. This is why he divorces instruction from development. When either the structural or the functional aspect of thought is excluded from analysis in favor of the other, psychological research on the problem of school instruction is no longer possible. If it is assumed that knowledge and thinking are incommensurable, any attempt to find a link between instruction and development will be doomed to failure. In contrast, if we attempt to unite the structural and functional aspects in the study of thinking, that is, if we begin with the idea that what functions influences the process of functioning, the problem not only becomes accessible but is solved.

Since the meaning of a word belongs to a certain type of structure, only a certain range of operations will be possible within this structure. A different range of operations requires a different structure. In the development of thinking we must deal with several very complex internal processes that change the internal structure of the fabric of thought. There are two aspects that we will always encounter in the concrete study of thinking. Both are of fundamental importance.

The first is the growth and development of the child's concepts, the development of word meaning in particular. The meaning of the word is a generalization. The unique structure of these generalizations represents a unique mode of reflecting reality in thought. This already implies that there will be different relationships of generality among concepts. Finally, different relationships of generality determine the different types of operations that are possible for a given form of thinking. The mode and character of functioning is determined by the structure of that which functions. This is the second critical aspect of any research on thinking. These two aspects of the problem are internally connected with one another. Where one is excluded in favor of the other, this is done to the detriment of the investigation as a whole.

Unifying both these aspects in a single investigation makes it possible to see connection, dependence, and unity where an exclusive, one-sided study sees metaphysical contradiction, antagonism, and permanent conflict, or (in the best case) a possibility for compromise between two incommensurable extremes. Our research indicates that spontaneous and scientific concepts have complex internal connections. In fact, if we fully extend this line of analysis, we find that we will at some point be able to study both spontaneous and scientific concepts within a single research framework. Instruction does not begin at school. It is present in the preschool age as well. We would anticipate that future research will show that the child's spontaneous concepts are the product of preschool forms of instruction, just as scientific concepts are the product of formal instruction in school. We know that the relationship between instruction and development differs with each developmental stage. With each stage, the character of development changes and the organization of instruction takes on a new form. Even more significant, however, is the fact that the relationship between instruction and development changes with each stage. We have developed this idea in more detail elsewhere. In this context, we will merely assert that future researchers must remember that the unique nature of the child's spontaneous concepts is entirely dependent on the relationship between instruction and development in the preschool age. We will refer to this as a transitional spontaneous-reactive form of instruction since it constitutes a bridge between the spontaneous instruction characteristic of early childhood and the reactive instruction common to the school age.

We will not speculate further on the findings of this future research. We have made only the first step in this new direction. While this new approach may seem to needlessly complicate what sometimes seems to be the simple questions of instruction

and development -- or of spontaneous and scientific concepts -- future research will show that it is simply a crude simplification of the real complexities of the situation.

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In light of what we have said, the comparative study of everyday and scientific (i.e., social science) concepts and their development in the school age child carried out by Shif has a twofold significance. The first and the most immediate task of this research was to provide an experimental assessment of our working hypothesis concerning the unique developmental path of the scientific concept. Its second task was to resolve the more general problem of the relationship between instruction and development. We have outlined how this research resolved these two issues. A more complete discussion can be found in the research report itself. In this context, we will only say that these two issues have been satisfactorily resolved on the experimental plane for the first time in this research.

In dealing with these two issues, however, we must raise two additional issues that provide the necessary background for developing research on the first two.

First, we have the issue of the nature of the child's spontaneous concepts, concepts that have until now been considered the only legitimate object of psychological research on concepts and their development. Second, we have the issue of the school child's general psychological development, an issue that must be resolved in some manner before the narrower issues associated with the child's concepts and their development can be investigated. Of course, these latter two issues cannot occupy the same position in our research as the first two. They are not at the center of our attention. Therefore, our research provides only indirect evidence relating to them. Nonetheless, this evidence supports the relevant assumptions we have made in developing our hypothesis.

The most significant aspect of this research, however, is that it leads us to a new statement of the problem of concept development in the school-age child. It provides a working hypothesis which explains the findings of previous studies and is supported by the findings of the present study. Further, this research resulted in the development of methods for studying the child's actual concepts. As a consequence, it reestablished a bridge between the study of experimental concepts and the study of the child's actual living concepts. Moreover, it opened up a new and tremendously important field of investigation that is central to the whole history of the child's mental development. It demonstrated how the development of scientific concepts can be studied scientifically.

The practical significance of this research is that it created the potential for real psychological analysis of issues associated with instruction in the system of scientific concepts (this analysis was consistently guided by the principle and perspective of development). In this respect, this research is directly relevant to education. Though crudely and schematically, the findings of this study have clarified the nature of the processes that occur in the head of the pupil in the course of social science instruction.

We see three fundamental limitations in this research. First, our analysis focused on the general features of the child's social science concepts, not on the features specific to them. That is, in this research, social science concepts were treated more as a prototype for scientific concepts generally than as a particular or unique form of scientific concept. In these first research efforts in this new domain of investigation, we necessarily began by differentiating scientific and everyday concepts. We attempted to discover the unique characteristics of scientific concepts by studying a single form of scientific concept (i.e., the social science concept). Until we had established the line of

demarcation between scientific and everyday concepts, the differences between the various types of scientific concepts (e.g., arithmetic, natural science, and social science concepts) could not become the focus of our work. This is inherent in the logic of scientific research. We must first identify the general features of a given domain of phenomena. Only then can begin to look at the differences which exist within each domain.

This explains why the concepts analyzed in this research are not the system of basic, core concepts that form the foundation of the social sciences, but several individual concepts that are not directly connected with one another. These concepts were selected in a simple empirical manner from the material that constitutes the educational program. This also explains why this research tells us more about the general nature of the development of scientific concepts than about the specific characteristics of social science concepts. Finally, this explains why these social science concepts were not compared with everyday concepts taken from comparable domains of social life.

The second obvious limitation of this work is that it is too general and insufficiently differentiated in its approach to concept structure, the relationships of generality inherent in a given structure, and the functions that determine a particular structure or particular relationships of generality. As we have seen, the first major limitation of this research made it impossible to address the internal connections in the system of social science concepts, although this is a fundamental issue concerning the development of the concept system. The second major limitation of this research had equally serious consequences. Specifically, we were not able to adequately develop the entire problem of the concept system, that is, the problem of the relationships of generality. As we have seen, this problem is fundamental to child development during the school years. Further, its resolution is basic to the construction of a bridge between the study of experimental concepts (with their structure) and the study of actual concepts (with their unity of structure and function of generalization of thought operations). This simplification was introduced with our statement of the research problem. We were forced to frame the problem more narrowly than we would have preferred. The result was what, under other conditions, would have been an unacceptable oversimplification in our analysis of the intellectual operations that were considered in the experiments. For example, we did not differentiate among various types of causal relationships or among the empirical, psychological, and logical meanings of the word "because." Piaget's work was much better than our own in this respect. One consequence of this was that phases of development within the school age could not be identified. We consciously sacrificed our capacity to make these distinctions in order to gain precision and certainty in our attempt to answer the more basic issue, the issue of the unique characteristics of the development of scientific concepts.

Finally, the third deficiency of this research lies in its inadequate experimental development of the two issues mentioned above, that is, the issue of the nature of everyday concepts and the issue of the general structure of psychological development in the school-age child. The issue of the relationship between the structure of the child's thinking (as described by Piaget) and the basic features of everyday concepts (i.e., their extrasystemic and nonvolitional nature) and the issue of the development of conscious awareness and volition with the emerging system of concepts is fundamental to the general problem of the school child's mental development. Neither of these problems has be resolved experimentally. They have not even been stated in a manner that will allow them to be subjected to experimental resolution. A separate study is needed for the full development of these issues. Consequently, our critique of Piaget's basic positions has inadequate experimental support.

We have outlined these limitations in our work because they allow us to point to the new lines of research that emerge beyond the final pages of our reports. In this way, we also identify this work as a first, modest effort in a new and extremely fruitful domain of psychological research.

We would also like to acknowledge that this working hypothesis and experimental research emerged somewhat differently in the research process than they are presented here. The dynamic process of research is always different from the way it is described and formulated in the scientific literature. Our working hypothesis was not fully constructed before we began our experimental research. Research never begins with a fully developed hypothesis. In Levine's words, the hypothesis and the experiment are two poles of a single dynamic whole. They are constructed, develop, and grow as a single unit. They fertilize one another and move one another forward.

In our view, among the most important indices of the plausibility and fruitfulness of our hypothesis is the fact that the experimental research and theoretical hypothesis -- though developed simultaneously -- led not only to consonant but to fully unified findings. They provided an illustration of the central point -- the main thought -- of our entire work. They illustrate the notion that the development of the corresponding concept is not completed but only beginning at the moment a new word is learned. The new word is not the culmination but the beginning of the development of a concept. The gradual, internal development of the word's meaning leads to the maturation of the word itself. Here, as everywhere, the development of the meaningful aspect of speech turns out to be the basic and decisive process in the development of the child's thinking and speech. While it has usually been assumed that the concept is ready when the word is ready, Tolstoy correctly states that "the word is almost always ready when the concept is."

Chapter 7

THOUGHT AND WORD

I forgot the word that I wanted to say,
And thought, unembodied, returns to the hall of shadows.
O.E. Mandelshtam, *The Swallow*

1

Our investigation began with an attempt to clarify the internal relationships between thought and word at the most extreme stages of phylogenetic and ontogenetic development. In the prehistoric development of thinking and speech, we found no clearly defined relationships or dependencies between the genetic roots of thought and word. Thus, the internal relationships between thought and word with which we are concerned are not primal. They are not something given from the outset as a precondition for further development. On the contrary, these relationships emerge and are formed only with the historical development of human consciousness. They are not the precondition of man's formation but its product.

With the anthropoids -- the ultimate development of the animal world -- we find forms of speech and intellect that are phenotypically similar to their counterparts in man. However, they are not connected with one another in any way. In the initial stages of child development, we can clearly identify a preintellectual stage in the formation of speech and a pre-speech stage in the development of thinking. Once again, the connection between thought and word is neither inherent or primal. This connection emerges, changes, and grows with the development of thought and word.

As we tried to show at the outset, however, it would be incorrect to represent thinking and speech as processes that are externally related to one another, as two independent forces moving and acting in parallel with one another or intersecting at specific points and interacting mechanically. The absence of a primal connection between thought and word does not imply that this connection can arise only as an external connection between two fundamentally heterogeneous forms of the activity of consciousness. On the contrary, the basic methodological defect of nearly all studies of thinking and speech -- that which underlies the fruitlessness of this work -- is the ten-

dency to view thought and word as two independent and isolated elements whose external unification leads to the characteristic features of verbal thinking.

We have attempted to demonstrate that those who begin with this mode of analysis are doomed to failure from the outset. To explain the characteristics of verbal thinking, they decompose the whole into the elements that form it. They decompose verbal thinking into speech and thinking, elements that do not contain the characteristics inherent to the whole. This closes the door to any real explanation of these characteristics. We have compared the researcher who takes this approach to one who decomposes water into hydrogen and oxygen in the attempt to explain why water extinguishes fire. As we noted, this researcher would find to his surprise that oxygen sustains combustion while hydrogen is itself combustible. We also argued that decomposition into elements is not analysis in the true sense of the word but *a process of raising the phenomenon to a more general level.* It is not a process that involves the internal partitioning of the phenomenon which is the object of explanation. It is not a method of analysis but a method of generalization. To say that water consists of hydrogen and oxygen is to say nothing that relates to water generally or to all its characteristics. It is to say nothing that relates to the great oceans and to a drop of rain, to water's capacity to extinguish fire and to Archimedes's law. In the same way, to say that verbal thinking contains intellectual processes and speech functions is to say nothing that relates to the whole of verbal thinking and to all its characteristics equally. It is to say nothing of relevance to the concrete problems confronting those involved in the study of verbal thinking.

From the outset, then, we have tried to frame the entire problem in a new way and apply a new method of analysis. We attempted to replace the method based on decomposition into elements with a method of analysis that involves partitioning the complex unity of verbal thinking into units. In contrast to elements, units are products of analysis that form the initial aspects not of the whole but of its concrete aspects and characteristics. Unlike elements, units do not lose the characteristics inherent to the whole. The unit contains, in a simple, primitive form, the characteristics of the whole that is the object of analysis.

We found the unit that reflects the unity of thinking and speech in the *meaning* of the word. As we have tried to show, word meaning is a unity of both processes that cannot be further decomposed. That is, we cannot say that word meaning is a phenomenon of either speech or thinking. The word without meaning is not a word but an empty sound. Meaning is a necessary, constituting feature of the word itself. It is the word viewed from the inside. This justifies the view that word meaning is a phenomenon of speech. In psychological terms, however, word meaning is nothing other than a generalization, that is, a concept. In essence, generalization and word meaning are synonyms. Any generalization -- any formation of a concept -- is unquestionably a specific and true act of thought. Thus, word meaning is also a phenomenon of thinking.

Word meaning, then, is a phenomenon of both speech and intellect. This does not, however, represent a simultaneous and external membership in two different domains of mental life. Word meaning is a phenomenon of thinking only to the extent that thought is connected with the word and embodied in it. It is a phenomenon of speech only to the extent that speech is connected with thought and illuminated by it. Word meaning is a phenomenon of verbal thought or of the meaningful word. It is a unity of word and thought.

No further evidence is needed to support this basic thesis. Our experimental studies have consistently supported and justified it. They have shown that by taking word meaning as a unit of verbal thinking we create the potential for investigating its

development and explaining its most important characteristics at the various developmental stages. The primary result of this work, however, is not this thesis itself but a subsequent conclusion that constitutes the conceptual center of our investigation, that is, the finding that word meaning *develops*. The discovery that word meaning changes and develops is our new and fundamental contribution to the theory of thinking and speech. It is our major discovery, a discovery that has allowed us to overcome the postulate of constancy and unchangableness of word meaning which has provided the foundation for previous theories of thinking and speech.

From the perspective of traditional psychology, the connection between word and meaning is associative; it is a connection established as a result of a repeated coincidence in perceptual consciousness of the word and the thing the word designates. The word reminds an individual of its meaning in the same way that a person's coat reminds him of the person. From this perspective, word meaning cannot develop or change once it has been established. Associations that connect word and meaning can be reinforced or weakened. It can be enriched through connections with other objects of the same type, extended in accordance with similarity or contiguity to a wider circle of objects, or contracted as this circle of objects narrows or becomes more restricted. In other words, the association may undergo a series of quantitative and external changes. It cannot, however, change its internal psychological nature. This would require that it cease to be what it is, that it cease to be an association. From this perspective, the development of the meaningful aspect of speech -- the development of word meaning -- becomes inexplicable and impossible.

This is expressed in linguistics and in the psychological study of both child and adult speech. Having assimilated the associative conception of the word, the field of linguistics that is concerned with the study of the meaningful aspect of speech (i.e., semantics) has continued to view the word as an association between the word's sound-form and its object content. Word meanings -- from the most concrete to the most abstract -- are assumed to have a single common structure. Since the associative connection that unites the word and its meaning constitutes the foundation not only for meaningful speech but for processes such as being reminded of a person because we have seen his coat there is nothing unique to speech as such. The word forces us to remember its meaning in the same way that one thing reminds us of another. Because there is nothing unique in the connection of the word with its meaning, semantics cannot pose the question of the development of the meaningful aspect of speech, the question of the development of word meaning. The entire process of development is reduced to changes in the associative connections between words and objects. The word may initially designate one object and then become connected with another through the processes of association. The coat, being transferred from one owner to another, may initially remind us of one person and subsequently of another. The development of the meaningful aspect of speech is reduced to the changes that occur in the object content of words. The notion that the semantic structure of word meaning might change through the historical development of language is completely foreign to linguistics. Linguistics cannot perceive the possibility that the psychological nature of meaning changes, that linguistic thought moves from primitive forms of generalization to higher and more complex forms, that the very nature of the reflection and generalization of reality in the word changes with the emergence of abstract concepts in the process of the historical development of language.

This associative perspective on word meaning also leads to the view that the development of the meaningful aspect of speech in ontogenesis is impossible and inexplicable. The development of word meaning in the child is reduced to purely external and quantitative changes in the associative connections that unite word and meaning,

to the enrichment or reinforcement of these connections. The notion that the structure and nature of the connections between word and meaning might change during the development of the child's speech -- the fact that they do change during ontogenesis -- is inexplicable from the associative perspective.

Finally, this perspective leads to the notion that there is nothing in the verbal thinking of the adult other than an unbroken, lineal, associative movement from the word to its meaning and from the meaning to the word. The understanding of speech is conceptualized as a chain of associations that arise in the mind under the influence of familiar word forms. The expression of thought in the word is conceptualized as the reverse movement along this same associative path, beginning this time with the representation of objects in thought and moving to their verbal designation. These kinds of mutual connections between two representations are always insured by associations. At one point, the coat may remind us of the person who wears it, while at another the form of the person may remind us of his coat. Thus, there is nothing in the understanding of speech nor in the expression of speech in thought that is new or unique when compared to other acts of remembering or associative connection.

The inadequacy of associative theory was recognized and demonstrated (both experimentally and theoretically) some time ago. This has not, however, influenced the associative understanding of the word and its meaning. The Wurzburg school considered its main task to be that of demonstrating that thinking cannot be reduced to an associative flow of representations, that the movement, cohesion, and recall of thoughts cannot be explained in associative terms. It assumed the task of demonstrating that the flow of thought is directed by several unique laws. However, the Wurzburg school not only failed to reanalyze the associative perspective on the relationship between word and meaning but failed see why this kind of reanalysis was necessary. Instead, it separated speech and thinking, granting to God what is God's and to Caesar what is Caesar's. It liberated thought from all images and from everything sensual. It liberated thought from the power of associative laws, transforming it into a purely mental act. In the process, it returned to ideas that have their roots in the prescientific spiritualistic conceptions of Augustine[75] and Descartes.[76] The final product was an extreme subjective idealism that surpassed even that of Descartes. In Kulpe's words: "We not only say: 'I think therefore I am.' We argue that 'the world exists only as we establish it and define it'" (1914, p. 81). Since thinking belonged to God it was granted to God. As Kulpe himself recognized, this opened the door for the psychology of thinking to move toward the ideas of Plato.

Having liberated thought from any sensual component and returned it to a pure, unembodied, mental act, these psychologists simultaneously tore thinking from speech and assigned the latter entirely to the domain of associative laws. Thus, the connection between the word and its meaning continued to be viewed as a simple association. The word was seen as the external expression of thought, as its clothing. The word had no place in the inner life of thought. Never have thinking and speech been as isolated from one another in psychological theory as they were in the Wurzburg epoch. The process of overcoming associationism in the domain of thinking led to its reinforcement in the domain of speech. As Caesar's, speech was granted to Caesar.

Psychologists who have extended this line of thought within the tradition of the Wurzburg school have not only failed to transform it but have continued to deepen and develop it. Having demonstrated the complete inadequacy of the constellational theory of productive thinking (ultimately, the inadequacy of the associative theory of productive thinking), Seltz replaced it with a new theory that deepened and strengthened the gap between thought and word that was inherent in the works of this tradition from the outset. Seltz continued to analyze thinking in and of itself, estranged

from speech. He concluded that man's productive thinking is identical in its fundamentals to the intellectual operations of the chimpanzee. To the extent that the word introduced nothing new to the nature of thought, thinking remained independent of speech.

Even Ach, who made special studies of word meaning and who first made the move toward overcoming associationism in concept theory, was unable to go beyond a recognition that determining tendencies were present alongside associative tendencies in the process of concept formation. He did not escape from the earlier understanding of word meaning. He identified the concept with word meaning, excluding any potential for change and development in concepts. Ach assumed that once meaning emerged, it remained unchanged and constant. He assumed that the development of word meaning is finished at the moment of its formation. The psychologists Ach criticized assumed the same thing. Thus, though Ach and his opponents differed in their representations of the initial moment in the formation of word meaning, both assumed that the initial moment and end point in the process of concept development coincide.

We find the same thesis concerning the theory of thinking and speech in contemporary structural psychology. This tradition has made a more profound and consistent attempt to overcome associative psychology. Therefore, it has not been limited to the indecisive resolutions of the question characteristic of its predecessors. It has attempted to remove not only thinking but speech from the domain of associative laws, to subordinate both to the laws of structural formations. However, this tradition not only failed to advance in its theory of thinking and speech but took a profound step backward in comparison to its predecessors.

First, this new theory preserved a fundamental break between thinking and speech. The relationship between thought and word was represented as a simple analogy, as a reduction of both to a common structural denominator. Within this tradition, researchers conceptualized the origin of true meaningful words in the child as analogous to the intellectual operations of the chimpanzee in Kohler's experiments. They argued that the word enters the structure of things and acquires a certain functional significance in the same way that the stick entered into the structure of the situation of attaining fruit for the chimpanzee and acquired the functional significance of a tool. The connection between the word and meaning is no longer thought of as an associative connection. It is represented as a structural connection. Of course, this is a step forward. However, if we carefully consider the foundations of this new perspective, we quickly find that this step forward is an illusion, that we remain in the rut laid down by associative psychology.

The word and the thing that it designates form a single unified structure. However, this structure is analogous to any structural connection between two things. There is nothing that is unique to the word. Any two things, whether they are a stick and some fruit or a word and the object it designates, merge into a unified structure in accordance with the same laws. Once again, the word turns out to be just one thing among other things. It is a thing which is united with other things in accordance with the general structural laws that unite all things. What distinguishes the word from other things? What distinguishes the structure of the word from other structures? How does the word represents the thing in consciousness? What makes the word a word? All these questions remain outside the researcher's field of view. The rejection of the unique character of the word and its relationship to meaning, the dissolving of these particular connections into the sea of all structural connections, is no less characteristic of the new psychology than it was of the old.

To clarify the concept of the word's nature in structural psychology, we can once again use the example of the man and his coat. That is, we can use the same example

we used in clarifying the concept of the connection between word and meaning in associative psychology. The word reminds us of its meaning in the same way that the coat reminds us of the man on which we are accustomed to seeing it: this thesis preserves its force for structural psychology. Here, the coat and the man that wears it form a unified structure, a structure which is entirely analogous to the word and the thing it designates. The fact that the coat may remind us of its owner and that the man's form may remind us of his coat are once again explained in this new psychology through a single set of structural laws. The principle of association is replaced with the principle of structure.

Like the principle of association, this new principle is extended to all relationships, extended universally and without differentiation. Representatives of the old psychology argue that the connection between the word and its meaning is formed in the same way as the connection between the stick and the banana. Is this not the same connection that we have discussed in our example? In the new psychology, as in the old, any possibility of explaining the unique relationships between word and meaning is excluded. There is no fundamental distinction between these relationships and other object relationships. In the twilight of universal structural relations, all cats are gray. As had earlier been the case in the twilight of universal associative connections, it is impossible to distinguish them.

Ach attempted to overcome the concept of associations by using the concept of the determining tendency. Gestalt psychology made the same attempt, relying on structural principles. In both cases, however, two basic features of the old theory were preserved. First, Ach and the Gestalt psychologists preserved the concept that the connections between word and meaning are fundamentally identical to the connections between other things. Second, they preserved the notion that the word -- by its nature -- does not develop. The concept that the development of word meaning is completed at the moment the word emerges is as basic to Gestalt psychology as it was for traditional psychology. This is why the succession of research traditions in psychology -- while producing sharp advances in areas such as perception and memory -- appear to be ceaselessly marking time or revolving in a circle in their treatment of the issue of thinking and speech. One principle is replaced by another and the new is in radical opposition to what has preceded it. In their understanding of the relationship between thinking and speech, however, the old and new are like identical twins. In the words of the French proverb, the more things change the more they stay the same.

In its theory of speech, the new psychology retains the thesis of the old; it preserves the concept that thought is independent of word. In its theory of thinking, however, it actually takes a significant step backward. First, Gestalt psychology tends to reject the notion that there are laws that are specific to thinking as such; it tends to merge the laws of thinking with general structural laws. The Wurzburg school raised thought to the rank of a purely mental act, leaving the word in the domain of unchanging sensory associations. As we said, this was its basic flaw. Nonetheless, the Wurzburg school was able to differentiate the laws that govern the coupling, movement, and flow of thoughts from the more elementary laws that govern representations and perceptions. This psychology was more advanced than Gestalt psychology in this respect. Reducing the domestic chicken's perception, the chimpanzee's intellectual operations, and the child's first meaningful word to a common structural denominator, Gestalt psychology has not only erased any boundary between the structure of the meaningful word and the structure of the stick and banana -- it has erased the boundary between the highest forms of thinking and the most elementary perception.

If we summarize this modest critical outline of the basic contemporary theories of thinking and speech, we find two basic theses inherent to them. First, none of these

theories has grasped what is most basic and central to the psychological nature of the word; none has grasped what makes the word a word and without which it would no longer be one. All have overlooked the generalization that is inherent in the word, this unique mode of reflecting reality in consciousness. Second, these theories consistently analyze the word and its meaning in isolation from development. These two points are internally linked. Only an adequate conception of the word's mental nature can lead us to an understanding of the possibilities that exist for the development of the word and its meaning. These features are preserved at each stage in this sequence of research traditions. To this extent, they merely repeat one another. Thus, the conflicts among the various research traditions in the contemporary psychology of thinking and speech are reminiscent of Heine's humorous poem where he tells of the reign of the old and venerable Template (Schablon) who was killed by a dagger raised against him:

When they had finished with the coronation,
The new heir to kingdom and throne
Seemed to those who called him New Temmplate
Like the Old Template they'd already known.

2

The discovery of the changeable nature of word meanings and their development is the key to liberating the theory of thinking and speech from the dead end where it currently finds itself. Word meaning is inconstant. It changes during the child's development and with different modes of the functioning of thought. It is not a static but a dynamic formation. To establish the changeable nature of meaning, we must begin by defining it correctly. The nature of meaning is revealed in generalization. The basic and central feature of any word is generalization. All words generalize.

It is important to emphasize, however, that the fact that the internal nature of word meaning changes implies that the relationship of thought to word changes as well. To understand the changeable and dynamic relationship of thought to word, we need to take a cross-section of the genetic scheme of changes in meaning that we developed in our basic research. We need to clarify *the functional role of verbal meaning in the act of thinking.*

We have not yet had the opportunity to consider the process of verbal thinking as a whole. However, we have brought together all the information necessary to outline the basic features of this process. At this point, we will attempt to outline the complex structure of the actual process of thinking, the complex movement from the first vague emergence of a thought to its completion in a verbal formulation. For this purpose, we must move from a genetic to a functional plane of analysis. That is, we must now analyze not the development of meanings and their structure, but the process through which *meanings function in the living process of verbal thinking.* If we succeed in this, we will have shown that with each stage in development there exists not only a specific structure of verbal meaning, but a special relationship between thinking and speech that defines this structure. Functional problems are resolved most easily when we are studying the higher, developed forms of some activity, where the whole complexity of the functional structure appears in a well articulated, mature form. Therefore, we will consider issues of development only briefly, turning then to the study of the relationships of thought to word in the development of consciousness.

When we attempt to realize this goal, a grand and extraordinarily complex picture emerges before us, a picture that surpasses in subtlety the architectonics of researchers' richest expressions. In the words of Tolstoy, "the relationship of word to

thought and the formation of new concepts is the most complex, mysterious, and delicate process of the spirit (1903, p. 143).

Before moving on to a schematic description of this process, we will state our leading concept. This central idea -- a concept we will develop and clarify in the following discussion -- can be expressed in the following general formula: The relationship of thought to word is not a thing but a process, a movement from thought to word and from word to thought. Psychological analysis indicates that this relationship is a developing process which changes as it passes through a series of stages. Of course, this is not an age related development but a functional development. The movement of thinking from thought to word is a developmental process. Thought is not expressed but completed in the word. We can, therefore, speak of the establishment (i.e., the unity of being and nonbeing) of thought in the word. Any thought strives to unify, to establish a relationship between one thing and another. Any thought has movement. It unfolds. It fulfills some function or resolves some task. This flow of thought is realized as an internal movement through several planes, as a transition from thought to word and from word to thought. Thus, the first task in an analysis of the relationship of thought and word as a movement from thought to word is to analyze the phases that compose this movement, to differentiate the planes through which thought passes as it becomes embodied in the word. To paraphrase Shakespeare, much opens up before us here of which "even wise men have not dreamed."

Our analysis leads first to the differentiation of two planes of speech. Though they form a unity, the inner, meaningful, semantic aspect of speech is associated with different laws of movement than its external, auditory aspect. The unity of speech is complex, not homogeneous. This differentiation in the movement of the semantic and sound aspects of speech is reflected in several factors related to the ontogenesis of speech development. In the present context, we will note only two major factors.

First, we know that the development of the external aspect of speech in the child begins with the initial single word utterance and moves to the coupling of two or three words, then to the simple phrase and the coupling of phrases, and still later to the complex sentence and connected speech composed of a series of complex sentences. Thus, in mastering the external aspect of speech, the child moves from the part to the whole. In its meaning, however, we know that the child's first word is not a one word sentence but a whole phrase. Thus, in the development of the semantic aspect of speech, the child begins with the whole -- with the sentence -- and only later moves to the mastery of particular units of meaning, to the mastery of the meanings of separate words. The child begins with the whole and only subsequently partitions its fused thought which is expressed in the one word sentence into a series of separate though interconnected verbal meanings. Thus, the development of the semantic and external aspects of speech move in opposite directions. The semantic aspect of speech develops from the whole to the part or from the sentence to the word. The external aspect of speech moves from the part to the whole or from the word to the sentence.

This alone is sufficient to demonstrate the necessity of distinguishing the development of the meaningful and the external aspects of speech. Movement along these two planes does not coincide; it does not merge into a single line. As this example indicates, it can follow lines that move in opposite directions. Of course, this does not imply a rupture in the relationship between these two planes of speech. It does not imply that they are autonomous of one another. On the contrary, the differentiation of these two planes is a first and a necessary step in establishing their internal unity. This unity presupposes that each of these two aspects of speech has its own movement and that the relationships between these movements are complex. We can analyze the relationships underlying the unity of speech only after we have differentiated the aspects

of speech among which these complex relationships exist. If both these aspects of speech appeared as one -- if they coincided with one another and merged in a single line -- we could not speak of their relationship, since it is impossible to have a relationship between a thing and itself. The internal unity of these two aspects of speech emerges no less clearly than their lack of correspondence. The child's thought emerges first in a fused, unpartitioned whole. It is for precisely this reason that it must be expressed in speech as a single word. It is as though the child selects the verbal garment to fit his thought. To the extent that the child's thought is partitioned and comes to be constructed of separate parts, his speech moves from parts to a partitioned whole. Correspondingly, to the extent that the child moves in his speech from parts to the partitioned whole of the sentence, he can move in his thought from an unpartitioned whole to parts.

Even at the outset, then, thought and word are not cut from a single mold. In a certain sense, one can say that we find more opposition than agreement between them. The structure of speech is not a simple mirror image of the structure of thought. It cannot, therefore, be placed on thought like clothes off a rack. Speech does not merely serve as the expression of developed thought. Thought is restructured as it is transformed into speech. It is not expressed but completed in the word. Therefore, precisely because of their contrasting directions of movement, the development of the internal and external aspects of speech form a true unity.

A second fact of no less importance characterizes a later phase of development. As we noted earlier, Piaget established that the child masters the complex structure of the subordinate clause (composed of conjunctions such as "because," "despite," "since," and "although") earlier than he masters the semantic structures that correspond with these syntactic forms. In other words, the child's grammar develops before his logic. Over the entire extent of the school age, the child uses conjunctions correctly and adequately in spontaneous speech in expressing causal, temporal, adversative, conditional, and other dependencies. He is not, however, consciously aware of the semantic aspect of these conjunctions nor is he able to use them voluntarily. Once again, then, the movements of the semantic and external aspects of the word in the mastery of complex syntactic structures do not coincide. Analysis of the word indicates, however, that this lack of correspondence does not exclude the unity of grammar and logic in the development of the child's speech. In fact, this lack of correspondence is fundamental to the internal unity of meaning and word that is expressed in complex logical relations.

This lack of correspondence between the semantic and external aspects of speech emerges less directly but even more clearly in the functioning of developed thought. To see this, we must shift our analysis from the genetic to the functional plane. First, however, it is important to note that the facts which have emerged in our discussion of the genesis of speech allow us to draw several important conclusions concerning the nature of functional relationships. We have seen that the development of the meaningful and external aspects of speech move in opposing directions during the entirety of the early childhood period. It is, therefore, no surprise that we would never find complete correspondence between them at any point in the developmental process.

A more striking set of facts can be taken directly from the functional analysis of speech, facts that are well known to psychologically oriented contemporary linguistics. Of many relevant facts, the most significant are those which indicate a lack of correspondence between the grammatical and the psychological subject and predicate.

Fasler argues that it is wrong to use a grammatical framework in interpreting the meaning of linguistic phenomena, since the psychological and grammatical articulation of speech do not always correspond. Uland[77] begins the prologue to "Herzog Ernst Shvabskii" with the words: "A severe spectacle opens up before you." Grammatically,

"severe spectacle" is the subject of this sentence and "opens up" is the predicate. If we consider the psychological structure of the phrase, however, "opens up" is the subject and "severe spectacle" the predicate. The poet is trying to say here that what is going to occur before us is a tragedy. In the listener's consciousness, what is represented first is that he is going to observe a spectacle. This is what the phrase speaks about. It is the psychological subject of the phrase. What is new -- what is said about this subject -- is that the spectacle will be a tragedy. This, then, is the psychological predicate.

The following example clarifies this lack of correspondence between the grammatical and psychological subject and predicate still more clearly. Consider the phrase, "The clock fell." Here, the "clock" is the grammatical subject and "fell" the predicate. This phrase can be used in different situations and can express different thoughts while retaining this form.

Consider two situations. In the first, I notice that the clock has stopped and I ask why. I am told: "The clock fell." Here, the clock is in my consciousness initially. It is the psychological subject that is spoken about. The representation that it fell arises second. Here, "fell" is the psychological predicate. It is "fell" that says something about the subject. Here, there is correspondence between the grammatical and psychological partitioning of the phrase. However, this kind of correspondence is not inevitable.

Consider the following situation: I am working at my desk. I hear a noise from a falling object and ask what it was that fell. The same phrase is used to answer my question, but here it is the falling that is initially represented in consciousness. "Fell" is what is spoken about in this phrase; it is the psychological subject. The clock is what is said of this subject, what arises in consciousness second; it is the psychological predicate. This thought might better be expressed as follows: "What fell is the clock." In the first situation, the psychological and grammatical predicate correspond. In the second, they do not.

Any part of a complex phrase can become the psychological predicate and will carry the logical emphasis. The semantic function of this logical emphasis is the isolation of the psychological predicate. According to Paul[78], the grammatical category is to some extent a fossil of the psychological category. It therefore needs to be revived by a logical emphasis that clarifies its semantic structure. Paul demonstrates that a wide variety of meanings can reside in a single grammatical structure. Thus, correspondence between the grammatical and psychological structure of speech may be encountered less frequently than we generally assume. Indeed, it may merely be postulated and rarely if ever realized in fact. In phonetics, morphology, vocabulary, and semantics -- even in rhythm, metrics, and music -- the psychological category lies hidden behind the grammatical or formal category. If the two appear to correspond with one another in one situation, they diverge again in others. We can speak not only of the psychological elements of form and meaning, not only of the psychological subject and predicate, but of psychological number, gender, case, pronouns, superlatives, and tenses. Thus, what is a mistake from the perspective of language, may have artistic value if it has an original source. Consider Pushkin's poem:

> Like rosy lips without a smile, I would not love Russian speech,
> Without grammatical errors.

This has a more profound meaning than is generally assumed. Only in mathematics do we find a complete elimination of incongruities in the use of common and unquestionably correct expressions. It appears that it was Descartes who first saw in mathematics a form of thinking that has it origins in language but has nonetheless surpassed it. We

can say only one thing: In its oscillation and in the incongruity of the grammatical and the psychological our normal conversational language is in a state of dynamic equilibrium between the ideals of mathematics and the harmony of imagination. It is in the state of continuous movement that we call evolution.

These examples demonstrate the lack of correspondence between the external and the semantic aspects of speech. At the same time, however, they show that this does not exclude their unity. On the contrary, it presupposes such a unity. This lack of correspondence does not interfere with the realization of thought in the word. Indeed, it is necessary for the movement from thought to word.

To clarify this internal dependency between the two planes of speech, we will give two examples of how changes in the formal and grammatical structure of speech lead to profound changes in its sense. Krylov, in the fable, "The Dragonfly and the Ant", substituted the dragonfly for La Fontaine's grasshopper while retaining the inapplicable epithet "the jumper." In French, the word grasshopper is feminine. It is, therefore, well suited to embody the image of a carefree attitude and feminine lightheadedness. In Russian -- because the grammatical gender of "grasshopper" is masculine -- this nuance of meaning critical to the illustration of frivolity would have disappeared had the fable been translated literally. Therefore, Krylov took grammatical gender over actual meaning -- substituting the dragonfly for the grasshopper -- while preserving characteristics of the grasshopper such as jumping and singing that are clearly not characteristic of the dragonfly. Thus, to adequately translate the sense of the tale, the feminine grammatical gender had to be preserved.

We find something similar in the Russian translation of Heine's poem, "The Fir and the Palm." In German, "fir" is masculine in gender. Thus, in German, the poem symbolizes love for women. To preserve the sense of the German text, Tiutchev substituted a cedar for the fir, since in Russian "cedar" is masculine. In contrast, by translating the poem literally, Lermontov lost this sense. As a consequence, his translation gives the poem a fundamentally different sense, one that is more abstract and generalized. Thus, a change in a single, seemingly insignificant, grammatical detail can lead to a change in the whole meaningful aspect of speech.

We can summarize what we have learned from this analysis of the two planes of speech in the following way. First, these two planes do not correspond. There is a second, inner, plane of speech standing beyond words. The independence of this grammar of thought, of this syntax of verbal meanings, forces us to see -- even in the simplest of verbal expressions -- a relationship between the meaningful and the external aspects of speech that is not given once and forever, a relationship that is not constant or static. What we do see is movement. We see a continuous transition from the syntax of meanings to the grammar of words, a transformation of sense structure as it is embodied in words.

Obviously, if the external and the semantic aspects of speech do not correspond, the verbal expression cannot emerge directly in its fully developed form. As we have seen, the semantic and the verbal syntax arise neither simultaneously nor together. Transition and movement from one to the other is inherent in the process. Moreover, this complex process involved in the transition from meanings to sounds itself develops. This development constitutes an important aspect of the development of verbal thinking. The partitioning of speech into semantics and phonology is not given at the outset. It arises in the course of development. The child must differentiate these two aspects of speech. He must become consciously aware of the different nature of each to permit the gradual descension that is presupposed in the living process of meaningful speech. In the child, we initially find a lack of conscious awareness of verbal forms and verbal meanings. The two are not differentiated. The word and its sound

structure are perceived as a part or characteristic of the thing. They are not differentiated from its other characteristics. This phenomenon appears to be inherent in any primitive linguistic consciousness.

Humboldt[79] relates an anecdote about a peasant who was listening to student astronomers as they were discussing the stars. At one point, the peasant turned to the students and said: "I understand that people have measured the distance from the Earth to the most distant stars with these instruments, that they have identified their distribution and movement. What I want to know is how they learned their names." Here, the peasant has assumed that the names of the stars can only be learned from the stars themselves. Simple experiments with children have shown that children explain the names of objects by referring to their characteristics even in the preschool age: "A cow is called "cow" because it has horns, a calf "calf" because his horns are still small, a horse "horse" because it has no horns, a dog "dog" because it has no horns and is small, and an automobile "automobile" because it is not alive at all." When asked if one could substitute the name of one object for another (e.g., calling a cow "ink" and ink "cow") children answer that this is impossible because you write with ink and a cow gives milk. The characteristics of the thing are so closely connected with its name that to transfer the name means to transfer the characteristics.

The difficulty the child has in transferring the name of one thing to another becomes apparent in experiments where the child is asked to establish temporary names for objects. In one experiment, the names of "cow and dog" and those of "window and ink" were interchanged. The child was asked: "If the dog has horns, does the dog give milk?" The child answered: "It'll give." The child was then asked: "Does a cow have horns?" The child answered: "It has." The experimenter responded: "Cow -- that is a dog. Does a dog really have horns?" The child answered: "Of course. Here the dog is a cow. If it is called a cow there must be horns. With the kind of dog that is called a cow there must be little horns." Here, we can see how difficult it is for the child to distinguish the name of the thing from its characteristics. We can see how its characteristics follow the name in the way that property follows its owner. Similar results emerged with questions about the characteristics of ink and window when their names were exchanged. Though with great difficulty, correct answers were initially given to questions. However, we received a negative answer to the question of whether ink is transparent. The experimenter responded: "But "ink" is "window and "window" is "ink."" The child countered: "It doesn't matter. Ink is ink and non-transparent."

This example illustrates the thesis that the *auditory aspect of the word is an immediate unity* for the child, that it is undifferentiated and lacking in conscious awareness. One extremely important line of speech development in the child is the *differentiation of this unity and emergence of conscious awareness of it*. Thus, in early development we have a merging of the two planes of speech. With age, there is gradual differentiation. The distance between the two planes increases. To each stage in the development of verbal meaning and the emergence of conscious awareness of these two planes, there corresponds a specific relationship of the semantic and external aspects of speech and a specific path from meaning to sound. The inadequate differentiation of these planes of speech in the earlier ages is linked with a limited potential for expressing and comprehending thought.

If we consider what we said at the outset about the communicative function of meanings, it becomes clear that the child's social interaction through speech is immediately linked with his differentiation and conscious awareness of verbal meanings. To clarify this thought, we must consider an extremely important characteristic of word meanings that we discussed in the analysis of our experimental findings. In our analysis of the word's semantic structure, we distinguished between its object relatedness

and its meaning. We tried to show that the two do not coincide. In functional terms, this caused us to differentiate the word's indicative and nominative function from its signifying function. If we compare these structural and functional relationships in the initial, middle, and end points of development, the following genetic sequence becomes apparent. Initially, we have only object relatedness in the structure of the word. The word's function is exclusively indicative and nominative. Meaning independent of object relatedness, signification independent of the indication and naming of the object, arises later, developing along the path that we attempted to outline earlier.

This makes it apparent that from the moment these structural and functional characteristics of the word emerge in the child they diverge from the characteristics of the word in both its opposing aspects. On the one hand, the word's object relatedness is expressed more clearly and more strongly in the child than in the adult. For the child, the word is part of the thing. It is one of the characteristics of the thing. Thus, the child's word is much more closely connected with the object than the adult's. This underlies the much greater relative weight of object relatedness in the word of the child. On the other hand, precisely because the word is connected more closely with the object for the child -- precisely because it is a part of the thing -- it can more easily be isolated from the object than can the adult's word. It can more easily take an independent place in thought, more easily live an independent life. In this way, the insufficient differentiation of object relatedness and word meaning in the child leads to a situation where the child's word is simultaneously closer to reality and further from it than the adult's. The child does not initially differentiate between word meaning and the object nor between the meaning and the sound form of the word. In development, this differentiation occurs in accordance with the development of generalization. It is only with the completion of the developmental process -- at the point where we find true concepts -- that the complex relationships between the partitioned planes of speech first arise.

This ontogenetic differentiation of the two speech planes is accompanied by the development of the path that thought follows in the transformation of the syntax of meanings into the syntax of words. Thought imprints a logical emphasis on one word in a phrase, isolating the psychological predicate. Without this, no phrase would be comprehensible. Speaking requires a transition from the internal to the external plane. Understanding presupposes movement in the reverse direction, from the external plane of speech to the internal.

3

We must take an additional step to penetrate the internal aspect of speech more deeply. The semantic plane is only the first of the internal planes of speech. Beyond it lies the plane of inner speech. Without a correct understanding of the psychological nature of inner speech, we cannot clarify the actual complex relationships between thought and word.

There has been more confusion in attempts to address this problem than with any of the other issues associated with the theory of thinking and speech. Much of this confusion has its source in a lack of terminological clarity. The term "inner speech" or "endophasia" is used in the literature to refer to a wide variety of phenomena. This has led to a great deal of misunderstanding, with researchers often arguing about very different things that are designated by a single term. Until some terminological clarity is introduced, it will be impossible to systematize our knowledge of the nature of inner

speech. It is because this work has not yet been done that there currently exists no systematic presentation of even the simplest empirical data on this problem.

Initially, it appears that the term "inner speech" referred to verbal memory. I can learn a poem by heart and reproduce it only in memory. Like any object, the word can be replaced by a mental representation or image in memory. Within this framework, inner speech differs from external speech in the same way that a representation of an object differs from the object itself. It is in precisely this sense that inner speech was understood by French scholars in their studies of the memory images through which this reproduction of the word is realized (i.e., autistic, optical, motoric, or synthetic images). Of course, memory is one feature that defines the nature of inner speech. However, memory alone does not exhaust the content of this concept. It does not even correspond with it directly. The older scholars consistently equate the reproduction of the word through memory with inner speech. However, these are two different processes that must be carefully distinguished.

The second meaning commonly attributed to the term "inner speech" implies an abbreviation of the normal speech act. Here, inner speech is called unpronounced, silent, or mute speech. In accordance with Miller's well known definition, it is speech minus sound. According to Watson, inner speech is precisely the same as external speech with the exception that it is not completed. Bekhterev[80] similarly defined inner speech as a speech reflex where the motor component is not manifested. Sechenov[81] defined it as a reflex that is cut off when two thirds of its course is completed. Recently, Shilling has proposed the term "speaking" [*govorenie*], using this term to designate the concept of inner speech that is shared by the authors we have just mentioned. This concept differs from inner speech qualitatively in that it incorporates only the active, not the passive, processes of speech activity. It differs qualitatively from inner speech in that it refers to the initial motor activity of the speech function. From this perspective, inner speaking is only part of the function of inner speech. It is a speech-motor act of an initial character, an impulse that is not completely expressed in articulatory movements or one that is manifested in movements that are silently and unclearly expressed but nonetheless accompany, reinforce, or hinder the thinking function. These ideas identify a feature basic to a scientific concept of inner speech. Once again, however, this conception does not exhaust the concept inner speech nor even correspond with it entirely.

The third and most diffuse of all conceptions of inner speech reflects an extremely broad interpretation of the concept. For example, Kurt Goldstein[82] uses the phrase to refer to all that precedes the motor act of speaking, the entire internal aspect of speech itself. He breaks this down into two components. The first is the linguist's inner speech form or Wundt's speech motive. The second is an experience specific to speech. It is an experience that is neither sensory nor motor in nature and is well known to all -- though it defies precise characterization. Thus, uniting the entire internal aspect of speech activity in the concept of inner speech -- fusing the French scholars' conception of inner speech with the German word-concept -- Goldstein places inner speech at the center the whole speech process. This conception of inner speech correctly addresses the negative aspect of the phenomenon's definition. Sensory and motor processes do indeed have a subordinate significance in inner speech. However, the positive aspect of Goldstein's definition of inner speech is extremely confused and, consequently , false. The center of the entire speech process cannot be identified with an experience consecrated only in intuition, an experience that is not submitted to any objective analysis -- whether functional or structural. It is equally wrong to identify this experience with inner speech. The identification of inner speech with this experience dissolves the structural planes that have been distinguished

through psychological analysis. In fact, precisely because this speech experience is common to all forms of speech activity it is useless as a means of isolating inner speech as a unique speech function. If we take Goldstein's perspective to its conclusion, we find that inner speech is not speech but thought and affective-volitional activity. It includes speech motives as well as the thought that is expressed in the word. What this concept actually refers to are all the internal processes that occur before the act of speaking, that is, the entire internal aspect of external speech.

If we are to understand this phenomenon, we must begin with the thesis that *inner speech is a psychological formation that has its own unique nature*, the thesis that inner speech is a unique form of speech activity that has unique characteristics and stands in complex relationships to other speech forms. To study the relationships of inner speech to thought and to the word, we must identify what distinguishes inner speech from thought and word. We must clarify its unique function.

In our view, it is important in this connection that in one case I am speaking to myself and in the other to another. Inner speech is speech for oneself. External speech is speech for others. This is a fundamental functional difference in the two types of speech that will have inevitable structural consequences. In our view, then, it is incorrect to view the difference between inner and external speech as one of degree rather than of kind (as Jackson and Head, among others, have done). The presence or absence of vocalization is not a cause that explains the nature of inner speech. It is the consequence of its nature. Inner speech is not merely what precedes or reproduces external speech. Indeed, in a sense, it is the opposite of external speech. External speech is a process of transforming thought into word; it is the materialization and objectivization of thought. Inner speech moves in the reverse direction, from without to within. It is a process that involves the evaporation of speech in thought.* This is the source of the structure of inner speech, the source of all that structurally differentiates it from external speech.

Inner speech is among the most difficult domains of psychological research. As a consequence, most theories of inner speech are arbitrary and speculative constructions based on little empirical data. The experiment has been used primarily as a demonstration or illustration. Research has centered on attempts to identify subtle shifts in articulation and respiration, factors that are at best three stages removed from the phenomenon of inner speech. This problem has remained almost inaccessible to the experiment because genetic methods have not be utilized. Development is the key to understanding this extremely complex internal function of human consciousness. By identifying an adequate method for investigating inner speech, we can move the entire problem from its current stalemate. The first issue we must address, then, is that of method.

Piaget was apparently the first to recognize the special function of egocentric speech in the child and to understand its theoretical significance. Egocentric speech is a common phenomenon in the child, one familiar to all who deal with children. Piaget did not overlook its significance. He attempted to study it and interpret it theoretically. However, he remained entirely blind to the most important characteristics of egocentric speech, that is, to its genetic origins and its connections with inner speech. As a consequence, his interpretation of its nature was false in functional, structural, and genetic terms.

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* It is apparent from the context that in using the expression "the evaporation of speech in thought," Vygotsky is referring to a qualitative change in the speech process with the act of thought, not to the disappearance of the word. Editors' note.

Using Piaget as a point of departure, our research has focused on the relationship between egocentric and inner speech. As a consequence, we have identified a means for studying inner speech experimentally.

Earlier, we outlined the basic considerations that caused us to conclude that *egocentric speech passes through a several stages that precede the development of inner speech.* These considerations can be classed in three groups. First, in functional terms, we found that egocentric speech fulfills an intellectual function similar to that of inner speech. Second, we found that the structure of egocentric speech is similar to that of inner speech. Third, in our genetic analysis, we combined Piaget's observation that egocentric speech atrophies in the school-age child with several facts that forced us to associate this event with the initial development of inner speech. This led to the conclusion that as egocentric speech atrophies it is transformed into inner speech. This new working hypothesis concerning the structure, function, and ontogenetic fate of egocentric speech facilitated a radical restructuring of our entire theory of the phenomenon. More importantly, however, this new hypothesis provided an access route to the problem of the nature of inner speech. If our proposal that egocentric speech is an early form of inner speech is verified, the problem of finding a method of studying inner speech is resolved.

This implies that egocentric speech is the key to the study of inner speech. Egocentric speech is still vocal and audible. Though internal in function and structure, egocentric speech is external in manifestation. In any investigation of a complex internal process, we must externalize that process to allow experimentation; we must connect it to some form of external activity. This permits an objective functional analysis based on observable external aspects of the internal process. With egocentric speech, we have what might be called a natural experiment. *Egocentric speech -- a process internal in nature but external in manifestation -- is accessible to direct observation and experimentation.* Thus, the study of egocentric speech is the method of choice for the study of inner speech.

The second advantage of this method is that it allows us to study egocentric speech dynamically in *the process of its development.* It allows us to study the gradual disappearance of certain characteristics and the gradual development of others. This provides us with the potential for understanding the trends characteristic of the development of inner speech. By analyzing what drops out in the developmental process, we can identify what is inessential to inner speech. Correspondingly, by analyzing what tends to be strengthened, what emerges more and more clearly in the developmental process, we can identify what is essential to it. Relying on methods of interpolation, we can follow the development from egocentric to inner speech and draw conclusions concerning the nature of inner speech itself.

Before we discuss the results we have obtained by using this method, we must first clarify its theoretical foundation by outlining our general conception of egocentric speech. We will begin by contrasting Piaget's theory of egocentric speech with our own.

According to Piaget, the child's egocentric speech is a direct expression of the egocentrism of his thought. In turn, the child's egocentrism is a compromise between the initial autism of the child's thinking and its gradual socialization. This compromise differs with each stage in the child's development. It is a dynamic compromise. As the child develops, the elements of autism decrease while those of socialized thought increase. The result is that egocentrism in both thinking and speech is gradually reduced to nothing.

Piaget's view of the structure, function, and fate of egocentric speech flows directly from this understanding of its nature. In egocentric speech, the child need not

accommodate himself to adult thought. As a consequence, his thought remains maximally egocentric. This is reflected in the incomprehensible nature of egocentric speech, in its abbreviation, and in several other structural characteristics. Functionally, egocentric speech does nothing more than accompany the basic melody of the child's activity, changing nothing in the melody itself. It has no independent functional significance. Because it is simply the expression of the child's egocentrism -- a phenomenon that is doomed to atrophy in the course of the child's development -- the genetic fate of egocentric speech is to disappear along with the egocentrism of the child's thought. Thus, the development of egocentric speech follows a falling curve. The apex of this curve lies at the beginning of the developmental process and drops to nothing at the threshold of the school age.

Thus, we can say of egocentric speech what Liszt said of the child prodigy: Its whole future lies in its past. Egocentric speech has no future. It does not arise and develop with the child; it simply atrophies. With egocentric speech, change is not an evolutionary but an involutionary process. At any stage of the child's development, this speech reflects the insufficient socialization of speech, the insufficient socialization of a speech that is initially individual in nature. Egocentric speech is the direct expression of the inadequate and incomplete socialization of speech.

In contrast, our own theory suggests that the child's egocentric speech is one aspect of the general transition from inter-mental functions to intra-mental functions, one aspect of the transition from the child's social, collective activity to his individual mental functions. As we have shown in one of our earlier works,* this transition constitutes the general law of the development of all higher mental functions. Initially, these functions arise as forms of cooperative activity. Only later are they transformed by the child into the sphere of his own mental activity. Speech for oneself has its source in a differentiation of an initially social speech function, a differentiation of speech for others. Thus, the central tendency of the child's development is not a gradual socialization introduced from the outside, but a gradual individualization that emerges on the foundation of the child's internal socialization.

This changes our perspective on the structure, function, and fate of egocentric speech. Having received a new assignment, speech is naturally reconstructed and takes on a new structure that corresponds with its new functions. We will consider the structural characteristics of inner speech in more detail later. At this point, we would only emphasize that these characteristics do not atrophy. They are not smoothed away and reduced to nothing. They are strengthened and grow. They evolve and develop in correspondence with the child's age. Like egocentric speech as a whole, they follow a rising not a falling curve.

Our experiments make it clear that the function of egocentric speech is closely related to the function of inner speech. It is not an accompaniment of the child's activity. It is an independent melody or function that facilitates intellectual orientation, conscious awareness, the overcoming of difficulties and impediments, and imagination and thinking. It is speech for oneself, a speech function that intimately serves the child's thinking. The genetic fate of egocentric speech is much different from that depicted by Piaget. Egocentric speech develops along not a falling but a rising curve. Its development is not an involution but a true evolution. It has no relationship to the processes of involution so well known to biology or pediatrics, to processes such as the healing and shedding of the umbilical cord or the obliteration of Botallov's channel and the umbilical veins in the newborn. It is more comparable to processes of the child's development that are directed forward, processes that are by nature construc-

* Here, Vygotsky is referring to, "The Development of the Higher Mental Functions," which will be published in a later volume of the Collected Works. Editors' note.

tive and creative and have an entirely positive significance for development. Our hypothesis suggests that egocentric speech is speech that is internal in its mental function and external in its structure. It is fated to develop into inner speech.

This hypothesis has several advantages over Piaget's. It allows a more adequate explanation of the structure, function, and fate of egocentric speech. It is in closer agreement with the experimental data we obtained which indicate that the coefficient of egocentric speech increases with the introduction of difficulties that require conscious awareness and reflection. These facts are not explained by Piaget.

The decisive advantage of our hypothesis, however, is that it explains an important and pervasive characteristic of the development of egocentric speech that is paradoxical and inexplicable from Piaget's perspective. According to Piaget's theory, egocentric speech atrophies as the child gets older. Its quantitative significance decreases in accordance with the level of the child's development. This perspective would cause us to anticipate that the unique structural characteristics of egocentric speech would become less and less prominent as egocentric speech disappears. It is difficult to imagine that the process through which egocentric speech gradually atrophies would be reflected in the quantity of egocentric speech but not in its internal structure. If the structural characteristics of egocentric speech are rooted in the child's egocentrism, one would expect that they would fade into the background as the child's egocentrism atrophies. That is, one would expect that the structural characteristics of egocentric speech -- characteristics expressed primarily in its incomprehensibility for others -- would gradually disappear entirely along with egocentric speech itself. The internal structure of egocentric speech should become increasingly similar to that of socialized speech. It should become increasingly comprehensible.

What do we find when we look at the empirical data? Is the three year old's egocentric speech in fact less comprehensible than that of the seven year old? Among the most important and decisive empirical findings of our research is that the structural characteristics of egocentric speech that differentiate it from social speech -- the characteristics that make it incomprehensible to others -- increase rather than decrease with age. At three years of age, the differences between egocentric and social speech are minimal. They reach their peak at seven years of age. Thus, these characteristics do not atrophy but evolve, reversing the pattern that characterizes the coefficient of egocentric speech. While the latter steadily decreases, dropping to nothing at the threshold of the school age, the structural characteristics of egocentric speech continue to develop in the opposite direction. That which is unique to egocentric speech increases from almost nothing at three years of age to nearly one hundred percent.

Piaget's theory cannot explain how this atrophy of childhood egocentrism and egocentric speech can be associated with the rapid development of the characteristics that distinguish egocentric speech from social speech. Our own hypothesis allows us to reconcile these facts. Moreover, it helps us understand why the coefficient of egocentric speech decreases as the child develops, that is, it helps explain the phenomenon that provided the foundation on which Piaget constructed his entire theory of egocentric speech.

What is the fundamental significance of the finding that the coefficient of egocentric speech decreases as the age of the child increases? As we have seen, the structural characteristics of inner speech and its functional differentiation from external speech increase with age. Only one characteristic of egocentric speech fades away -- its vocalization. Does this fading of vocalization indicate that the whole of egocentric speech atrophies? Such an assumption leaves the development of the structural and functional characteristics of egocentric speech entirely unexplained. The reduction of the coefficient of egocentric speech becomes fully comprehensible and meaningful,

however, if we consider it in the context of the development of the other characteristics of egocentric speech. In fact, the contradiction between the rapid disappearance of one symptom of egocentric speech (i.e., its vocalization) and the equally rapid strengthening of its other symptoms (i.e., its structural and functional differentiation) is only apparent.

Our data indicate that the structural and functional characteristics of egocentric speech develop along with the development of the child. At three years of age, there is little difference between egocentric and communicative speech. By seven years of age, nearly all the functional and structural characteristics of egocentric speech differ from those of social speech. In our view, this finding indicates the progressive differentiation of the two speech functions, *the isolation of speech for oneself and speech for others from a general, undifferentiated speech function* that fulfills both these tasks in early childhood. There is no question about this. It is a fact, and it is widely known that it is difficult to argue with facts.

Once this is understood, related issues are immediately clarified. The structural and functional characteristics of egocentric speech -- its internal structure and its mode of activity -- develop and differentiate it from external speech. To the extent that these specific characteristics of egocentric speech develop, *its external, acoustic aspect will inevitably atrophy*. Its vocalization and external expression will become less prominent and, in the end, disappear. This in fact occurs, and is expressed in the drop in the coefficient of egocentric speech that has been observed between the ages of three and seven years. To the extent that the function of egocentric speech is differentiated from that of social speech, its vocalization becomes functionally superfluous and meaningless. We know our own phrase before we pronounce it. Moreover, to the extent that the structural characteristics of egocentric speech develop, vocalization becomes impossible. Speech for oneself is very different in its structure from speech for others. It simply cannot be expressed in the foreign structure of external speech. This structurally unique form of speech *must have a special form of expression*; its structure and organization has ceased to correspond with that of external speech. The development of the functional characteristics of egocentric speech, its isolation as an independent speech function, and the gradual formation of its independent internal nature, inevitably lead to a situation where its external manifestations become impoverished. It is at this point that its vocal aspect is lost. At a certain moment in development, when speech for oneself is finally differentiated from speech for others, it must cease to be vocal speech. This creates the illusion that it disappears or atrophies entirely.

However, this is precisely an illusion. It is as much an error to view the drop in the coefficient of egocentric speech as a symptom of its disappearance as it would be to assume that the moment when the child stops using his fingers to count -- the moment when he moves from counting aloud to counting in his mind -- indicates that counting itself has disappeared. In both cases a systematic disappearance, a negative symptom of involution, masks an entirely positive content. As we have shown, the drop in the coefficient of egocentric speech -- the fading of its vocalization -- is closely linked with the internal development and differentiation of this new speech form. What appear to be negative, involutionary symptoms are in fact evolutionary symptoms indicating that development is moving forward. They are symptomatic *not of a process of atrophy but of the emergence of a new form of speech.*

Thus, the fading external manifestations of egocentric speech reflect its developing abstraction from the vocal aspect of speech, that is, from a feature that is fundamental to external speech. It is, then, simply one aspect of the broader progressive differentiation of egocentric from communicative speech. It is a sign of the child's developing capacities to think or represent words while not pronouncing them, to operate

not with the word itself but with its image. The drop in the coefficient of egocentric speech has a clearly defined significance. It is part of the process where the development of the functional and structural characteristics of egocentric speech is realized. It is part of the development of egocentric speech toward inner speech. The fundamental difference between inner and external speech is the absence of vocalization in the former.

Inner speech is mute, silent speech. This is its basic distinction. It is precisely in this direction, in the gradual emergence of this distinction, that the evolution of egocentric speech occurs. Its vocalization fades. It becomes mute speech. This is inevitable, however, if egocentric speech is an early stage in the genesis of inner speech. That the disappearance of vocalization is a gradual process, that egocentric speech is differentiated from social speech in its function and structure before it is differentiated in its vocalization, is an extremely important fact. It indicates that the development of inner speech does not have its roots in the external weakening of the vocal aspect of speech; it does not move from speech to whisper and from whisper to mute speech. It indicates that the development of inner speech begins with its functional and structural differentiation from external speech, that it moves from external to egocentric speech, and then from egocentric to inner speech. This concept is the foundation of our hypothesis concerning the development of inner speech.

The contradiction is only apparent. The drop in the coefficient of egocentric speech is a symptom of the development of a basic characteristic of inner speech, its abstraction from the vocal aspect of speech. It is a symptom of the final differentiation of inner and external speech. Thus functional, structural, and genetic analysis -- indeed all the data we have on the development of egocentric speech (including that of Piaget's) -- provide consistent support for a single idea, the idea that *egocentric speech develops in the direction of inner speech.* The development of egocentric speech can be understood only as a gradual and progressive growth of the basic distinguishing characteristics of inner speech.

In this, we see irrefutable support for the hypothesis that we have developed concerning the nature and origin of egocentric speech. Moreover, in our view, this proves that the study of egocentric speech provides the foundation for understanding inner speech. However, for our hypothetical proposal to be transformed into a theoretical certainty, we must find a critical experiment, an experiment that will resolve which of these two conceptions of egocentric speech and its development corresponds with reality. We will turn to this critical experiment.

Consider the theoretical problem this experiment must resolve. In Piaget's view, egocentric speech arises from the inadequate socialization of what is initially an individual form of speech. In our view, it arises from the inadequate individualization of an initially social speech, from the inadequate isolation and differentiation of egocentric from social speech. In the first case, egocentric speech is a point on a falling curve that culminates in its disappearance. Here, egocentric speech has nothing but a past. In the second case, egocentric speech is a point on a rising curve, the culmination of which lies in the future in inner speech. Here, egocentric speech has a future. In the first case, speech for oneself -- inner speech -- is introduced from the outside in the socialization process in accordance with the principle mentioned earlier through which the red water is forced out by the white. In the second case, speech for oneself arises from egocentric speech; it develops from within.

To decide which of these views is correct, we had to demonstrate experimentally the direction of the effects of two types of changes in the situation in which egocentric speech occurs, specifically, changes that weaken the social aspects of the situation and changes that reinforce them. The data we have introduced in support of our concep-

tion of egocentric speech up to this point -- though of tremendous significance in our view -- provide only indirect support for our conception. Their significance depends on one's general framework of interpretation. In contrast, this experiment can provide a direct answer to our central question. It is an *experimentum crucis*.

If the child's egocentric speech stems from the egocentrism and inadequate socialization of his thinking, then any weakening of the social aspects of the situation, any seclusion or liberation of the child from his links with the collective, any increase in his psychological isolation, any loss of psychological contact with other people -- anything that liberates the child from the necessity of adapting to the thought of others and using socialized speech -- should lead to a sharp increase in the coefficient of egocentric over socialized speech. This would create the most favorable conditions possible for the liberation and full manifestation of the child's inadequately socialized thought and speech. If, on the other hand, egocentric speech stems from the inadequate differentiation of speech for oneself from speech for others, if it flows from an inadequate individualization of what is initially a social form of speech, these changes in the situation will be reflected in a sharp reduction in egocentric speech.

This is the question that motivated our experiment. As a point of departure for the construction of this experiment, we selected features of egocentric speech identified by Piaget himself. As a consequence, there can be no question of their empirical relationship to the circle of phenomena we are studying.

Though Piaget did not attribute any theoretical significance to them -- describing them merely as external features of egocentric speech -- three characteristics of egocentric speech struck us from the outset:

1. The fact that egocentric speech is a collective monologue, that it accompanies the child's activity in the collective (i.e., in the presence of other children) but not when the child is by himself.
2. The fact (noted by Piaget) that this collective monologue is accompanied by an illusion of understanding. The child believes and assumes that the egocentric expressions that he addresses to no one are understood by those around him.
3. The fact that speech for oneself has the character of external speech, that it is similar to socialized speech. It is not pronounced in a whisper for oneself.

These three essential characteristics of egocentric speech cannot be accidental. Egocentric speech has not yet been adequately differentiated from social speech. This is true subjectively, from the child's perspective. The result is the illusion of understanding. It is also true objectively, in terms of the situation. The result is that egocentric speech has the characteristic of collective monologue. Finally, this is true with respect to form. The result is that egocentric speech is vocalized. This alone causes us to question the validity of the notion that the source of egocentric speech lies in inadequate socialization. On the contrary, these characteristics of egocentric speech indicate that socialization is too extensive, that there is an inadequate differentiation of speech for oneself from speech for others. Egocentric speech, speech for oneself, seems to emerge in the objective and subjective conditions characteristic of social speech, of speech for others.

Our evaluation of these three features of egocentric speech is not the product of our own assumptions. In fact, Grunbaum reached a similar conclusion on the basis of Piaget's data. Grunbaum argues that superficial observation will frequently indicate that the child is entirely immersed in himself. This false impression is a function of our expectation that the three year old will relate logically to those around him. Because a logical relationship to reality is in fact not typical of the child, we falsely as-

sume that he lives immersed in his own thought and fantasy, that he has an egocentric set. When they are engaged in joint play, children between three and five years of age are frequently occupied only with themselves. Each speaks only to himself. If this talk is printed, it looks like conversation. Analysis indicates that it is a collective monologue where the participants do not listen or respond to one another. In reality, however, this prototype of the child's egocentric set demonstrates the social connectedness of the child's mind. The collective monologue does not represent an intentional isolation from the collective, an autism as that is defined by modern psychiatry. Indeed, it is symptomatic of the opposite mental structure. Even Piaget, who takes the child's egocentrism as the cornerstone of his whole theory of the child's mental characteristics, recognizes that children believe that they are speaking and listening to one another in the collective monologue. It is true, of course, that they do not attend to one another. This, however, reflects a shared assumption that the thoughts of each are the common property of all, even if these thoughts are expressed inadequately or remain entirely unexpressed.

Grunbaum argues that this demonstrates the inadequate differentiation of the child's individual mind from the social whole. However, the final resolution of this question cannot be found in a particular interpretation of these facts. A critical experiment is required. Our experiment involved the variation of the three characteristics of egocentric speech mentioned earlier: its vocalization, the illusion of understanding, and the fact that it is collective monologue. To clarify the nature and origin of egocentric speech, we systematically strengthened and weakened each of these characteristics through variations introduced into the experimental setting.

In the initial series of experiments, we attempted to destroy the illusion that egocentric speech is understood by other children by placing our subjects either among children who were either deaf or spoke a different language. In other respects, the experimental situations were no different from those where the coefficient of egocentric speech had been measured earlier with the same subjects, situations similar to those in Piaget's experiments. The sole variable in the experiment was the illusion of understanding. In the original experimental situation this illusion had emerged naturally. In these new experiments it was carefully excluded. We found that when the illusion of understanding was excluded the coefficient of egocentric speech fell sharply. In the majority of cases it fell to nothing. In the remaining cases, it was reduced on the average by a factor of eight.

Thus, the illusion of understanding is not accidental. It is not a by-product, an appendage or an epiphenomenon of egocentric speech but is functionally connected with it. These results are paradoxical for Piaget's theory. The less psychological contact between the child and the children around him, the weaker the child's connection with the collective, the less the situation presents the child with demands for socialized speech and for adapting his thought to the thought of others, the more freely egocentrism should be manifested in the child's thinking and, consequently, in his speech. If the child's egocentric speech is actually a function of the inadequate socialization of his thought and speech, no other conclusion is possible. From this perspective, when we exclude the illusion of understanding we should find not an increase but a decrease in the coefficient of egocentric speech. Our hypothesis suggests the true source of egocentric speech is the inadequate individualization of speech for oneself, the failure to differentiate it from speech for others. These data indicate that egocentric speech cannot live and function in isolation from social speech. When we exclude the illusion of understanding -- a critical psychological feature of social speech -- egocentric speech atrophies.

The second series of critical experiments differed from the basic series on the variable of collective monologue. As in the first series of critical experiments, we initially measured the coefficient of egocentric speech in the basic situation where it appeared as collective monologue. We then transferred the child's activity to a situation where the potential for collective monologue was excluded. Specifically, we either placed the child with unfamiliar children (children with whom he did not enter conversation before, during, or after the experiment), placed him behind a table in the corner of a room in isolation from other children, or placed him in complete isolation. In each of these situations, the experimenter left midway through the experiment leaving the child alone. In general, the results of these experiments correspond with those of the first series. Excluding the collective monologue led to a sharp drop in the coefficient of egocentric speech, though the drop was generally less dramatic than in the first experiments. The mean relation of the coefficient of egocentric speech in the basic and second experiments was six to one. The various methods of excluding the collective monologue were associated with different levels of egocentric speech. However, the basic tendency toward a reduction was clearly manifested.

The argument we developed in our discussion of the first series of experiments can be repeated here. Obviously, collective monologue is not an accidental characteristic of egocentric speech. It is not a mere epiphenomenon. It has functional connections with egocentric speech. From the perspective of Piaget's hypothesis, this again presents a paradox. By excluding the collective, we should give full play to the manifestation of egocentric speech. If the source of egocentric speech for oneself actually lies in the inadequate socialization of the child's thinking and speech, the exclusion of the collective should lead to a rapid increase in the coefficient. If, on the other hand, the foundation of egocentric speech lies in the inadequate differentiation of speech for oneself from speech for others, the exclusion of the collective monologue should lead to a reduction in the coefficient.

In the third and final series of experiments, we focused on the vocalization of egocentric speech. After measuring the coefficient of egocentric speech in the basic situation, the child was transferred to a situation where the possibility for vocalization was restricted or excluded. Three arrangements were used. In the first, the child was seated in a large hall far from other children. In the second, an orchestra or some other loud noise was used to drown out the child's own voice as well as the voices of others. In the third, the child was forbidden to speak loudly. He was instructed to carry on conversation only quietly or in a soundless whisper. In each of these critical situations, we observed a drop in the coefficient of egocentric speech. The reduction in the coefficient was expressed in a somewhat more complex form that it had been in the second series of experiments. The relationship of the coefficient in the basic and critical experiments was five-and-four-tenths to one. The differences associated with the various modes of excluding or interfering with vocalization were even greater than in the second series. However, the basic pattern once again emerged clearly. When vocalization was excluded, there was a reduction in the coefficient of egocentric speech. Again, these data present a paradox for Piaget's hypothesis while providing direct support for our own.

These three series of experiments had a single goal. They focused on three phenomena that are associated with almost any expression of the child's egocentric speech; they focused on the illusion of understanding, the collective monologue, and vocalization. These three characteristics are shared by egocentric and social speech. In our experiments, we compared situations where these phenomenon were present and absent. We found that where these features were excluded, where we excluded

the features of speech common to speech for oneself and speech for others, there was inevitably a reduction in egocentric speech.

This provides a basis for our claim that the child's egocentric speech is a special form of speech. It provides a foundation for our claim that egocentric speech is a form of speech that is being differentiated functionally and structurally from social speech, but has not yet been fully differentiated from it. Egocentric speech has not become fully differentiated from social speech, the womb where it steadily develops and matures.

Consider the following situation: I sit at a desk and converse with a person who is behind me, a person whom I do not see. Unnoticed, this person leaves the room. However, I continue to speak guided by the illusion that I am heard and understood. Here, my speech is externally reminiscent of egocentric speech (i.e., speech in private and for oneself). Psychologically, however, it is social speech.

Compare this to the child's egocentric speech. Piaget assumes that the psychological nature of the child's egocentric speech is the opposite of that in our illustration. From the perspective of the child (i.e., psychologically and subjectively) his speech is egocentric; it is speech for himself. Only in its external manifestation is it social speech. Thus, its social character is an illusion, just as in the illustration the egocentric character of my speech is an illusion.

Our hypothesis suggests that the situation is much more complex. Functionally and structurally, the child's speech is egocentric. It is a special and independent form of speech. The special and independent nature of this form of speech has not, however, developed fully. It has not attained conscious awareness as inner speech either subjectively or psychologically. The child has not yet isolated it from speech for others. Objectively, this speech function has been differentiated from social speech. However, this process has not been completed. Thus, this speech continues to function only in situations where social speech is possible. If we consider both subjective and objective criteria, then, egocentric speech is a mixed speech form, a speech form that emerges in the transition from speech for others to speech for oneself. This constitutes the basic law of the development of inner speech. Speech for oneself (i.e., inner speech) becomes more internal in its function and structure -- in its psychological nature -- than in the external forms through which it is manifested.

This provides the empirical foundation required for the thesis we have advanced. The key to the investigation of the psychological nature of inner speech lies in the investigation of egocentric speech, in the analysis of the development of the characteristics fundamental to its function and structure. We can turn, then, to the basic results of our investigation, to a brief characterization of the third plane in the movement from thought to word, to the plane of inner speech.

4

Studying the development of inner speech in the child's egocentric speech has convinced us that the former is not speech minus sound but a speech function that is unique in its structure and function. Correspondingly, it has an entirely different organization than external speech. It has its own syntax. One characteristic of egocentric speech that manifests a clear developmental tendency is its fragmentation and abbreviation.

This observation is not new. All who have carefully studied inner speech have recognized that this fragmentation and abbreviation is its central feature. Even those such as Watson who have studied it from a behaviorist perspective have recognized

this fact. Inner speech has been seen as a mirror image of external speech only by those who reduce it to the reproduction of external speech in memory. As far as we know, however, no one has gone beyond the descriptive study of this characteristic. Indeed, a systematic descriptive analysis has not been completed. There are many phenomena associated with inner speech that find their expression in its fragmentary and abbreviated nature. Previous analyses have left these phenomena tangled in a single confused knot.

Through genetic analysis, we have attempted to partition the separate phenomena that characterize inner speech from this confused tangle and clarify their respective causes and explanations. Watson argued that this characteristic of silent speaking or thinking had its roots in the phenomenon of short circuiting common to habit development generally. He argued that even if we could record these hidden internal processes, their abbreviations, short circuits, and economies would make them unrecognizable unless we followed their genetic development from beginning to end, that is, from the point where they are complete and social in character to the point where they serve not social but individual adaptation.

Differing only in that it develops before our eyes, an analogous phenomenon can be observed in the development of the child's egocentric speech, a developmental process that culminates on the threshold of the school age as egocentric speech begins to approximate inner speech. As Piaget noted, if you do not know the situation where it arises, egocentric speech is abbreviated and incomprehensible. Studies on the dynamics of this development leave no doubt that if it were extended further it would lead to the complete incomprehensibility and abbreviation characteristic of inner speech. Thus, by studying the development of egocentric speech we can trace the gradual development of these features of inner speech, creating the possibility of isolating them from one another and explaining them.

If we take abbreviation as the first independent phenomenon, a genetic analysis shows us directly how and why it arises. As egocentric speech develops, it does not manifest a simple tendency toward abbreviation or the omission of words, a simple transition toward a telegraphic style. On the contrary, it manifests a tendency toward a form of abbreviation where the predicate and related words are preserved while the subject is omitted. This tendency toward a predicative syntax in inner speech was manifested in all our experiments. With almost no exceptions, its development is extremely regular. Interpolating, we can assume that the syntactic form of inner speech is that of pure and absolute predicativity.

To help us understand how and why this feature of the syntax of inner speech develops, we will consider the kinds of situations where it is manifested in external speech. A purely predicative syntax is manifested in external speech in two basic situations, either where a question is being answered or where the subject of the discussion is known to both the interlocutors. First, no one would answer the question, "Do you want a glass of tea?", with the fully expanded phrase: "No, I do not want a glass of tea." Again, no one would answer the question, "Has your brother read this book?," by saying: "Yes, my brother read that book." In both cases, the answer would be purely predicative. In the first case the answer might be "No"; in the second "Yes" or "He read it." This type of predicative sentence is possible only because its subject -- what the sentence speaks about -- is implied by the interlocutors.

An analogous situation occurs where the subject of an expression is known to the interlocutors. Imagine that several people are waiting at a stop for the "B" tram. Having sighted the approaching tram, none of these people would say: "The 'B' tram, which we are waiting for to go somewhere, is coming." The expression will always be abbreviated to a single predicate: "It's coming." or "B." Here, we find the predicative

sentence in external speech because the subject and associated words are known directly from the situation where the interlocutors find themselves.

In both cases, pure predication arises where the subject of the expression is present in the interlocutors' thoughts. If their thoughts coincide, if both have the same thing in mind, complete understanding can be realized through a single predicate. If the predicate is related to different subjects, however, inevitable and often humorous misunderstandings arise.

We find many examples of the abbreviation of external speech -- of the reduction of external speech to a single predicate -- in the works of Tolstoy (an author who dealt regularly with issues related to the psychology of understanding). Consider, for example: "No one heard what he [i.e., the dying Nikolai Levin - L.V.] had said; only Kitty understood. She understood because she constantly followed his thought so that she might know what he needed" (1893, v. 10, p. 311). Because Kitty followed the thought of the dying man, her thoughts contained the subject to which the word that no one had understood was related. The most striking example of the phenomenon of abbreviation in Tolstoy's works is found in the interchange between Kitty and Levin in which they communicated using nothing more than the initial letters of words:

> "I have long wanted to ask you one thing."
>
> "Please, ask."
>
> "Here," he said and wrote the initial letters: W,Y,A,M,I,C,B,D,T,M,N,O,T." These letters meant: "When you answered me, 'It cannot be,' did that mean never or then?" It seemed impossible that she would understand this complex phrase.
>
> Blushing, she said, "I understand."
>
> "What is this word?", he asked, indicating the "N" that represented the word "never."
>
> "That word means "never," she said. "But that is not right." He quickly erased what was written, gave here the chalk, and waited.
>
> She wrote: "I,C,N,A,O,T."
>
> He quickly brightened; he understood. It meant: "I could not answer otherwise then."
>
> She wrote the initial letters: "C,Y,F,A,F,W,H,H." This meant: "Can you forget and forgive what has happened?"
>
> He took the chalk, breaking it with his tense and trembling fingers, and then wrote the initial letters of the following: "I have nothing to forget and forgive. I never stopped loving you."
>
> "I understand," she said in a whisper.
>
> He sat and wrote a long phrase. She understood all. Taking the chalk she answered immediately. For a long time he was not able to understand what she had written. He glanced frequently into her eyes. His mind was blank with happiness. He could not fill in the words that she had in mind, but in her lovely, radiant eyes he understood all that he had to know. He wrote three letters. He had not finished writing when she had read beyond his hand and finished herself, writing the answer, "Da." In their conversation everything had been said: that she loved him; that she would tell her father and mother; that tomorrow he would arrive in the morning (Anna Karenina, Chap. 13, Part 4).

This example is of extraordinary psychological significance, because it was borrowed from Tolstoy's own biography, as indeed was the entire love affair between Levin and Kitty. This was precisely the way that Tolstoy declared his love for his future wife, C.A. Bers.

Like that which preceded it, this example is closely related to the problem of abbreviation in inner speech. When the thoughts and consciousness of the interlocutors are one, the role of speech in the achievement of flawless understanding is reduced to a minimum. Tolstoy turned to our attention the fact that understanding through abbreviated speech is more the rule than the exception for people who live in close psychological contact.

> Levin had grown used to being able to speak his thought without clothing it in precise words. He knew that, in intimate moments such as this, his wife would understand what he wanted to say on the basis of nothing more than a hint or allusion; and she did (1893, v.11, p. 13).

Studying this kind of abbreviation in dialogic speech, Yakubinskii[83] concluded that where there is common knowledge of the matter at hand, where we find this understanding through allusion and conjecture, the commonality of the interlocutors' apperceptive mass plays a tremendous role in the speech exchange. The understanding of speech requires a knowledge of the matter at hand. In Polivanov's[84] view, everything we say requires a listener who understands the nature of the matter at hand. If we had to include everything we wanted to say in formal word meanings, we would have to use many more words to express each thought than we do. We speak through hints and allusions. Yakubinskii was right in claiming that where we find these abbreviations we have a unique speech syntax with tremendous objective simplicity compared with that of more discursive speech. The simplification of syntax, the minimization of syntactic differentiation, the expression of thought in condensed form and the reduction in the quantity of words all characterize this tendency toward predicativity that external speech manifests under certain conditions.

The comic misunderstandings that we referred to earlier are the polar opposite of this understanding based on abbreviated syntax. A useful illustration is found in this well known parody, where the thoughts of the interlocutors are completely unconnected:

> Before the deaf judge two deaf men bow.
> The first cries: "Judge! He stole my cow."
> "Beg pardon," says the second, in reply,
> That meadow was my father's in days gone by."
> The judge: "To fight among each other is a shame.
> Neither one nor the other but the girl's to blame."

These two extremes are the poles between which the abbreviation of external speech moves. Where the thoughts of the interlocutors focus on a common subject, full understanding can be realized with maximal speech abbreviation and an extremely simplified syntax. Where they do not, understanding cannot be achieved even through expanded speech. Thus, two people who attribute different content to the same word or who have fundamentally different perspectives often fail to achieve understanding. As Tolstoy says, people who think in original ways and in isolation find it difficult to understand the thought of others. They also tend to be particularly attached to their own thought. In contrast, people who are in close contact can understand mere hints which Tolstoy called "laconic and clear." They can communicate and understand the most complex thoughts almost without using words.

5

Having discussed these examples of abbreviation in external speech, we return enriched to the analysis of this phenomenon in inner speech. As we have said, abbreviation is not something that is manifested in inner speech only in special situations. It is a consistent feature of inner speech. The significance of abbreviation becomes apparent when we compare external speech to written and inner speech.

Polivanov has noted that if we included all that we wanted to say in the formal meanings of the words we use, we would need to use many more words to express each of our thoughts than we do. This is precisely the situation we find in written speech. To a much greater extent than in oral speech, thought is expressed in formal word meanings. Written speech is speech without the interlocutor. It is, therefore, maximally expanded and syntactically differentiated. Because of the separateness of the interlocutors, understanding through hints and predicative expressions is rarely possible in written speech. The differing situations in which the interlocutors find themselves in written speech preclude the presence of a common subject in their thought. Thus, compared with oral speech, written speech is maximally expanded as well as syntactically complex. As Thompson has pointed out, we commonly use words, expressions, and constructions in written expositions that would seem artificial in oral speech. Griboedov's phrase, "and you speak as you write," refers to the comic transfer of the word-rich and syntactically complex language of written speech to oral speech.

In linguistics, this problem of the *variation in speech functions* has recently attracted a good deal of attention. It turns out that even from the linguist's perspective, language is not a single form of speech activity but a collection of varied speech functions. Researchers have begun to focus on the functional analysis of language, an analysis of language that focuses on the conditions and goals of the speech expression. As early as Humboldt, linguists addressed the issue of the functional variety of speech in their distinction between the language that is used in poetry and that which is used in prose. Poetry and prose differ from one another in their intention as well as their means. They can never merge because poetry is inseparable from music while prose belongs exclusively to language. In Humboldt's view, prose is distinguished by the fact that language enjoys its own advantages here, though they are subordinated to the governing goal. By subordinating and collecting sentences in prose, there develops a logical eurhythmy that corresponds to the development of thought, a logical eurhythmy in which prose constructs its own goal. Each of these forms of speech is characterized by its unique modes of selecting expressions, using grammatical forms, and incorporating words syntactically into speech.

According to Humboldt, then, speech forms that differ in their function have their own unique lexicon, grammar, and syntax. This is an extremely important concept. Neither Humboldt nor Potebnia -- who adopted and developed Humboldt's ideas -- understood the full significance of this thesis. Neither went significantly beyond the initial differentiation between poetry and prose, though there was an additional differentiation within prose between forms of conversation that are filled with thoughts and forms of mundane conversation or chatter that serve only for the communication of daily matters. For a period of time, linguists largely forgot this basic concept. As Yakubinskii notes, the very statement of this problem is foreign to linguistics. It is an issue that has generally not been mentioned in collections on general linguistics. However, this concept has tremendous significance for the psychology of language and linguistics and is currently enjoying a rebirth.

Though following its own path, the psychology of speech has also become involved in this task of differentiating the functional varieties of speech. For the psy-

chology of speech and for linguistics the differentiation of dialogic and monologic forms of speech has become particularly important. Written speech and inner speech are *monologic* speech forms. Oral speech is generally *dialogic*.

Dialogue always assumes the interlocutors' knowledge of the crux of the matter. As we have seen, this knowledge allows abbreviations in oral speech. In certain situations, it produces purely predicative statements. Dialogue presupposes visual perception of the interlocutor (of his mimics and gestures) as well as an acoustic perception of speech intonation. This allows the understanding of thought through hints and allusions. Only in oral speech do we find the kind of conversation where (as Tarde[85] has stated it) speech is only a supplement to the glances between the interlocutors.

Because we discussed the tendency of oral speech toward abbreviation earlier, we will limit ourselves here to a discussion of its acoustic aspects. Dostoevskii's[86] writing provides us with an excellent example of the extent to which intonation facilitates subtle differentiations in the comprehension of word meaning.

Dostoevskii describes the language of several drunks which consisted of a single unprintable noun:

> Once on Sunday, near evening, we happened to walk alongside a crowd of six drunken workers for fifteen paces. I suddenly became convinced that it is possible to express all thoughts and sensations -- even a whole chain of reasoning -- through a single short noun. One member of the group sharply and energetically pronounced a word, expressing his own scornful rejection of something they had been talking about. In response, another repeated this same noun using an entirely different tone and sense, expressing serious doubt about the validity of the first speaker's rejection. A third, suddenly becoming indignant with the first, sharply and heatedly entered into the conversation. He shouted the same noun at the first but with a sense that was abusive and reproachful. Here the second reentered, indignant with the third (i.e., the offender); he cautioned him: "Why did you fly in like that? We were talking calmly and in you come swearing." He expressed this thought using the same venerable word, the name of a single object. His speech differed from the others only in that he raised his hand and took the third speaker by the shoulder. Suddenly a fourth speaker -- the youngest who previously had been silent -- discovered a solution to the difficulty that had initially given rise to the argument. He raised his hand in delight and shouted...."Eureka,"... "I found it, I found it!" No, not, "Eureka," nor, "I found it": he merely repeated that same noun, only the one word. But he said it with delight, a visage of ecstasy. This seemed too strong. The sixth, a sullen individual and the oldest in the group, did not like it. He quickly snubbed the naive delight of the younger. He turned to him and sullenly repeated that same noun -- a noun forbidden to women -- with a nasal base tone. His meaning was clear and precise: "What are you screaming about?." Not saying another word, then, they repeated their pet word six times in sequence and understood each other completely. I was a witness (1929, pp. 111-112).[87]

Here we see another of the sources that underlie the tendency for abbreviation in oral speech. Dostoevskii writes that it is possible to express all thoughts, all sensations -- even a whole chain of argument -- through a single word. Here, this becomes possible when we use intonation to transfer the internal psychological context, that is, the context within which the word's sense can be understood. In this conversation, this context consists in sharp rejection, doubt, or indignation. When the internal content of thought can be expressed through intonation, speech will tend to become abbreviated.

Thus, we have identified two features that facilitate abbreviation, that is, the interlocutors' shared knowledge of the subject and the direct transfer of thought through intonation. Written speech precludes both. This is why we have to use more words to express a thought in written than in oral speech. As a consequence, *written speech has more words, is more precise, and is more expanded than any other form of speech.* In written speech, we must use words to transmit what is transmitted in oral speech through intonation and the immediate perception of the situation.

Shcherba[88] notes that dialogue is the most natural form of oral speech. He argues that monologue is to a large extent an artificial language form, that language reflects its true nature only in dialogue. This is true. In psychological terms, the initial form of speech is dialogic. Yakubinskii expresses this idea in his argument that dialogue -- though clearly a cultural phenomenon -- is still much more a natural phenomenon than monologue. Monologue is a higher, more complex speech form. It developed later than dialogue. In this context, however, we are interested only in the tendency of these two speech forms toward abbreviation, in their tendencies to be reduced to purely predicative utterances.

The rapid tempo of oral speech is not conducive to the development of speech activity as a complex volitional action, that is, as an action characterized by reflection, the conflict of motives, and selection. The rapid tempo of oral speech presupposes a simple volitional action, one with significant elements of habit. This is simply an observation. In contrast to monologue, and written speech in particular, dialogic social interaction implies immediate expression. Dialogue is speech that consists of rejoinders. It is a chain of reactions. In contrast, written speech is connected with consciousness and intentionality from the outset. Therefore, the potential for incomplete expression in inherent in dialogue. There is no need to mobilize the words that must be mobilized for expressing the same complex of thought in monologic speech. In contrast to dialogue's compositional simplicity, monologue is characterized by a compositional complexity that introduces speech facts into the field of consciousness. It is much easier to focus attention on speech facts in monologue than in dialogue. In monologue, the speech relationships become the determinants or sources of the experiences that appear in consciousness.

It is no surprise that written speech is the polar opposite of oral speech. The situation that is clear to the interlocutors in oral speech, and the potential for expressive intonation, mimic, and gesture, is absent in written speech. The potential for abbreviation is excluded from the outset. Understanding must be produced through words and their proper combination. Written speech facilitates speech as a complex activity. This underlies the use of the rough draft. The path from the rough to the final draft is a complex activity. However, even without the rough draft, the process of reflecting on one's work in written speech is extremely powerful. Frequently, we say what we will write to ourselves before we write. What we have here is a rough draft in thought. As we have tried to show in the preceding chapter, this rough draft that is constructed in thought as part of written speech is inner speech. Inner speech acts as an internal rough draft in oral as well as in written speech. We must, therefore, compare the tendency for abbreviation in inner speech with that of oral and written speech.

We have seen that the tendency for abbreviation and pure predicativity of expression arises in two circumstances in oral speech -- where the situation being referred to is clear to the interlocutors and where the speaker expresses the psychological context of his expression through intonation. We have also seen that both circumstances are excluded in written speech. Again, this is why written speech does not manifest the tendency for predicativity characteristic of oral speech. This is why it is the most expanded speech form.

What do we find if we analyze inner speech from this perspective? Our detailed discussion of predicativity in oral speech permits the clear expression of one of the most subtle and complex theses to which our research on inner speech has led us, the thesis that inner speech is predicative. This thesis is fundamental to the resolution of all related issues. In oral speech, the tendency for predicativity arises frequently and regularly in particular types of situations. In written speech, it never arises. In inner speech, it is always present. It is the basic and indeed the only form assumed by inner speech. Inner speech consists entirely of psychological predicates. We do not find a predominance of predicate over subject. We find absolute predicativity. As a rule, written speech consists of expanded subjects and predicates. In inner speech, however, the subject is always dropped. Only the predicate is preserved.

Why do we find this complete, absolute, and consistent predicativity in inner speech? The predicative nature of inner speech can be demonstrated experimentally. Our task here, however, is to explain and interpret this fact. This task can be approached in two ways. We can follow the ontogenetic development of pure predicativity or we can conduct a theoretical analysis of the tendencies of written and oral speech for abbreviation and compare these with the same tendency in inner speech.

We will begin with the second approach, with a comparison of inner speech with oral and written speech. In fact, we have nearly completed this task, having prepared the foundation for our final clarifying thought. Simply stated, the circumstances that sometimes create the potential for purely predicative expressions in oral speech, circumstances that are absent entirely in written speech, are a consistent characteristic of inner speech. They are inseparable from it. As a consequence, this same tendency for predicativity is a consistent characteristic of inner speech. It is expressed here in its pure and absolute form. Thus, written and oral speech are polar opposites because the former is maximally expanded, because it is characterized by a complete absence of the circumstances that result in dropping the subject. Correspondingly, inner and oral speech are also polar opposites, but in the reverse sense, with absolute and constant predicativity governing inner speech. Oral speech occupies a middle position between written and inner speech in this respect.

Let us analyze the circumstances that facilitate abbreviation in inner speech in more detail. Remember, with oral speech, elision and abbreviation arise where the subject of the expression is known to the interlocutors. In inner speech, we always know what our speech is about; we always know our internal situation, the theme of our inner dialogue. Piaget once noted that we easily believe our own word, that the need for proof and the ability to provide evidence for our thought emerges only in the encounter between our own ideas and the foreign ideas of others. In the same way, it is particularly easy to understand ourselves through hints and allusions. In inner speech, we are always in the kind of situation that arises from time to time in oral dialogue, the kind of situation that we have illustrated in our examples. Inner speech always occurs in a situation comparable to that where the speaker expressed an entire thought at the tram stop through the single predicate "B." We always know our own expectations and intentions. We never need to resort to the expanded formula: "The B tram that we are waiting for to go somewhere is coming." In inner speech, the predicate is always sufficient. The subject always remains in the mind, just as the remainders beyond ten remain in the student's mind when he is doing multiplication or addition.

Moreover, we always have the capacity to express our thought in inner speech without clothing it in precise words. This was what happened in the conversation between Levin and his wife. As we indicated above, the mental intimacy of the interlocutors creates a shared apperception[89] that is critical for attaining comprehension

through allusions, critical for the abbreviation of speech. This shared apperception is complete and absolute in the social interaction with oneself that takes place in inner speech. Therefore, the nearly wordless yet laconic and clear communication of complex thoughts is a consistent characteristic of inner speech, where in external speech it is possible only where there is a profound internal intimacy between the speakers. In inner speech, we never need to name the subject. We limit ourselves to what needs to be said of this subject, to the predicate. This is the source of the dominance of predicativity in inner speech.

Thus, analyzing the tendency for predicativity in oral speech has allowed us to conclude that this tendency arises where the subject is known to the interlocutors, where it is present in the speakers' shared apperception. The fact that these characteristics are found in their extreme and absolute form in inner speech helps us to understand the absolute dominance of pure predicativity that we find here. We have also seen that in oral speech these conditions lead to the reduction of syntactic complexity and differentiation, that is, to a unique syntactic structure. However, what we find expressed weakly in oral speech is manifested in its absolute form in inner speech. In inner speech, we find the ultimate syntactic simplification, the absolute condensation of thought, and an entirely new syntactic structure. We find the complete abolition of the syntax of oral speech in a purely predicative sentence structure.

Our analysis of oral speech also indicated that it is the functional change in speech that leads to structural changes. Once again, the structural changes we found in oral speech are found in absolute form in inner speech. Our genetic and experimental studies demonstrated that what is initially only a functional differentiation of egocentric and social speech leads directly and systematically to structural changes as well. With the development of functional differentiation, we find structural changes in egocentric speech that gradually approach the complete abolition of the syntax of oral speech.

We can trace the developing predicativity of inner speech. Initially, the structural characteristics of egocentric speech are identical to those of social speech. As egocentric speech develops and becomes functionally isolated from social speech, as it becomes an independent and autonomous speech form, we find increasing manifestations of the tendency for abbreviation, continual reduction in the levels of syntactic differentiation, and increasing tendencies for condensation. Before it atrophies, before it is transformed into inner speech, the syntax of egocentric speech is almost purely predicative.

Experimental observations illustrate the nature of the process through which this new syntax of inner speech develops as well as the source of that development. The child talks about what he is occupied with at the moment. He speaks of what he is doing, of what is before his eyes. As a consequence, he increasingly drops, abbreviates, and condenses the subject. Increasingly, speech is reduced to a single predicate. The remarkable law that these experiments establish can be stated in the following way: *As the functional character of egocentric speech is increasingly expressed, we begin to see the emergence of its syntactic characteristics. We begin to see its simplicity and its predicativity.* We see this clearly if we compare that egocentric speech which assumes the role of inner speech and acts as a means of interpreting problems and difficulties with that egocentric speech which is manifested in isolation from these intellectual functions. The stronger the specifically intellectual function of inner speech, the more clearly its unique syntactic structure emerges.

The predicativity of inner speech is not the only phenomenon that lies hidden behind its obvious abbreviation. When we analyze the abbreviation of inner speech, we

find an entire series of structural characteristics reflected in it. In the present context, we will mention only a few of the most important.

First, the abbreviation of inner speech includes a reduction in its phonetic aspect. We have seen several examples of this already in the abbreviation of oral speech. The conversation between Kitty and Levin based on only the initial letters of words indicates that the role of verbal stimuli is reduced to a minimum where there is a shared orientation in consciousness. Once again, this reduction in the role of verbal stimuli is taken to its extreme in inner speech. Here, the shared orientation of consciousness is complete.

This situation -- a rarity in oral speech -- is a consistent aspect of inner speech. In inner speech, we are always in a situation comparable to that in which the conversation between Kitty and Levin took place. In inner speech, we are always guessing the meaning of the complex phrase through nothing more than the initial letters of the words. In Lemetre's studies of inner speech, we find striking analogies to the conversation between Kitty and Levin. In one of his studies, twelve year olds thought the phrase, "Les montagnes de la Suisse sont belles," as a series of letters (l,m,n,d,l,s,s,b) behind which there was a vague outline of a row of hills (Lemetre, 1905, p. 5). In the initial stages of the formation of inner speech, we find an analogous mode of speech abbreviation. The phonetic aspect of the word is reduced to its initial letters. We never have the need to pronounce the word fully in inner speech. In our intention, we already understand the word we will pronounce.

This comparison is not meant to imply that the word is always replaced by its initial letters in inner speech. Nor do we mean to imply that speech unfolds through identical mechanisms in inner and external speech. Our point is much more general. Simply stated, the role of verbal stimuli is reduced to a minimum in oral speech where there is a shared orientation of consciousness. In inner speech, this reduction in the phonetic aspect of speech is pervasive and consistent. Inner speech is speech carried out almost without words. This is why we find such a profound similarity in these examples of inner and external speech. The fact that we find a reduction of words to their initial letters in certain cases in both oral and inner speech and that the same mechanism seems to be operating in both cases further convinces us of the close relationship between the phenomena of oral and inner speech that have been compared here.

The abbreviated nature of inner speech masks a second feature of substantial significance for understanding the psychological nature of this phenomenon. So far, we have named two sources of the abbreviated nature of inner speech, that is, its predicativity and its reduced phonetic aspect. Both indicate that in inner speech we find an entirely different relationship between the semantic and phonetic aspects of speech than we find in oral speech. In inner speech, the syntactic and phonetic aspects of speech are reduced to a minimum. They are maximally simplified and condensed. Word meaning advances to the forefront. Thus, in inner speech, the relative independence of word meaning and sound is graphically illustrated.

To explain this, we must analyze a third source of abbreviation in inner speech, that is, its unique semantic structure. The syntax of meanings -- indeed the whole structure of the meaningful aspect of inner speech -- is no less unique than its syntax or sound structure. In our studies, we were able to establish three basic characteristics of the semantics of inner speech. These characteristics are interconnected and together constitute its unique semantics.

First, in inner speech, we find a predominance of the word's sense over its meaning. Paulhan[90] significantly advanced the psychological analysis of speech by introducing the distinction between a word's sense and meaning. A word's sense is the ag-

gregate of all the psychological facts that arise in our consciousness as a result of the word. Sense is a dynamic, fluid, and complex formation which has several zones that vary in their stability. Meaning is only one of these zones of the sense that the word acquires in the context of speech. It is the most stable, unified, and precise of these zones. In different contexts, a word's sense changes. In contrast, meaning is a comparatively fixed and stable point, one that remains constant with all the changes of the word's sense that are associated with its use in various contexts. Change in the word's sense is a basic factor in the semantic analysis of speech. The actual meaning of the word is inconstant. In one operation, the word emerges with one meaning; in another, another is acquired. The dynamic nature of meaning leads us to Paulhan's problem, to the problem of the relationship between meaning and sense. Isolated in the lexicon, the word has only one meaning. However, this meaning is nothing more than a potential that can only be realized in living speech, and in living speech meaning is only a cornerstone in the edifice of sense.

The fable, "The Dragon-fly and the Ant," as translated by Krylov, can be used to illustrate the difference between the word's meaning and its sense. The word "dance" with which the fable ends has a definite and constant meaning. This meaning is identical in all contexts. In the context of this fable, however, it acquires a much broader intellectual and affective sense. It simultaneously means "be merry" and "die." This enrichment of the word through the sense it acquires in context is a basic law of the dynamics of meaning. The word absorbs intellectual and affective content from the entire context in which it is intertwined. It begins to mean both more and less than it does when we view it in isolation. It means more because the scope of its meaning is expanded; it acquires several zones that supplement this new content. It means less because the abstract meaning of the word is restricted and narrowed to what the word designates in this single context.

Paulhan states that the word's sense is complex, fluid, and constantly changing. To some extent, it is unique for each consciousness and for a single consciousness in varied circumstances. In this respect, the word's sense is inexhaustible. The word acquires its sense in the phrase. The phrase itself, however, acquires its sense only in the context of the paragraph, the paragraph in the context of the book, and the book in the context of the author's collected works. Ultimately, the word's real sense is determined by everything in consciousness which is related to what the word expresses. According to Paulhan, the sense of the Earth is the solar system, the sense of the solar system the Milky Way, and the sense of the Milky Way.... We never know the complete sense of anything, including that of a given word. The word is an inexhaustible source of new problems. Its sense is never complete. Ultimately, the sense of a word depends on one's understanding of the world as a whole and on the internal structure of personality.

Paulhan's most important contribution, however, lies in his analysis of the relationship between word and sense. Paulhan demonstrated that the relationship between a word and its sense is not characterized by the same direct dependency as the relationship between a word and its meaning. Words can be disassociated from the sense that is expressed in them. It has long been known that words can change their sense. More recently, it has been noted that we must also study how senses change their words or, more precisely, how concepts change their names. Paulhan provides several examples illustrating how the word can remain after sense has evaporated. He analyzed stereotyped phrases such as, "How are you doing?", as well as other situations that illustrate the independence of word from sense. Paulhan also shows how sense can be isolated from the word that expresses it, how it can become fixed in another word. He argues that in the same way that the word's sense is connected not with each

of its sounds but with the word as a whole, sense is connected not with each of the words that constitute the phrase but with the phrase as a whole. This creates the potential for one word to take the place of another, for sense to be isolated from the word yet still preserved. However, the word cannot exist without sense nor can sense exist without the word.

Once again, we will use Paulhan's analysis to identify a phenomenon in oral speech that has a kinship with a characteristic of inner speech. In oral speech, we generally move from the more stable and constant element of sense -- from the word's meaning -- to its more fluid zones, that is, to its sense as a whole. In inner speech, on the contrary, the predominance of sense over meaning that we find in oral speech in unusual situations approaches its mathematical limit. It is manifested in absolute form. The prevalence of sense over meaning, of the phrase over the word, and of the whole context over the phrase is the rule rather than the exception in inner speech.

This characteristic of the semantic aspect of inner speech is the source of two of its other characteristics, both of which are associated with the process of word unification. The first is comparable with agglutination, a means of unifying words basic to some languages though comparatively rare in others. In German, the single noun is frequently formed from several words or an entire phrase that carry the functional meaning of a single word. In other languages, this type of agglutination is pervasive. Wundt argues that these complex words are not accidental word aggregates, that they are formed according to definite laws. These languages take words that designate simple concepts and unite them into words that express complex concepts, concepts that nonetheless continue to designate each of the particular representations they contain. In this mechanical connection or agglutination of linguistic elements, the greatest accent is given to the main root or main concept, facilitating ease of comprehension. Thus, in the Delaware language, there is a complex word formed from the three words "to obtain", "boat," and "us." The literal meaning of the word is "to obtain something for us on the boat" or "to ferry something to us on the boat." The word is most commonly used, however, as a challenge to an enemy to cross a river. This word is conjugated in all the many moods and tenses of other Delaware verbs. Two aspects of this situation should be noted. First, the words that constitute the complex word often undergo phonetic abbreviation as they are incorporated in it. Second, the complex word has the function and structure of a unified word. It does not act as a unification of independent words. Wundt notes that the complex word is viewed in precisely the same way as the simple word in the American Indian languages -- that it is declined and conjugated in the same way.

Something analogous can be observed in the child's egocentric speech. As egocentric speech begins to approximate inner speech, agglutination emerges with increasing frequency and clarity as a means of forming unified complex words that are used to express complex concepts. The increasing manifestations of this tendency for an asyntactic fusing of words in the child's egocentric expressions parallels the drop in the coefficient of egocentric speech.

The third and final semantic characteristic of inner speech can once again be illustrated by analyzing a phenomenon found in oral speech. Word sense -- broader and more dynamic than word meaning -- is characterized by different laws of unification and fusion. We have referred to the unique mode of word unification that we observed in egocentric speech as the *influence* of sense, understanding the word "influence" here both in its literal sense (i.e., that of infusion) and in its broader commonly accepted meaning. Senses infuse or influence one another such that one is contained in or modifies the other.

With external speech, similar phenomena can be observed most frequently in literary speech. Passing through a work of literature, the word acquires all the varied units of sense included within it. Its sense becomes equivalent to that of the work as a whole. The title of a literary work clearly illustrates this. The title has a different relationship to the work in literature than it does in poetry or music. It expresses and crowns the entire sense content of the work much more than it does in painting. Words such as "Don Quixote," "Hamlet," "Eugene Onegin", or "Anna Karenina" express this law of sense-influence in its pure form. The sense-content of the entire work can be contained in a single word.

Gogol's work, "Dead Souls," provides a remarkable example of this law of sense influence. Initially, these words designate dead serfs who have not been removed from official lists, dead serfs that can therefore be bought and sold like the living. These words are used in this sense throughout the poems, poems that focus on the trafficking in these dead souls. As they pass through the poems, however, these two words acquire an entirely new and an immeasurably richer sense. As a sponge absorbs the ocean mist, these words absorb the profound sense of the various chapters. Only toward the end do they become completely saturated with sense. By this time, however, these words designate something entirely different than they did initially. "Dead souls" refers not only to the dead, yet still counted, serfs but to all the poems' central characters, characters who live but who are spiritually dead.

There is an analogous phenomenon in inner speech, though it is again taken to the extreme,. Here, the word assumes the sense of preceding and subsequent words, extending the boundaries of its meaning almost without limit. In inner speech, the word is much more heavily laden with sense than it is in external speech. Like the title of Gogol's poems, it is a concentrated clot of sense. To translate this meaning into the language of external speech, it must be expanded into a whole panorama of words. This is why the full revelation of the sense of the title of Gogol's poems requires the entire text of, "Dead Souls," for its development. However, just as the entire sense of the poems can be included in these two words, tremendous sense content can be fit into a single word in inner speech.

These characteristics of the meaningful aspect of inner speech result in the incomprehensible nature of egocentric and inner speech that has been noted by all who have observed them. It is impossible to understand the child's egocentric expression if you do not know what is referred to by the predicates that constitute it, if you do not see what the child is doing and seeing. Watson suggested that inner speech would remain completely incomprehensible even if one were to succeed in recording it. Though noted by all observers, the incomprehensible nature of inner speech -- like its abbreviated nature -- has not been subjected to analysis. What analysis indicates is that, like the abbreviation of inner speech, its incomprehensible nature is a product of many factors. It is the summary expression of a wide variety of phenomena.

A sufficient explanation and clarification of the psychological nature of the incomprehensibility of inner speech has been provided by our discussion of its characteristics, that is, its unique syntax, its phonetic reduction, and its special semantic structure. Nonetheless, we will consider two additional factors that lead to the incomprehensible nature of inner speech. The first is the integral consequence of all the characteristics of inner speech listed above. It stems from the unique function of inner speech. Inner speech is not meant for communication. It is speech for oneself. It occurs under entirely different internal conditions than external speech and it fulfills an entirely different function. Thus, we should not be surprised by the fact that inner speech is incomprehensible but by the fact that we expect it to be comprehensible.

The second is associated with the unique nature of the sense structure of inner speech. We will again clarify our thought through an illustration from external speech. In *Childhood, Adolescence*, and *Youth*, Tolstoy notes that among people who live the same life a special dialect or jargon often emerges that is comprehensible only to those who have participated in its development. The brothers Irten'ev had their own dialect, as do street children. Under certain conditions, the usual sense and meaning of a word changes and it acquires a specific meaning from the conditions that have led to this change. It should be no surprise that this kind of inner dialect also arises in inner speech. In its internal use, each word gradually acquires different colorations, different sense nuances, that are transformed into a new word meaning as they become established. Our experiments show that word meanings are always *idiomatic* in inner speech, that they are always untranslatable into the language of external speech. The meaning of the word in inner speech is an individual meaning, a meaning understandable only in the plane of inner speech. It is as idiomatic as an elision or password.

The infusion of varied sense content into a single word constitutes the formation of an individual, untranslated meaning -- an idiom. What occurs here is similar to what we found in the conversation among the six drunken workmen that was described by Dostoevskii. However, once again, what is the exception for external speech is the rule for inner speech. In inner speech, we can always express all thoughts and sensations -- even a whole chain of reasoning -- through a single word. Of course, the meaning of this word cannot be translated into the language of external speech. It is incommensurate with the word's common meaning. It is because of this idiomatic nature of the semantics of inner speech that it is so difficult to comprehend and translate inner speech into normal language.

With this we can end our outline of the characteristics of inner speech. It is important to emphasize that we first identified these characteristics in our experimental investigation of egocentric speech. We have analyzed analogous or closely related phenomena in external speech in order to more fully understand their nature. This comparison was important because it provided a means of generalizing the data we found in our experiments. Even more significantly, however, this comparison demonstrated that the potential for the formation of these characteristics is already present in external speech.* This provides additional support for the hypothesis that egocentric and external speech constitute the source of inner speech. Given the proper circumstances, all these characteristics of inner speech (i.e., the tendency for predication, the reduction in the phonetic aspect, the predominance of sense over meaning, the agglutination of semantic units, the influence of word sense, and idiomatic speech) can be found in external speech. This is an extremely important fact, since it demonstrates that the word's nature permits the emergence of these phenomena. In our view, this provides the best support for the hypothesis that inner speech has its origins in the differentiation and circumscription of the child's egocentric and social speech.

This outline of the characteristics of inner speech leaves no doubt concerning the validity of our basic thesis, the thesis that *inner speech is an entirely unique, independent, and distinctive speech function*, that it is completely different from external speech. This justifies the view that inner speech is an internal plane of verbal thinking which mediates the dynamic relationship between thought and word. After all that we have said about the nature of inner speech, about its structure and its function, there is no question that the movement from inner to external speech is incomparable to the direct translation of one language to another. The movement from inner to external speech is not a simple unification of silent speech with sound, a simple vocalization of

* The present Russian text reads "inner" where I have translated "external." Earlier versions read "external" which is clearly indicated by the context. N.M.

inner speech. This movement requires a complete *restructuring* of speech. It requires a transformation from one distinctive and unique syntax to another, a transformation of the sense and sound structure of inner speech into the structural forms of external speech. External speech is not inner speech plus sound any more than inner speech is external speech minus sound. The transition from inner to external speech is complex and dynamic. It is the transformation of a predicative, idiomatic speech into the syntax of a differentiated speech which is comprehensible to others.

We can now return to the definition of inner speech and the contrast of inner and external speech which served as the point of departure for our analysis. We said then that inner speech is a unique function that can be considered the polar opposite of external speech. We rejected the view that inner speech is what precedes external speech, that it is the latter's internal aspect. External speech is a process that involves the transformation of thought into word, that involves the materialization and objectivization of thought. Inner speech involves the reverse process, a process that moves from without to within. Inner speech involves the evaporation of speech into thought. However, speech does not disappear in its internal form. Consciousness does not evaporate and dissolve into pure spirit. Inner speech is speech. It is thought that is connected with the word. However, where external speech involves the embodiment of thought in the word, in inner speech the word dies away and gives birth to thought. To a significant extent, inner speech is thinking in pure meanings, though as the poet says "we quickly tire of it." Inner speech is a dynamic, unstable, fluid phenomenon that appears momentarily between the more clearly formed and stable poles of verbal thinking, that is, between word and thought. Consequently, its true role and significance can be clarified only if we take an additional analytic step inward, only if we establish some general representations about the next stable plane of verbal thinking.

This plane is thought itself. The first task of our analysis is to isolate this plane, to partition it from the unity where we always encounter it. We have said that any thought strives to unite something with something else. Thought is characterized by a movement, an unfolding. It establishes a relationship between one thing and another. In a word, thought fulfills some function. It resolves some task. Thought's flow and movement does not correspond directly with the unfolding of speech. The units of thought and speech do not coincide. The two processes manifest a unity but not an identity. They are connected with one another by complex transitions and transformations. They cannot, however, be superimposed on one another.

This can best be seen where the work of thought is unsuccessful, where -- in Dostoevskii's words -- thought does not move into word. Once again, consider an example from literature, an observation made by one of Uspenskii's[91] characters. In the relevant scene, the unfortunate character has failed to find the words to express a thought that possesses him. He tortures himself helplessly as he wanders in silence, hoping that God will provide the concept and relieve his unspeakable burden. There is no essential difference between what this poor dispirited mind is experiencing and the similar tormented words of the poet or thinker. He speaks with almost the same words:

> "...My friend, our sort does not have language... What I say seems to shape up as thoughts,... but not in language. That's our sorrow and stupidity. At times the fog clears... and, like a poet, we think that at any moment the mystery will assume a familiar image" (1949, p. 184).

Here, the boundary that separates thought from word, the uncrossable Rubicon that separates thinking from speech for the speaker, becomes apparent. If thought coincided directly in its structure and tendency with speech, this situation described by

Uspenskii would be impossible. Thought has its own special structure and course. The transition from this to speech can be extremely difficult.

The theater faced this problem of the thought that lies behind the word earlier than psychology. In Stanislavskii's system in particular, we find an attempt to recreate the subtext of each line in a drama, to reveal the thought and desire that lies behind each expression. Consider the following example: Chatskii says to Sophia: "Blessed is the one who believes, for believing warms the heart." Stanislavskii reveals the subtext of this phrase as the thought: "Let's stop this conversation." We would be equally justified, however, in viewing this phrase as an expression of a different thought, specifically: "I do not believe you. You speak comforting words to calm me." It might express still another thought: "You cannot fail to see how you torture me. I want to believe you. For me, that would be bliss." The living phrase, spoken by the living person, always has its subtext. There is always a thought hidden behind it.

In the examples given above where we tried to show the lack of correspondence between the psychological and grammatical subject and predicate, we broke off our analysis at midpoint. We can now complete it. Just as a single phrase can serve to express a variety of thoughts, one thought can be expressed in a variety of phrases. The lack of correspondence between the psychological and grammatical structure of the sentence is itself determined by the way the thought is expressed in it. By answering the question, "Why has the clock stopped?", with, "The clock fell.", we can express the thought: "It is not my fault that the clock is broken; it fell!" However, this thought can be expressed through other words as well: "I am not in the habit of touching other's things. I was just dusting here." Thus, phrases that differ radically in meaning can express the same thought.

This leads us to the conclusion that thought does not immediately coincide with verbal expression. Thought does not consist of individual words like speech. I may want to express the thought that I saw a barefoot boy in a blue shirt running down the street today. I do not, however, see separately the boy, the shirt, the fact that the shirt was blue, the fact that the boy ran, and the fact that the boy was without shoes. I see all this together in a unified act of thought. In speech, however, the thought is partitioned into separate words. Thought is always something whole, something with significantly greater extent and volume than the individual word. Over the course of several minutes, an orator frequently develops the same thought. This thought is contained in his mind as a whole. It does not arise step by step through separate units in the way that his speech develops. *What is contained simultaneously in thought unfolds sequentially in speech.* Thought can be compared to a hovering cloud which gushes a shower of words.

Therefore, the transition from thought to speech is an extremely complex process which involves the partitioning of the thought and its recreation in words. This is why thought does not correspond with the word, why it doesn't even correspond with the word meanings in which it is expressed. The path from thought to word lies through meaning. There is always a background thought, a hidden subtext in our speech. The direct transition from thought to word is impossible. The construction of a complex path is always required. This is what underlies the complaint of the word's incompletion, the lamentation that the thought is inexpressible:

> How can the heart express itself,
> How can the other understand...[92]

or:

> If only it were possible to express the spirit without words![93]

To overcome this, attempts arise to fuse words, to create new paths from thought to word through new word meanings. Khlebnikov[94] compared this kind of work with the construction of a road from one valley to another. He spoke of it as the direct path from Moscow to Kiev rather than one that goes via New York (he called himself a language traveler).

We said earlier that experiments have shown that thought is not expressed but completed in the word. However, as with Uspenskii's character, sometimes thought remains uncompleted. Did Uspenskii's character know what he wanted to think? He knew in the way that those who want to remember something -- but fail to remember -- know. Had he begun to think? He had begun as they have begun to remember. But had his thought succeeded as a process? To this question we must give a negative answer. Thought is not only mediated externally by signs. It is mediated internally by meanings. The crux of the matter is that the immediate communication of consciousness is impossible not only physically but psychologically. The communication of consciousness can be accomplished only indirectly, through a mediated path. This path consists in the internal mediation of thought first by meanings and then by words. Therefore, thought is never the direct equivalent of word meanings. Meaning mediates thought in its path to verbal expression. The path from thought to word is indirect and internally mediated.

We must now take the final step in the analysis of the internal planes of verbal thinking. Thought is not the last of these planes. It is not born of other thoughts. Thought has its origins in the motivating sphere of consciousness, a sphere that includes our inclinations and needs, our interests and impulses, and our affect and emotion. The affective and volitional tendency stands behind thought. Only here do we find the answer to the final "why" in the analysis of thinking. We have compared thought to a hovering cloud that gushes a shower of words. To extend this analogy, we must compare the motivation of thought to the wind that puts the cloud in motion. A true and complex understanding of another's thought becomes possible only when we discover its real, affective-volitional basis. The motives that lead to the emergence of thought and direct its flow can be illustrated through the example we used earlier, that of discovering the subtext through the specific interpretation of a given role. Stanislavskii teaches that behind each of a character's lines there stands a desire that is directed toward the realization of a definite volitional task. What is recreated here through the method of specific interpretation is the initial moment in any act of verbal thinking in living speech.

Because a volitional task stands behind every expression, Stanislavskii notes the desire that underlies the character's thought and speech in each line of a play. As an example, we will present the text and subtext in an interpretation that is similar to that of Stanislavskii's.

Text of the play	Parallel desires
Sophia:	
Oh Chatskii, I am glad to see you.	Wants to hide her confusion.
Chatskii:	
You're glad, that's good.	Wants to appeal to her conscience
Though, can one who becomes glad in this way be sincere?	through mockery. Aren't you ashamed! Wants to elicit openness.
It seems to me that in the end,	
People and horses are shivering,	
And I have pleased only myself.	

Liza:	
But, sir, had you been behind the door,	Wants to calm Chatskii and to help Sophia in a difficult situation.
Not five minutes ago,	
You'd have heard us speak of you,	
Miss, tell him yourself!	
Sophia:	
It is always so -- not only now.	Wants to calm Chatskii.
You cannot reproach me so.	I am guilty of nothing!
Chatskii:	
Let's assume it is so.	Let us cease this conversation.
Blessed is the one who believes,	
And warm his life.	

Understanding the words of others also requires understanding their thoughts. And even this is incomplete without understanding their motives or why they expressed their thoughts. In precisely this sense we complete the psychological analysis of any expression only when we reveal the most secret internal plane of verbal thinking -- its motivation.

With this, our analysis is finished. We will now briefly consider the results to which it has led. In our analysis, verbal thinking has emerged as a complex dynamic whole where the relationship between thought and word is manifested as a movement through several internal planes, as a transition from one plane to another. We carried our analysis from the most external to the most internal plane. In the living drama of verbal thinking, movement takes the reverse path. It moves from the motive that gives birth to thought, to the formation of thought itself, to its mediation in the internal word, to the meanings of external words, and finally, to words themselves. However, it would be a mistake to imagine that this single path from thought to word is always realized. On the contrary, the current state of our knowledge indicates that extremely varied direct and reverse movements and transitions from one plane to another are possible. We also know in general terms that it is possible for movement to be broken off at any point in this complex path in the movement from the motive through the thought to inner speech, in the movement from inner speech to thought, or in the movement from inner to external speech. However, our task was not to study the varied movements that are actually realized along the trajectory from thought to word. Our goal was merely to show that the relationship between thought and word is a dynamic process. It is a path from thought to word, a completion and embodiment of the thought in the word.

We followed several unusual paths in this investigation. We attempted to study the internal aspect of the problem of thinking and speech, what is hidden from immediate observation. We attempted to analyze word meaning, a phenomenon that has always been as foreign to psychologists as the other side of the moon, a phenomenon that has always remained unstudied and unknown. The sense aspect of speech, indeed the entire internal aspect of speech that is oriented toward the personality, has until recently been unfamiliar territory for psychology. Psychology has primarily studied the external aspects of speech, those that are oriented toward us. The result has been that the relationships between thought and word have been understood as constant, eternal relationships between things, not as internal, dynamic, and mobile relationships between processes. The basic conclusion of our investigation can therefore be expressed in the thesis that these processes -- which have previously been thought of as connected permanently and uniformly -- in fact have changing and dynamic connections. What has previously been considered a simple construction has turned out to be a complex structure. Our desire to differentiate the external and sense aspects of

speech, word, and thought has concluded with the attempt to illustrate the complex form and subtle connections of the unity that is verbal thinking. The complex structure of this unity, the complex fluid connections and transitions among the separate planes of verbal thinking, arise only in process of development. The isolation of meaning from sound, the isolation of word from thing, and the isolation of thought from word are all necessary stages in the history of the development of concepts.

Our goal has never been to provide an exhaustive account of the complex structure and dynamics of verbal thinking. Our goal was to illustrate the tremendous complexity of this dynamic structure. Our only remaining task at this point is that of summarizing the general understanding of the relationships between thought and word that has emerged in this investigation.

Associative psychology represented the relationship between thought and word as an external relationship that is formed through repetitive connections between two phenomena. In principle, this relationship was thought to be analogous with the associative connections that arise between two meaningless words. Structural psychology replaced this representation with one based on a structural connection between thought and word. However, it left unchanged the underlying postulate that this connection is non-specific. It placed this connection alongside all other structural connections that can arise between two objects such as the stick and the banana in the chimpanzee experiments.

All theories that have attempted to resolve this question have remained polarized around two opposing positions. At one pole is the behaviorist[95] conception of thinking and speech, expressed in the formula that thought is speech minus sound. At the other is extreme idealism, a view developed by the Wurzburg school and Bergson in their conception of the complete independence of thought from word and in their view that the word distorts thought. Tiutchev's line, "Thought verbalized is a lie." expresses the essence of this view. This is the source of the attempts of psychologists to isolate consciousness from reality. In Bergson's words, it is the attempt to grasp our concepts in their natural state, in the form in which they are perceived by consciousness, by destroying the parameters of language.

These perspectives share a common point that is inherent to nearly all theories of thinking and speech. They share a profound and fundamental antihistorical perspective. All these theories oscillate between the poles of pure naturalism and pure spiritualism. They view thinking and speech in isolation from their history. However, only an historical psychology, only *an historical theory of inner speech, has the capacity to lead us to a correct understanding of this complex and extraordinary problem*. This is the path that we have attempted to follow in our research.

The basic finding of our research can be expressed in a few words: The relationship of thought to word is a vital process that involves the birth of thought in the word. Deprived of thought, the word is dead. As the poet writes:

> And as the bees which have sunk into their silent Yule season,
> So do dead words sink.[96]

However, in the words of another poet, thought that is not embodied in the word remains a Stygian shadow, it remains in the "mist, bells, and radiance." In Hegel's view, the word is existing, vitalized thought. This kind of existence is absolutely necessary for our thoughts.

The connection between thought and word is not an primal connection that is given once and forever. It arises in development and itself develops. "In the beginning was the word."[97] Goethe answered this Biblical phrase through Faust: "In the beginning was the deed."[98] Through this statement, Goethe wished to counteract the word's

overvaluation. Gutsman has noted, however, that we can agree with Goethe that the word as such should not be overvaluated and can concur in his transformation of the Biblical line to, "In the beginning was the *deed*." Nonetheless, if we consider the history of development, we can still read this line with a different emphasis: "In the *beginning* was the deed." Gutsman's argument is that the word is a higher stage in man's development than the highest manifestation of action. He is right. The word did not exist in the beginning. In the beginning was the deed. The formation of the word occurs nearer the end than the beginning of development. The word is the end that crowns the deed.

* * *

In concluding, we should say a few words about the prospects that lie beyond the present study. Our investigation has brought us to the threshold of a problem that is broader, more profound, and still more extraordinary than the problem of thinking. It has brought us to the threshold of the problem of consciousness. In our investigation, we have tried to consistently keep in view that aspect of the word which has been unfamiliar ground for experimental psychology. We have tried to study the word's relationship to the object, its relationship to reality. We have tried to study the dialectical transition from sensation to thinking and show that reality is reflected in thinking differently than it is reflected in sensation. We have tried to show that the word's distinguishing feature is a generalized reflection of reality. In the process, however, we have touched on an aspect of the word's nature whose significance exceeds the limits of thinking as such, an aspect of the word that can be studied only within the framework of a more general problem, the problem of the relationship between the word and consciousness.

The consciousness of sensation and thinking are characterized by different modes of reflecting reality. They are different types of consciousness. Therefore, *thinking and speech are the key to understanding the nature of human consciousness.* If language is as ancient as consciousness itself, if language is consciousness that exists in practice for other people and therefore for myself, then it is not only the development of thought but the development of consciousness as a whole that is connected with the development of the word. Studies consistently demonstrate that the word plays a central role not in the isolated functions but the whole of consciousness. In consciousness, the word is what -- in Feuerbach's[99] words -- is absolutely impossible for one person but possible for two. The word is the most direct manifestation of the historical nature of human consciousness.

Consciousness is reflected in the word like the sun is reflected in a droplet of water. The word is a microcosm of consciousness, related to consciousness like a living cell is related to an organism, like an atom is related to the cosmos. The meaningful word is a microcosm of human consciousness.

LECTURES ON PSYCHOLOGY

Lecture 1[1]

PERCEPTION AND ITS DEVELOPMENT IN CHILDHOOD

The theme of our lecture today is the problem of perception in child psychology. You know, of course, that no chapter of contemporary psychology has been as fundamentally rewritten in the past 15-20 years as that concerned with the problem of perception. You know that the skirmish between the representatives of the old and the new psychology has been more intense here than in any other domain of research. Nowhere has the structural tradition placed its new conceptions and experimental research methods in such sharp opposition to the old, associative tradition. If we consider concrete experimental material, the chapter on perception has clearly been more extensively rewritten than any other chapter of experimental psychology.

Though you are probably aware of the essence of this revision, I will outline it briefly.

Taking the law of association as a point of departure, associative psychology represented memory as the basic and general law of connection of the separate elements of mental life. Memory served as the model for the construction and interpretation of all other functions. Thus, perception was understood as a product of the association of a whole complex of sensations, as the sum of separate sensations constructed through their mutual association. This process was assumed to occur in accordance with the same law that leads to the association of separate representations or memories in the creation of a unified picture in memory. These associations were thought to explain the connectedness of perception.

How is it that we perceive not separate, disparate, and dispersed points but a whole figure reflecting the outline of a body's surface? How is it that we perceive the meaning of this body? This is how the associative school stated the question. They answered that connectedness in perception appears in the same way that it does in memory. The separate elements are connected, chained, or associated with one another, producing a unified, connected, integral perception. This theory assumes that the physiological correlate of connected, integral visual perception is a similar picture that is summarized in equivalent disparate points on the retina. It is assumed that each of the separate points of the object excite the corresponding stimulation in the disparate points of the retina. All these stimuli, summarized in the central nervous system, are thought to create a complex excitation, the object's correlate.

The inadequacy of this theory of perception served as the point of departure for the rejection of associationism. The initial attack on associative psychology was not waged on its fortress -- on its theory of memory. In fact, the "structural" attack on associative psychology continues to be weakest on this point. Structural psychology's[2] attack began with the demonstration of the structural and integral origins of man's mental life in the domain of perception.

The structural perspective began with the notion that the perception of the whole precedes the perception of the separate parts. Structural psychologists argued that the connected whole of objects, things, and processes is not the product of a summary of separate, disparate, and dispersed sensations. They argued that the physiological substratum of perception is not a group of separate excitations that come to be associated. In several brilliant experimental demonstrations, structural psychologists have collected data representing different stages of development that can only be adequately understood on the basis of the new structural theory. The foundation of this theory is the concept that mental life is not constructed from separate sensations or representations and their mutual association, but from separate integral formations, structures, and images that are called Gestalten. This basic principle has been extended to other domains of mental life. In each domain, structural psychologists have tried to show that the integral formations of mental life arise as integral formations. All this has been demonstrated clearly in several experimental studies.

Consider Kohler's experiment with domestic chickens. This experiment showed that the chicken does not perceive a pair of colors as a simple associative union but as the relationship between these colors. The perception of the field precedes and indeed defines the perception of its separate parts. The colors constituting the colored field can be changed while the general law governing the perception of the field remains the same. These experiments were transferred from the lower animals to the humanoid apes and, with certain modifications, were also carried out with children. They demonstrated that perception is an integral process. The general character of perception is preserved though the separate parts have changed. The structure that forms the integral perception may change, but this change produces a different integral perception.

Folkelt's experiment with spiders demonstrated this in still more integral form, though with less experimental elegance. Folkelt demonstrated that a spider that reacts correctly and adequately when a fly has fallen into its web, that is, when the whole situation is preserved, loses this capacity when the fly is torn from the web and placed in the spider's nest.

Similarly, in one of Gottshald's[3] late experiments, he presented the separate parts of a complex figure to his subjects several hundred times until they had learned them thoroughly. He found, however, that if these figures were presented in a different aggregation, and if this whole was unfamiliar to the subject, the old figure remained unrecognized in the new structural perception.

I will not summarize additional experiments. I will say only that they have been extensively developed in zoopsychology and in child psychology. Analogous experiments conducted with adults have also supported this notion that our perception is not atomistic but integral in nature. This thesis is sufficiently well known that there is no need to dwell on it. It is another aspect of the dispute between these traditions that is of particular interest to us here. Specifically, what framework does each provide for understanding child development? How is the question of the development of the child's perception stated by the new structural theory?

Within the associative framework, the theory of the development of the child's perception was entirely analogous to the general theory of mental development. In

accordance with this perspective, the key factor of mental life is given at the outset, soon after birth. This factor is the capacity for association, that is, the connecting of elements that are experienced either simultaneously or in close sequence. In the child, however, the material that is pasted or soldered together through these associative connections is extremely limited. The child's mental development consists of the constant accumulation of this material, resulting in new, more extended, and richer associative connections among separate objects. The child's perception is constructed and grows with this development of associative connections. The child moves from the perception of separate sensations to the perception of interconnected groups of sensations, from the perception of interconnected groups of sensations to the perception of interconnected groups of objects, and, finally, to the perception of the whole situation. The infant's initial perception is thought to be chaotic, as Buhler expressed it, a wild dance of uncoordinated sensations.

When I was a university student, the infant's perception was viewed in precisely this way. The infant was thought to be capable of perceiving taste (i.e., bitter or sour) or temperature (i.e., warm and cold). In addition, it was thought that soon after birth he is capable of perceiving sound and color. However, these were thought to be uncoordinated sensations. It was thought that because the groups of sensations belonging to a single object were repeated frequently in a given combination, they began to be perceived complexively by the child, that is, through a simultaneous grasping. This was thought to be the foundation of perception in the true sense of the word.

Though they agreed that separate sensations are present from the outset, researchers differed in their view of which month in the first year of life is associated with the development or emergence of these complex perceptions. Some argued that the infant's perception is a connected integral process by the fourth month of life. Others argued that this type of perception emerges only in the seventh or eighth month.

Like the idea of deriving the complex mental whole from the sum of its separate isolated elements, this representation of the development of the child's perception is inadequate from the perspective of structural psychology. Structural psychology valued data obtained in the lower stages of development that indicated that our perception is integral in nature from the outset. In his work, *Human Perception*, Kohler attempted to show that the same basic laws are manifested in human and animal perception. For Kohler, human perception is a perfection of animal perception. It is where these laws find their most subtle, precise, and developed expression.

Structural psychology fell into a dangerous trap in its treatment of the child's perception. In Folkelt's experiments, structural psychology indicated that the structural character of perception can be demonstrated in the earliest stages of the child's development, indeed, in the first month of the infant's life. The structural character of perception is primal; it emerges at the outset. It is not the product of an extended development. If one accepts these arguments, what constitutes the development of the child's perception? Where are we to find development if the most essential feature of perception (i.e., its structural integral nature) is present both at the beginning of the developmental process and at its culmination in the adult?

This is among the weakest empirical and theoretical aspects of structural psychology. Nowhere does structural psychology manifest its inadequacy more clearly than in its theory of perception. Several attempts to construct a theory of the child's mental development based on the structural perspective are well known. Though it may seem strange, the weakest aspect of these attempts to develop a theoretical analysis of the psychology of the child's development from the perspective of structural theory has been in the treatment of the child's perception. The refusal, in principle, to view the

child's perception in the context of its development is connected with the basic methodological assumptions of this theory. These assumptions attribute a metaphysical character to the concept of structure.

As a product of these assumptions, we have two works that have appeared following that of Gottshald. The first, Koffka's study of the phylogenetic problem, rejected the very possibility that the nature of this difference could be clarified. In the second, Folkelt relied on an experimental study of very young children to conclude that we are dealing here with features of perception that characterize a primitive integral structure at various stages of development. Utilizing Goethe's catchword, Folkelt attributed these the characteristics of the eternal, unchanging child to the category of that which is preserved throughout man's development.

To illustrate the path taken by researchers striving to avoid this dead end, or by those who return to this problem again and again in the hope of avoiding it, I must consider what is commonly called the orthoscopic nature of the child's perception. This is an old problem. Several psychophisiologists first stated the problem and made the initial attempts to resolve it. It had a particularly important place in the research of Helmholtz.[4] Following these early efforts, the problem was largely abandoned. In the past two decades, however, it has emerged once again.

The essence of the problem is that the perception of contemporary adults is distinguished by several mental characteristics that seem to be unexplained or incomprehensible. Which characteristics of our perception are the most important? What characteristics of perception, when lost, lead to the pathology of perception? Before all else, our perception is characterized by the fact that we see a more or less constant, ordered, connected picture wherever we direct our eyes.

As we partition this problem into its separate aspects, they must be named in a specific order corresponding to the order of their emergence in experimental psychology.

First, we will consider constancy in the perception of magnitude. If I hold two objects of identical length before an infant's eyes, two identical pencils for example, there will be two representations of identical length on the retina. If I hold one pencil that is five times greater in length than the other, the corresponding representations will be found on the retina. It would appear, then, that my perception of one pencil as longer than the other is a direct function of retinal representation. I continue the experiment, however, and hold the larger pencil at a distance five times greater than the other. The size of its representation on the retina decreases by a factor of five. Thus, the two representations on the retina will be identical in size. How do we explain the psychological fact that the pencil that is removed to five times the distance does not seem to be reduced in size by a factor of five? Why, when it is removed at a distance, do I continue to see it as the same size? With the similarity of the two representations on the retina, what allows me to see the larger pencil as larger but located at a distance.

How can we explain that the object preserves its size despite the increase in its distance from the eye? Even more remarkable, how do we explain that this occurs even though objects actually have a tendency to seem smaller at a greater distance (i.e., at a great distance a large ship seems like a small point)? The experiment is well known in which one holds an object close to the eye and then quickly moves it away. The object dances in the eyes and becomes smaller. How do we explain the finding that objects seem smaller in accordance with their distance from the eye but nevertheless retain a relative tendency for the preservation of size? This question becomes still more interesting when we remember its tremendous biological significance. On the one hand, perception would not fulfill its biological function if it did not have this

orthoscopic character, that is, if the size of the object changed with its distance from the subject. To the animal that fears the beast of prey, the latter at one hundred steps must not seem one hundred times smaller. On the other hand, if perception did not have this tendency, the impression of an object's proximity or distance would not arise. Clearly, the biological mechanism that allows the object to preserve size constancy with distance from the eye -- and at the same time to lose it -- must be extremely complex.

We should also consider constancy in the perception of color. Hering[5] demonstrated that a piece of chalk reflects ten time more white light at midday than at dusk. Still, at dusk, chalk is white and coal is black. Though the quantity of rays falling on the object and the color of this illumination may change the quality of the immediate stimulus, other colors are also characterized by a relative constancy. Of course, there is also constancy in the perception of form. Though I look on it from above, the briefcase lying before me appears to me as a briefcase, an object with a definite form. As Helmholtz notes, a painting instructor goes to a good deal of effort to show his pupil that he does not see the entirety of the chair, but only a portion of it.

We could supplement the analysis of constancy in the perception of size, form, and color with a discussion of constancy in the perception of several other features. This is the general phenomenon called orthoscopic perception. *Orthoscopic* (on analogy with *orthographic*) means that we see objects correctly. Despite the varying conditions of perception, we see an object of a certain size, form and color. The orthoscopic nature of perception makes it possible to perceive stable features of objects that are independent of accidental conditions such as the angle of view or of the subject's own movements. In other words, it allows a comparatively eternal, stable picture which is independent of subjective and accidental aspects of the observation.

Interest in this problem has grown because we have found that analogous perceptual phenomena have different characteristics. In particular, you probably are aware that after-images manifest characteristics of orthoscopic perception that are the opposite of those manifested by real perception. If we fix a red square on a grey background and then remove it from this background, we see the square illuminated by its complementary color. This experiment demonstrates what our perception would be like if it was not orthoscopic. If I move the screen away, the size of this square increases. If I move the screen closer by a factor of two, the square is reduced in size by a factor of two. The perception of the square's size, position, and movement is a function of movement, the angle of vision, and all the other factors that our actual perception is independent of. In my view, the emergence of an ordered, constant perception raises several important questions. It indicates the developmental path of the child's perception in a place where associative and structural schools have closed the door for the researcher.

How can we explain these facts? In his attempt, Helmholtz himself suggested that orthoscopic perception is not primal, that it arises in the developmental process. He considered some precarious yet interesting data. In particular, he discussed memories of distant childhood. For example, when passing a bell tower, the child may think that the people there are tiny. Describing similar observations by other children, Helmholtz concludes that orthoscopic perception does not exist from the outset. One of Helmholtz's pupils argued that it is only this gradually acquired perception of a constant picture that can reflect constant object characteristics. He suggested that the acquisition of this constant picture constitutes a major feature of the development of the child's perception.

Helmholtz's explanation of orthoscopic perception relied on the concept of unconscious inference. He assumed that the pencil that is removed from the eye at 10

times the distance of another is actually perceived as a pencil reduced in size by a factor of ten. At this point, however, he felt that perception adds several unconscious judgments. The subject knows from previous experience that this is an object that he has seen up close and that it is now some distance from the eye. Thus, a correction is made on the initial portion of the perception, introducing the unconscious inference.

Numerous experimenters have scoffed at this kind of explanation and immediate experience does indicate the naivete of the way that Helmholtz states the question. In real perception I do not perceive a pencil that has decreased in size, while consciously knowing that it has been removed to a distance. The simplest data of immediate experience indicate that Helmholtz's explanation is inadequate. However, several experiments have shown that he was moving in the right direction. Helmholtz was right when he said that the orthoscopic character of perception should not be taken as something given from the outset, when he said that we should understand it as a product of development. This is the first point. The second point is that we need to understand that constancy of perception does not arise from changes in the internal constitution and characteristics of perception itself. The emergence of this feature of perception has its roots in the fact that perception begins to act within a system that involves other functions.

Helmholtz's reference to unconscious inference is an unscientific hypothesis that has hindered the search for a solution to this problem for years. However, contemporary research shows that the orthoscopic nature of perception, visual perception in particular, arises from truly complex available stimuli and from stimuli that are fused with them, stimuli that act simultaneously with them. I said that in Helmholtz's view the pencil that is removed 5 times further from the eye must appear to be reduced in size by a factor of five. Suppose, on the other hand, that we have before us not a pencil but its representation as an after-image. If the object itself is taken away and the screen is removed to a distance 5 times further from the eye, the law of Emert indicates that the pencil will increase in size by a factor of five. However, if the screen was moved away from the eyes the size of the object must not change. Consequently, I must perceive the object and its retinal image as mutually compensating for one another. The image increases by a factor of five in accordance with the distance of the screen, while the object decreases in size by a factor of 5. Thus, if the object is fused with the after-image, the available stimulus would remain unchanged.

The initial experimental studies moved in this direction. Can this fusion of the available perception with the after-image be created in such a way that the alter-image would be given simultaneously with the perception? Experimenters quickly resolved this task. The subject was asked to fixate on a red square on the screen, but the square was actually an illustration in red light, not an actual square constructed of paper. This red square was then taken away. The subject saw the green complementary image. Unnoticed by the subject, a real red square was then substituted. The experimenter then moved the screen away from the subject, producing a violation of Emert's law.

At the same time, experimenters made a bold and brilliant attempt to produce constancy in the image. They tried to find conditions under which the size of the image would increase nonproportionally with distance, diverging in this respect from Emert's law. If this hypothesis were correct, it would become impossible to explain why an object at a greater distance seems smaller. For this to occur the object must be quickly (i.e., instantaneously) removed from the eye, so that I would not notice its decrease in size.

This type of complete constancy in perception would be as bad in biological terms as complete changeability of perception. If we lived in a world of constantly changing

objects, absolute stability of perception would mean that we could not perceive the distance that separates the object from us. Experiments carried out by the Marburg school indicate that the explanation for this characteristic of perception must take as its point of departure not the after-image but the eidetic image. An entirely independent line of research has shown that the eidetic image that we see on the screen after an object has been removed is not susceptible to Emert's law. As it is removed to a greater distance, the increase in the size of the eidetic image is much slower than it would be if it were proportional.

Research carried out in accordance with the method described, that is, research that elicits a fusion of the real light illustration with the eidetic image, has shown that this fusion produces an experimental effect much more similar to that of real perception. The size of the theoretically calculated error here turns out to be 1/10 while the error that is found experimentally differs by only 1/5.

Before I attempt to summarize this discussion and draw theoretical conclusions, it would be useful to consider two additional closely related problems. This should allow us to draw several theoretical conclusions more easily and on better empirical foundations.

The first of these two problems is that of the meaningful nature of perception. Taking the developed perception of the cultured adult as our point of departure, we face a problem that is analogous to that I have just developed for you. The orthoscopic nature of adult perception is one of its prominent characteristics. Another is the meaningful nature of our perception. It has been shown experimentally that we cannot create conditions that will functionally separate our perception from meaningful interpretation of the perceived object. I now hold a notebook in front of myself. I do not perceive something white with four corners and then associate this perception with my knowledge of the object and its designation, that is, with my understanding that this is a notebook. The understanding of the thing, the name of the object, is given together with its perception. Studies have in fact shown that the perception of the object's distinct objective characteristics depends on the meaning or sense that accompanies the perception.

You are probably aware that several experimenters have continued the experiments begun by Rorshach.[6] Recently, these studies have been presented systematically and definitively by the young Bleuler. These studies have shown that the problem of the perception of meaningless ink spots posed by Binet[7] is a truly profound one, one that leads us to the problem of the meaningful interpretation of our perception. Why is it that I don't see a certain form, weight, or size? Why do I know simultaneously that what I have before me is a chair or table? Binet proposed the following experiment. Have the subject look at a simple inkblot on a piece of paper that has been folded in two such that the spot is symmetric, meaningless, and entirely accidental. Binet notes that, remarkably, in every case the resultant inkblot seems to be similar to something. The children with whom he carried out his initial experiments were almost never able to perceive this meaningless inkspot as a spot. They always perceived it as a dog, a cloud, or a cow.

Rorshach created a systematic series of these meaningless colored symmetrical figures and used them in his experiments. His experiments have shown that only in a state of dementia, particularly in an epileptic state, can the spot be perceived as entirely meaningless. It is only in this situation that subjects say that this is nothing more than a spot. The normal subject sees a lamp, a lake, or a cloud. The nature of the meaningful interpretation changes, but the tendency to see the spot meaningfully is consistent.

Buhler used this tendency toward the meaningful interpretation of any perception as a means for analyzing the meaningful nature of our developed perception. He showed that to the extent that developed forms of perception are stable and constant, they are also meaningful or categorical. I do not see a series of separate external forms of an object. I see the object. I immediately perceive the object as such, with all its meaning and sense. I see a lamp, a table, a person, or a door. In Buhler's words, my perception is an inseparable part of my concrete thinking. Simultaneously with that which is seen, I am given the categorically ordered nature of the visual situation that is the object of my perception.

Related research has indicated that this kind of complex meaningful interpretation arises in immediate perception and occasionally leads to illusion. Consider, for example, Sharpant's illusion. If the subject is asked to determine (either simultaneously or successively) the heaviness of two cylinders that are identical in weight and form but differ in size, it will always seem that the smaller of the two is the heavier. Even if we see the two cylinders weighed and are convinced that they are of equal weight, when we take them in our hands we cannot escape the sensation that the smaller is the heavier.

Many explanations have been offered for Sharpant's illusion. However, several studies concerning the problems we have just discussed have demonstrated that this mistake arises because this apparently mistaken perception is actually, in a certain sense, a correct perception. Those who have studied this illusion have noted that when we judge the small object to be the heavier our evaluation is correct with respect to the object's relative weight or density, that is, with respect to the relationship of the object's weight to its volume. In this sense, the smaller object actually is "heavier." The immediate perception of heaviness is subordinated to the meaningful perception of heaviness in relation to volume. This results in the distortion of the immediate perception. If we close our eyes, we perceive these objects as equally heavy. Nonetheless, those who have been blind from birth experience Sharpant's illusion. Though they do not see the cylinders, the cylinder that they perceive through their developed tactile sensation as the smaller is perceived as heavier. It is in the meaningful perception that the immediate sensation of heaviness is compared with the object's volume. Experiments have shown that, though they can see, deaf and mute children are not susceptible to Sharpant's illusion.

Research has also shown that this illusion has an important diagnostic significance. The absence of Sharpant's illusion among profoundly retarded children is referred to as Demor's[8] symptom. The perception of these children remains nonmeaningful. The smaller cylinder does not seem heavier. When there is a need to differentiate diagnostically between profound retardation and a lesser degree of retardation in a child of between 9-10 years, the presence or absence of Demor's symptom is an extremely important criterion. Extending this line of reasoning, Claparede suggested that Sharpant's illusion could be used as a criterion in the analysis of the development of the child's perception. Studies have demonstrated that before five years of age normal children are not susceptible to Sharpant's illusion.

It is clear, then, that the phenomenon observed by Sharpant emerges in development. It does not occur in profoundly retarded children or in the majority of deaf and mute children. It does appear in the blind and it can serve as a reliable diagnostic criterion in the differentiation of profound retardation from lesser degrees of retardation.

Thus, experimentation in this domain has led to findings similar to those that have resulted from the study of orthoscopic perception. On the one hand, experiments have shown that the meaningful character of the adult's perception is not inherent in the

perception of the child. This characteristic of perception emerges at a certain stage. It is not given at the outset, but is the product of development. On the other hand, experiments have shown that much as the stability and constancy of our perception is a function of the fusion of perception with the eidetic image, what we have in meaningful perception is an immediate fusion of the processes of concrete thinking and perception such that the two functions are inseparable. One function works within the other as its constituent. The two form a cooperative unit that can only be partitioned through experimental means. It is only in the psychological experiment that we can achieve meaningless perception, that we can partition immediate from meaningful perception.

The third problem of perception that we will consider here, the problem of true categorical perception, is closely related to this problem of meaningful perception. A typical example of studies in this domain are the experiments with the perception of pictures, experiments that have a long history. Early researchers believed that this experiment was the key to the study of the general development of the child's meaningful perception. In their view, a picture represents some portion of reality. They felt that by selecting pictures, showing them to children of various ages, and studying the development of changes in the perception of these pictures, statistical methods could be used to summarize the thousands of facts accumulated. Through this process, they hoped to identify the stages through which the developing child passes in his perception of reality.

These stages have been defined and described in a variety of ways. Stern, for example, classified these stages differently at various points in his career. However, the majority of authors agree that there are four basic stages in the child's perception of pictures. Initially, in the object stage, the child perceives separate objects. Then, in the action stage, the child begins to name objects and indicate the actions that are being carried out with them. In the next stage, the stage of qualities or features, the child begins to indicate the features of the perceived object. Finally, the child begins to describe the picture as a whole, beginning with it as an aggregation of parts. On the basis of these experiments, investigators (in particular, Stern in Germany and Blonskii here) have suggested that we can identify basic stages in the development of the child's meaningful perception. Blonskii argues that in the beginning the child perceives the picture, that is, the world, as a collection of objects. Later he begins to perceive it as a collection of acting and moving objects and then begins to enrich this collection of action objects with qualities or characteristics. Finally, the child attains the perception of an integral picture. This is the analogue of the real, meaningful, integral situation, the perception of an integral reality. The strength of these arguments is that they are actually supported consistently in experiments. That is, Blonskii's experiments, conducted here, have produced the same basic results as the experiments of Stern, Neuman, Rollof, Mukhov, and many other researchers internationally.

Only 15 years ago, this was considered a basic law of the development of the child's perception. However, in the past 15 years experimental psychology has undertaken critical work that has left this concept with little credibility.

Given what we do know of perception, it is difficult to imagine that the child moves from the perception of separate objects to the unification of objects with actions, then to the unification of the object with its features, and finally to the perception of the whole. Experimental data have shown that the structural and integral nature of perception are inherent to the earliest stages of development. The perception of the whole precedes the perception of its parts. The data from these experiments stand in glaring contradiction to what we know of the structural character of perception.

Associative atomistic psychology naturally presupposes that the child moves from the part to the whole, that he supplements the parts with actions and qualities, perceiving the whole situation only as a final achievement. From the perspective of structural psychology, on the other hand, the notion that the child moves from the perception of separate parts and then, by summarizing them, to the perception of the whole, is nonsense. We know the development of perception follows the opposite path. Structural psychology has shown that the small child does not perceive separate objects. Daily observation supports this perspective. Whether the situation is that of play or feeding, the child perceives the whole situation. The infant's perception, not to mention that of the older child, is consistently determined by the integral situation. It would be extraordinarily difficult if the child actually achieved the potential of perceiving the whole meaningful situation only between the ages of ten and twelve! It is difficult to imagine the actual implications this would have for the child's mental development. (We will not even consider, in this context, the experiments that have shown that the perception of movements and actions is often found much earlier than the perception of objects.)

These considerations concerning the experimental verification of this law make it necessary to resolve two questions. First, if this law is a false representation of the sequence of stages in the development of the child's perception, how should this sequence actually be represented? Second, if this law incorrectly represents the sequence of stages, why is there such massive support for the notion that younger children describe the picture by isolating objects while in subsequent ages children isolate actions and features?

Attempts to resolve this problem have begun in a variety of countries and have taken different paths. The most interesting research has been carried out by Piaget and Eliasberg. Eliasberg has shown that the younger child's perception is not the perception of separate objects. Indeed, it is composed of completely undifferentiated connections. Similarly, Piaget's research has demonstrated that the younger child's perception is syncretic. That is, it is associated with groups of objects that are not isolated, objects that are globally interconnected and perceived as a unified whole. These studies indicate that Stern's point of departure was false. In general terms, current research has shown that this proposed sequence of stages cannot withstand criticism.

This brings us to the two questions mentioned above. It would be inadequate to merely refute Stern's perspective. We need to show why the child's description of pictures follows a developmental path that is the opposite of his actual perceptual development. Stated crudely, the question is that of how we are to explain the finding that the child moves in perception from the whole to its parts, while in the perception of pictures he moves from the parts to the whole? Stern attempted to explain this by saying that the structural development of perception from the whole to its parts is characteristic of immediate perception, while the sequence described earlier is characteristic of meaningful perception, perception that is fused with concrete thinking. Eliasberg's experiment, however, initially dealt with nonmeaningful material. This material was then replaced with meaningful material. There was no difference in Eliasberg's findings related to the type of material used. Eliasberg demonstrated that meaningful material contradicts the findings that would be anticipated on the basis of Stern's data.

At the International Psychotechnics Congress in Moscow, we had the opportunity to hear Eliasberg's report on his new studies as well as his discussion with Stern. Stern's argument was clearly unsuccessful. Studies have demonstrated that this question is resolved both more simply and more complexly than Stern has imagined. Simple observation indicates that while this sequence of stages (i.e., the stages of objects,

actions, qualities, and relationships) is not a useful description of the development of the child's perception, it does coincide with the development of his speech. The child always begins with the pronunciation of separate words. Initially, these words are substantive nouns. Later substantive nouns are supplied with verbs, giving rise to the two word sentence. Adjectives appear in the third period. Finally, with the acquisition of a certain supply of phrases, we find extended accounts in the description of pictures. Thus, this sequence of stages is related not to the development of perception, but to the development of speech.

This fact becomes particularly interesting when we analyze it experimentally. For the sake of simplicity, I will allow myself a slight immodesty and cite our own published experiments in which we attempted to resolve this problem. If we ask the child to tell us what is depicted in a picture, we indeed do find evidence for the set of stages identified by previous researchers. However, if a young child is asked to represent the picture in play, he never merely plays with the separate objects (assuming, of course, that the conditions depicted in the picture are accessible to his understanding). For example, if the picture depicts a man with a bear on a chain that he is showing to a group of children, the child will not first take the role of the bear and then that of the children. The child does not reproduce several separate details in his play. He consistently represents the picture as a whole. When the child is asked to represent the picture in this way, the developmental sequence looks much different.

I do not have the time to discuss many other important problems. This would leave us with no time for theoretical conclusions, without which even the best material would lose its sense. To make my conclusions more complete, however, I will however permit myself a brief comment on several new studies concerned with the development of man's primitive perceptions.

Experimental psychology has recently begun to address problems associated with the senses of smell and taste. These experiments, though still in their infancy, have led researchers to surprising genetic conclusions. It seems that the immediate connection of perception and concrete thinking is absent in primitive perceptions. With smells, for example, we cannot produce generalizations either in everyday practice or in scientific theory. In the early stages of development, the child does not have a general concept of the color red. He knows only the concrete manifestations of red. In much the same way, we lack the ability to generalize smells. We designate them much like primitive peoples designate colors. It seems that categorical perception is not found in several biologically rudimentary phenomena, phenomena that have lost their adaptive significance, that no longer play an essential role in man's cultural development. The perception of smells is one such phenomenon. In this context, I would cite Henning's work. This work has opened up an entire epoch in the theory of the primitive forms of perception, forms of perception that have clearly regressed in man if we compare him to many of the higher mammals.

Permit me a few minutes to outline some conclusions. Whether we consider orthoscopic perception, meaningful perception, or the connections between perception and speech, we find a single fact of extraordinary theoretical importance. Specifically, at each stage in the child's development we observe changes in interfunctional connections and relationships. In the child's development a connection arises between the function of perception and the functions of eidetic memory. As a consequence, a new unified whole arises, a whole within which perception acts as an internal constituent. There is a fusion of concrete thinking and perception. We can no longer separate categorical from immediate perception. We can no longer separate the perception of the object as such from its meaning or sense. Experiments indicate that it is here that the connection between perception and speech, the connection between perception and

the word, arises. They indicate that the typical course of the child's development changes if we view this perception through the prism of speech, if the child not only perceives but tells about what is perceived.

We find these interfunctional connections everywhere. It is because of the emergence of these new connections, these new unities that include perception and other functions, that we find the extremely important developmental changes that lead to the emergence of the distinctive characteristics of developed adult perception. If we view the evolution of perception in isolation, if we fail to recognize that it is part of the complex development of consciousness as a whole, these changes and these characteristics will remain unexplained and inexplicable. Of course, this is precisely what associative and structural psychologies have done.

If we remember that the characteristic features of perception are the same in the earlier and later stages of development, it becomes clear that theories that have viewed, and continue to view, perception outside its connections with other functions, will be powerless to explain the distinctive characteristics of perception that arise in the developmental process. These new complex formations of mental functions are not separate functions. What we are speaking of here is a new unity. For lack of a better term, I will call these formations *psychological systems*. Throughout the child's development, then, new systems constantly emerge within which perception acts. Within these systems, and only within these systems, perception acquires new characteristics that are not inherent to it outside that developmental system.

It is also important to understand that with the formation of new interfunctional connections in development, perception is freed or emancipated from connections characteristic of it in earlier stages. In the early stages of its development, perception is immediately connected with the motor system. It is a feature of an integral sensorimotor process. Only gradually, over the years, does perception begin to acquire a significant degree of independence, to renounce this particular connection with the motor system. Lewin, who has worked most extensively on this problem, argues that only with the passage of years is the child's perception expressed dynamically in the internal processes. In particular, Lewin has shown that it is only with the liberation or differentiation of perception from this form of integral psychomotor process that its connection with concrete thinking becomes possible.

Folkelt, Krueger, and other researchers of the Leipzig school have shown that, in the early stages of perception's development, it is equally inseparable from emotional reactions. Krueger has suggested that in these early stages perception should be called "sensual" or "emotional" perception. His studies have shown that only with the passage of time is perception gradually liberated from its connections with the child's immediate affect or emotion.

We are indebted to the Leipzig school, because it established the extremely important fact that in the beginning of the developmental process we generally cannot identify fully differentiated mental functions. What we find at this stage are much more complex undifferentiated unities that give rise to the separate functions during development. Perception is one of these separate functions. However, further research cannot follow the path established by the Leipzig school. The development of perception will become comprehensible only if research is carried out on the basis of entirely different methodological foundations.

Lecture 2

MEMORY AND ITS DEVELOPMENT IN CHILDHOOD

No other chapter of contemporary psychology has produced more disputes than we find in idealistic and materialistic attempts to explain the phenomena of memory. It is impossible to discuss this chapter of contemporary psychology without considering the debates that have emerged in this domain over the past several decades. Only by analyzing these disputes can we fully and clearly understand the way empirical material has developed in this domain of psychological research.

As you probably know, psychological schools that are inclined to divide psychology into two independent sciences, that is, into explanatory and descriptive psychologies, usually identify the chapter on memory as one that must be developed along materialistic lines. Munsterburg[9] and his school, like other proponents of this idea, note that psychology frequently employs causal forms of thinking in its explanations of memory. That is, it searches for causes that are connected with the activity of the brain.

Attempts to explain the phenomena of memory in terms of contact between neurons have largely been abandoned. The theories that are currently being developed emphasize the establishment of paths between parts of the brain that were previously not connected directly. These kinds of theories continue to be advanced because psychologists working on this problem understand that a full explanation of memory phenomena cannot be obtained without considering brain functions, without connecting this activity with its material substratum.

This naturalistically materialistic tradition will never lead to a consistent materialistic theory of memory. This tradition is always linked with idealistic perspectives on the relationship between mind and brain. Every author who has studied memory from this perspective and proposed a developed theory has preserved some form of psychophysiological parallelism. None have taken the materialistic conception of memory to its end. This parallelism has consistently resulted in an extreme oversimplification of the problem. Parallelism leads to a mechanistic perspective that simplistically compares the physiological processes that provide the foundation for memory with the process of establishing paths between parts of the brain, establishing paths in a field, or forming contacts, that is, with the isolated elements of nervous activity. This kind of purely mechanistic conception has not allowed psychologists to develop a materialistic

explanation of memory phenomena that might be considered a developed philosophical explanation, that is, a rationally or theoretically consistent explanation.

This research tradition is reflected in the experimental studies on the psychology of memory included in Hering's important book. Hering proposed a classic formula for memory, arguing that memory is a common characteristic of all organized matter. In this argument, Hering made a bold attempt to identify the connection between the phenomena of human memory and analogous organic and inorganic phenomena. This provided the foundation for a natural-biological explanation or interpretation of memory. However, it also opened up an unlimited field for two other scientific traditions, that is, for unrestrained mechanism and parallelism.

As this materialistic tradition penetrated memory theory to the extent that this is possible for bourgeois science, idealistic psychology (which began its ascent in the beginning of the twentieth century) naturally took on the task of demonstrating the unscientific and inadequate nature of the mechanistic theory of memory. In the words of one of the leaders of this theoretical tradition, Bergson, idealistic psychology attempted to show that the true relationship between matter and spirit is revealed in the processes of memory.

In his book, *Matter and Memory*, Bergson's goal was to study the relationships between the spirit and the body. The problem of memory was represented as a specific case of the more general problem of the relationship between spirit and matter. The book presented an extremely rich collection of empirical material which included information on various pathologies associated with brain trauma such as amnesia, aphasia, forgetting, and speech disturbances.

Adopted by this entire philosophical school as the foundation for its theory of memory, Bergson's basic thesis is that there are two different forms of memory that cannot be reduced to one another. That is, he argued that there exist two different memories. One memory is analogous to other processes that occur in the body. This form of memory can be viewed as a function of the brain. However, a second form of memory develops in parallel with this in the child. This form of memory is a form of spiritual activity. In Bergson's view, if we wanted to take spiritual activity in its pure form, we would turn not to Plato's general ideas but to the sphere of memories or representations.

Bergson asks us to imagine that we memorize a poem as the consequence of learning it by heart. This is one form of memory. Structurally, it is reminiscent of a motor habit. Through exercise or practice a path is created which depends on the frequency and strength of repetitions. As a consequence, an activity that was formerly impossible becomes possible. In Bergson's view, this memory should be called motor memory. However, in another situation I do not reproduce something that I have learned through repetition but merely want to show that I have read a poem. Here, what I try to reproduce in memory was present only momentarily. This is an example of what Bergson identifies as the second form of memory. It is associated with the recreation of an image of some experience, but is not connected with exercise or the formation of a new motor habit. This memory is a purely spiritual form of activity. In Bergson's view, this latter form of memory is connected with the brain only to the extent that body and brain are tools necessary for the realization of purely spiritual activity.

By analyzing cases of brain disease, Bergson tried to demonstrate that it is memory as a motor habit that disappears first. Where the second type of memory does suffer, it does not suffer with the same immediate dependency on the brain disease. This form of memory suffers as a result of brain disease because the individual loses the apparatus or tool that the brain provides, an apparatus that is necessary for the mani-

festation of his spiritual activity. Thus, the brain participates in different ways in the two forms of memory. In the first case, it carries out the function. In the second, it serves as a tool for a purely spiritual activity. With certain forms of brain disease, this activity cannot be manifested in words, stories, or expressive movements. However, the brain itself is not connected with this second and purely spiritual activity of memory.

As is typical of this kind of argument, Bergson based his criticism of mechanistic conceptions of memory on the least adequate theories exiting at that time. By noting the lack of correspondence between simplistic conceptions such as the theory of localization and the complexity of memory phenomena themselves, Bergson sought to find support for his own idealistic conception of memory. Bergson's not only argued that memory is not localized in a single place in the brain; he argued that it is not a function of the brain at all. He constructed his own theory by using the flaws in what were then the dominant theories of memory and brain functions. He attempted to show that memory for unique events is in the domain of the spirit. That is, Bergson felt that the capacity of human consciousness to reproduce images of the past as if we were seeing them in reality provided the foundation for claiming the independence of man's spiritual functions from his body.

However, these developments of idealistic theory as part of the struggle between materialistic and idealistic conceptions of memory did not complete the history of memory theory, it did not end the theoretical dispute over this issue. In fact, if we analyze the theories that have appeared in recent years, we see that materialism as undergone a certain shift, while the idealistic tradition has begun to develop somewhat differently. Bergson has been replaced by biologists and laboratory or clinical workers. These scholars have not been satisfied with the dualistic resolution of the problem of memory. Moreover, as is often true of those who maintain a positivistic perspective, these scholars have been impatient with the striking differences that exist between experimental findings and the kinds of assertions on which Bergson based his work. What has emerged is a tendency to connect both forms of memory, to view memory as a single whole. By unifying opposite perspectives in this way, these scholars have attempted to achieve an integral conception of memory, a conception which has nonetheless developed within the framework of a nonmaterialistic philosophy.

Semon's theory of *mneme* is the most widely known of these efforts. For Semon, the capacity to preserve traces of the past is characteristic not only of man but of all living things, both animal and plant. This theory moved in the direction of Hering's concept of reproduction. However, it also moved in another direction, one which is inevitable for any consistent idealistic theory when it approaches this type of problem.

The most developed form of this theory was achieved by Bleuler. Bleuler's theory claimed to occupy an independent third position in the struggle between vitalism and mechanism. His basic work was entitled, "*Mechanism, vitalism, and mnemism.*" Thus, the theory of mneme attempted to resolve the problem of vitalism and mechanism, two dead ends that had paralyzed naturalistic thought.

Mnemism would seem to be the kind of concept that would allow one to overcome both mechanism and vitalism. This concept was presented in close connection with empirical material, and like Bergson, Semon viewed memory from two sides. On the one hand, he said that memory is the foundation of any form of consciousness, that to be conscious of something means to have a memory of a previous intention. On the other hand, in a work written in 1921, Bleuler argued that we must assume the presence of a factor of psychic representation, a factor that he called a "psychoid." He used this term to designate the psychical beginning inherent to any matter, including inorganic matter.

It is Bleuler's belief that memory is the function that bridges the gap between consciousness and matter. Even inorganic matter has the characteristic of plasticity, the characteristic of preserving traces of that which influences it. Using a rich body of material gathered by his students, Bleuler demonstrated how extensively traces of past influences are preserved in dead matter. In his view, from this characteristic of dead matter there extends an unbroken ladder that serves as the foundation for the development of the human mind. In this way, the function of memory unifies consciousness with all material nature, forming this ladder from several developmental stages and providing the connection between matter and spirit.

Such are the main features of the philosophical struggle now developing around the problem of memory in bourgeois psychology. Of course, no crisis in science associated with an empirical problem has only a single set of roots. There are several specific disputes and many disparate opinions that constitute current discussions of the problem of memory. This is true not only on the general philosophical plane, but on the plane of empirical and theoretical research as well.

At the center of this struggle is the difference between those who hold atomistic and structural views. In associative psychology, the chapter on memory formed the foundation for psychology as a whole. Perception, memory and will were all viewed from the perspective of the concept of association. Associative psychology attempted to extend the laws of memory to all other mental phenomena, to make memory theory the foundation for all psychology. Structural psychology was not immediately able to attack the associative position in the domain of memory theory. In its early years, the struggle between the structural and atomistic traditions developed around theories of perception. Recently, however, several practical and theoretical studies have emerged where structural psychologists have attempted to attack the associative theory of memory.

The first point that these studies have attempted to make is that remembering and the activity of memory are subordinated to the same structural laws as perception.

Many of you may remember Gottshald's report at the Institute of Psychology in Moscow which he followed with a presentation on a special portion of his work. In this study, the researcher presented various combinations of figures to his subjects until they had learned them perfectly. When these same figures were presented as part of a more complex structure, however, Gottshald found that subjects who were seeing this structure for the first time recalled it more frequently than those who had seen some portion of it as many as 500 times before. When the structure appeared in some new combination, that which had been seen many hundreds of times was reduced to naught. The subject failed to isolate the familiar part from the structure as a whole. Following Kohler, Gottshald demonstrated that the combination of visual images or memories depends on structural laws of mental activity, that is, it depends on the whole in which we see a given image or element. I will not discuss the experiments on color combinations carried out by Kohler and his colleagues with animals and children, since they have been described frequently. I will also refrain from reviewing the data on the development of habits in connection with certain visual structures. From the domestic chicken to man, we find that these habits have a structural nature that develops with the aid of memory. Man always reacts to a certain whole.

Second, Lewin's investigations based on the study of memory for nonsense syllables have demonstrated that the way meaningless material is remembered is a function of the difficulty inherent in forming a structure between its elements. In memory for the parts, the subject does not successfully establish the necessary structural correspondences. Thus, the success of memory depends on the kind of structure that the material forms in the consciousness of the subject who is learning the separate parts.

Other works have expanded the study of memory activity to new domains. I will mention only two that will facilitate the discussion of several important problems.

First, Zeigarnik's[10] research deals with memory for completed and uncompleted actions and figures. In her basic research, the subject is asked to carry out several actions that are presented in a randomized order. The subject is allowed to complete some of these actions while others are terminated before completion. It turns out that the actions the subjects failed to complete were remembered twice as well as those that they completed. Zeigarnik's experiments on the perception of figures produce the opposite pattern of performance. Here, complete visual images are remembered better than incomplete figures. Thus, memory for one's own actions and memory for visual images are subject to different laws and regularities.

It is only one step from these experiments to even more interesting structural studies of memory, studies that address the problem of how intentions are forgotten. Any intention requires memory. When I decide to do something this evening, I must remember what I intend to do. In Spinoza's remarkable words, the spirit can do nothing in accordance with its decision if it does not remember what needs to be done: "Intention is memory."

Thus, studying memory's influence on the future, researchers have shown that the laws of remembering are different in memory for completed and uncompleted actions than for verbal or other types of material. Thus, structural studies have shown that memory activity has diverse forms, that it is independent of any single general law such as the law of association. These studies have received broad support from other researchers.

You are probably familiar with Buhler's work that reproduced the experiments that had been conducted by associative psychologists in the analysis of memory. In his experiments, Buhler substituted complex ideas for the words and syllables that had been used in the original experiments. Buhler composed a series of ideas, each of which belonged to a pair that corresponded with one another. The members of each pair were presented in random. Buhler's study demonstrated that this kind of meaningful material is easier to remember than meaningless material. Twenty pairs of ideas were easily remembered by the average subject (i.e., subjects selected from a group whose occupations involved some form of intellectual activity) while six pairs of meaningless words were beyond their capacity. Thus, thoughts move in accordance with different laws than representations. Memory for ideas proceeds in accordance with laws that involve the meaningful relating of one thought to another.

We find additional support for this idea in the fact that we remember sense independently of words. For example, in today's lecture I must discuss the content of several books and reports. I have no difficulty in remembering their sense and content. Nonetheless, I do encounter difficulties in reproducing the verbal forms corresponding to this material.

Several studies indicate this independence of memory for sense from memory for the verbal account. Indeed, experimental support for this general position has been provided by zoopsychology. Thorndike identified two types of memorization. In the first, the curve that represents the number of mistakes made falls slowly and gradually; the animal learns the material gradually. In the second, this curve falls suddenly. In Thorndike's view, this second type of memory is not the rule but the exception. On the other hand, Kohler turned his attention to this second type of learning, this intellectual memory or instantaneous learning. His work demonstrated the existence of two different forms of memory activity.

Any teacher knows that some material demands memorization and repetition while some is remembered immediately. No one attempts to memorize the solutions

to arithmetic problems. One must understand the process involved in solving these problems only once to acquire the potential for solving them in the future. In much the same way, the study of theorems in geometry is not based on the kinds of processes involved in studying exceptions to Latin grammar, in memorizing poems, or in learning the rules of grammar.

Once again we find this difference between memory for thoughts (i.e., for meaningful material) and memory for nonmeaningful material. This contradiction continues to emerge in various fields of research with increasing clarity. The reanalysis of the memory problem by structural psychology, and the experiments that I will discuss in my conclusion (experiments that have their foundation in a variety of perspectives), have provided us with such a massive amount of new material that they have altered the old order of things in this domain of research. Contemporary empirical knowledge leads to a different statement of the problem of memory than was characteristic of researchers like Bleuler. Having communicated these facts, we will now attempt to move them to a new position.

I do not think we would err in saying that memory development provides the focus for much of the theoretical and empirical knowledge concerning memory. Nowhere is the question of development so confused as it is here. On the one hand, memory is found in the youngest children. If it develops in children of this age, this development is not obvious. Research has not provided any guiding thread for analyzing the development of memory at this stage. As a consequence, many of the issues concerning memory have been stated metaphysically, in philosophical argument as well as in research and applied work. Buhler feels that thoughts are remembered differently than representations. Nonetheless, research indicates that the child remembers representations better than thoughts. Numerous investigations, including those concerned with problems of memory, waver on the metaphysical ground which has provided the foundation for their construction. You know that the problem of memory development has given birth to tremendous disputes in psychology. Some psychologists assert that memory does not develop, that it is at its peak at the beginning of the child's development. I will not discuss these theories in detail. However, a variety of observations do indicate that memory is exceedingly strong in the early years and that it becomes weaker and weaker as the child develops.

In this connection, it is adequate to note how difficult the study of a foreign language is for us and with what ease the child learns a given language. It seems as though the early years were created for the study of language. In America and Germany, related pedagogical experiments have been conducted. These experiments involve shifting language study from the middle school to preschool institutions. Results from Leipzig have shown that two years of preschool instruction produce significantly greater results than seven years of middle school instruction in the same language. The effectiveness of foreign language learning increases as we shift instruction to younger children. The only languages that we master well are those we master in these early years. The young child has obvious advantages over the more mature child in the mastery of language.

The practice of cultivating several languages in the child at an early age has shown that the mastery of two or three languages does not slow language learning. For example, the Serbian, Pavlovich, carried out an experiment with his own children. Pavlovich addressed and responded to his children only in Serbian, while their mother spoke only in French. Pavlovich found that neither the degree nor the pace of development in either language suffered from the simultaneous presence of both. Iorgen's research is also of interest in this connection. These studies, which included 16 chil-

dren, demonstrate that three languages can be learned without any negative influence of one language on the other.

To summarize, the experiments on teaching young children reading, writing, and simple calculation that have been conducted by the Leipzig and American schools lead to the conclusion that it is easier to teach children who are between 5-6 years of age than those between 7-8 years of age. There are some data from research carried out in Moscow which support this position. Children who master reading and writing at nine years of age encounter significantly greater difficulties than those who learn at younger ages.

Several educators are suggesting that some of the discipline characteristic of the school should be done away with so that young children, joking and playing, could learn subjects that currently occupy a large proportion of the student's time. I mention this only to illustrate how sharp the young child's memory is. It cannot even be compared with the memory of the adolescent or adult. Still, the three year old who easily learns a foreign language cannot learn systematic knowledge from the domain of geography, while the nine year old school child who learns foreign languages only with difficulty acquires this kind of knowledge with relative ease. The adult also surpasses the child in remembering systematic knowledge.

We also find psychologists who attempt to occupy a middle ground on this question, trying to identify the point at which memory achieves the peak in its development. In particular, Groos's student Zeidel has collected a massive amount of material and attempted to show that memory peaks at near ten years of age, declining thereafter.

Each of these three perspectives, indeed their very existence, indicates that these schools have oversimplified the question of memory development. Researchers belonging to these schools conceptualize memory development in terms of a comparatively simple backward or forward movement. They see it in terms of ascent and decline, in terms of a movement that can be represented by a line that not only lies in a single plane but moves in a single direction. However, we find contradictions when we approach memory development with this kind of lineal scale. There are data that speak both pro and con. Memory development is a complex process that cannot be represented in a lineal cross-section.

Two issues must be addressed if we are to begin to outline a solution to this problem.

The first has been dealt with by several Russian studies and I will limit my discussion to them. I refer here to the attempt to distinguish two lines in the development of the child's memory, the attempt to show that the child's memory does not develop along a single path. This distinction was the point of departure for a series of memory studies with which I was connected. This work, published by Leont'ev and Zankov,[11] presents experimental material that supports this thesis. There is no question that we are dealing with different operations when we remember something without mediation than when we remember with the aid of a supplementary stimulus, when, for example, we tie a knot to aid memory rather than trying to remember without this knot.

In our studies, we presented children of various ages with identical material, asking them to remember it in one of two ways. In one case, the child was asked to remember directly. In the other, he was given auxiliary means to help him learn the assigned material. Children who remembered with the aid of the auxiliary means constructed the operation on a different plane than those who remembered directly. For children who used signs and auxiliary operations, the task required not memory so much as the ability to create new connections or new structures. It required a rich

imagination and sometimes well developed forms of thinking. That is, the task required the use of psychological qualities that are not essential to direct remembering.

This experiment demonstrated that if we take a class at any level and arrange the pupils in rank order with respect to the strength of direct memory and with respect to their skills in mediated remembering, there will be no correspondence between the two rankings. Direct and mediated remembering each have their own dynamic, their own developmental curve. Leont'ev attempted to present this curve schematically.

The results of this work is available in several books of which you are aware. Therefore, I will not discuss it further, though we could dedicate a whole lecture to it.

Theoretical studies indicate that the historical development of human memory has occurred primarily in the domain of mediated remembering. That is, man has worked out new means through which he has been able to subordinate memory to his own purposes, control the course of remembering, make it increasingly voluntary, and make it reflect the increasingly unique characteristics of human consciousness. In particular, we believe that the problem of mediated remembering leads to the problem of verbal memory, a form of memory that plays an essential role in contemporary cultured man. Verbal memory is based on the use of verbal accounts of events, on the use of verbal formulation in the effort to remember.

These studies have moved the question of memory development in the child from a standstill. They have also transferred it to a somewhat different plane. In my view, these studies have not provided any final resolution to the problem. On the contrary, I am inclined to think that they have greatly oversimplified it. At the same time, however, one senses that they have begun to introduce a certain complexity into the psychological problem.

Since you are familiar with this problem, I do not want to dwell on it. However, these studies lead directly to another problem which seems to strive to place itself at the center of our attention, a problem that is reflected clearly in memory development. Specifically, when mediated remembering is studied, when we study how man remembers through reliance on specific signs and methods, we see a change in memory's place in the system of mental functions. What is absorbed directly by memory in direct remembering is absorbed in mediated remembering with the aid of several mental operations that may have nothing in common with memory itself. What we find here, then, might be viewed as a substitution of certain mental functions for others. In other words, what changes in memory development is not so much the structure of the function that we call memory, but the character of the functions that aid remembering. That is, what changes are the interfunctional relationships that connect memory with other functions.

I gave an example from this domain in my first lecture which I will return to now. The remarkable fact is not that the memory of the more mature child is different than the memory of the younger child but the fact that the role of memory is different in the two cases. In early childhood, memory is among the most central and basic mental functions. The construction of all other functions reflect a dependence on memory. To a large extent, the young child's thinking is defined by his memory. This differs fundamentally from the thinking of the more mature child. For the young child, to think means to remember, to rely on his previous experience and on the modification of this experience. Thinking is never as closely related to memory as it is in early childhood. Here, thinking develops in direct dependence on memory.

I will give three examples, the first of which is concerned with the fact that the child defines concepts on the basis of memory. When the child is asked what a snail is, he says that it is small, slippery, and it moves with its foot. If he is asked to describe a cot, he says that it has a "soft seat." In these descriptions, the child gives a condensed

outline of the memories that reproduce the object. Consequently, for the child, the object of the act of thought in the designation of the concept is not so much the concept's logical structure as it is memories. The concreteness and syncretism of the child's thinking are particular manifestations of the dependence of his thought on his memory.

The exceptional cases that we sometimes observe in children can serve as another example. Experiments show that remembering plays a decisive role in all the thought constructions of these kinds of children, including concepts. In particular, in these children, we find the development of the concrete concept. The general representations of these children have their roots in the concrete sphere of concepts. Through certain combinations, the general concept arises. This concept is completely linked with memory and cannot, therefore, have the characteristics of an abstraction.

Stern's discussions of recent studies on child thought, in particular of research on what is called transduction (i.e., the transition from one specific case to another), also indicate that we are dealing with nothing more here than the recollection of one case on the basis of another particular, though analogous, case.

As a final example, consider the development of the child's representations in early childhood. The analysis of representations is related to the analysis of word meanings and is directly linked with a topic we that will discuss later. To construct a bridge between the two, however, I would note that studies in this domain indicate that there is a fundamental difference in the connections that stand behind the words of the child and those of the adult. The child forms word meanings differently than we do. For both the child and the adult, a generalization is hidden behind any word meaning. However, the means the child uses to generalize is different from our own and reflects the dependence of his thinking on memory. The child constructs the representations that he relates to multiple objects in the same way that we construct family names. The names of words or phenomena do not represent concepts so much as families, that is, groups of concrete things that have concrete connections.

Thus, in the early stages of development, it is the child's experience, and the direct influence of that experience documented in memory, that define the entire structure of his thinking. This is understandable from a developmental perspective. It is not thinking, particularly not abstract thinking, that we find at the beginning of the developmental process. The child's memory is the decisive feature at this point. However, there is a turning point in the child's development, with the decisive shift occurring near adolescent years. Studies indicate that near the end of the child's development memory's interfunctional relations change fundamentally. If to think is to remember for the young child, for the adolescent to remember is to think. The adolescent's memory is logicalized to the extent that recall is reduced to establishing and providing locations for logical relationships, while recall (pripominanie) becomes a search for points that have been established.

This logicalization of memory demonstrates how interfunctional relationships change in the course of development. The central feature of the transitional age is the formation of the concept. At this stage, representations and concepts, all thought formations, are constructed not as family names but as fully abstract concepts.

Thus, the same dependency that defined the complexive character of the young child's thinking subsequently leads to changes in the character of that thinking. Though there is certainly some similarity between the processes involved, remembering material that is thought in concepts and remembering the same material thought in complexes constitute two entirely different tasks. When I remember some material with the aid of conceptual thinking, that is, on the basis of the abstract analysis that is included in the thinking itself, the logical structure I am faced with is fundamentally

different than when I study this material using other means. In these two situations, the sense structure of the material will differ.

Therefore, in studying the development of the child's memory, we must focus not so much on the changes that occur within memory itself, but on the place of memory alongside other mental functions. In early childhood, memory is the dominant function. It defines the child's thinking. Correspondingly, the transition to abstract thinking leads to a different type of remembering. Obviously, a linear statement of the problem of the development of the child's memory does not fully encompass the critical developmental issues.

In our next lecture, our topic will be the problem of thinking. I will attempt to show that by studying the changes in the relationship between memory and thinking, we can derive the basic forms of thought. There is tremendous potential for change in these basic forms. Thinking can take on new forms, the characteristics of which we can then adopt.

Lecture 3

THINKING AND ITS DEVELOPMENT IN CHILDHOOD

Today we will address the issue of thinking and its development. Once again, we will begin our analysis with a schematic outline of the theoretical conceptions that currently have some significance for psychological perspectives on this problem.

From an historical perspective, we must once again consider associative psychology, since this was the source of the first attempts to resolve the problem of thinking through experimental means. Associative psychology encountered tremendous difficulties in this effort. The goal-directed character of thinking was extremely difficult to explain in terms of an associational flow of representations where one representation elicits another that is connected with it in accordance with proximity or time. Where in this stream of representations does the goal-directed nature of thinking arise? Why from this stream of representations do associations arise that are related to the thinking task that lies before us? In what way does the logical structure of the associative stream arise? In what way does an individual's thinking in resolving a task differ from the simple process of association that occurs when one word is strung together with another in an associative chain? Associative psychology could not answer any of these questions other than by introducing supplementary concepts, concepts previously unknown to experimental psychology.

The first attempt to provide an experimental explanation for the goal-directed nature and the logical order of the flow of associations in the thinking process was based on the introduction of the concept of perserveration. The associative tendency was conceptualized as the tendency of each representation in consciousness to elicit another representation connected with it. In their attempt to explain the rational flow of associations, psychologists assumed the existence of another tendency, the perseverative tendency. This was conceptualized as a tendency of consciousness that is in a sense in opposition to the associative. The concept of the perseverative tendency implied that any representation that penetrates consciousness has a tendency to be reinforced or held in consciousness. If a representation is forced out by another that is associated with it, it will manifest a perseverative tendency, a tendency to burst back into the flow of the associative process and, to the extent possible, to return to the previous associations.

Experimental research by several authors demonstrated that this kind of perseverative tendency is actually inherent to our representations, whether in the free flow of associations or in the ordered flow of associations that arises when we select associations in accordance with some previously established order.

The psychology of that time attempted to explain thinking in terms of a combination of associative and perseverative tendencies. Among the best expressions of this idea is found in the work of Ebbinghaus[12]. Ebbinghaus provided the classic definition of thinking, saying that it stands somewhere between an obsessive idea and an idea that gallops like the wind.

As you know, an obsessive idea is one that perseverates in consciousness to the extent that an individual cannot free himself from it. It is experienced as a point on which consciousness comes to rest, a point from which consciousness cannot be moved by voluntary effort. Ideas that move like a whirlwind, that move at a gallop, represent a pathological state of consciousness characterized by the opposing phenomenon. In this state, thinking cannot stop for any extended period on a single point. One idea is exchanged for another in accordance with some external compatibility, some feature of similarity, some accidental correspondence, or some external impression that takes root in the course of thinking. What is created as a consequence gives the impression of galloping ideas, a condition that can be observed clinically in maniacal excitement. In Ebbinghaus's view, then, thinking lies at a midpoint between the extreme expression of the perseverative tendency (i.e., the obsessive idea) and the associative tendency (i.e., a gallop or whirlwind of ideas).

An example used by Ebbinghaus, one that is extremely simple and crude, clarifies the views that he held on this issue. Imagine a man in a closed room who knows that the house is burning. He is seeking a means of saving himself. How will he behave? On the one hand, his behavior will be reminiscent of the ill man suffering from the gallop of ideas. He will throw himself from the window to the door, then wait for help. Not receiving it, he will once again begin to throw himself about the room, his thought jumping from one thing to the next. On the other hand, this man's behavior will be reminiscent of that of an individual with an obsessive idea. He has a single central representation that perseverates in his consciousness and defines the flow of his ideas. This thought is that of how to save himself from the burning room. Where thinking operates correctly, the perseverative representation insures stability. It maintains the task we are thinking about, that which is the object of our thinking. This object is temporally a perseverative representation in consciousness. However, the whole developing chain of associations that occur in consciousness, the chain of associations from which we select what we need in our thought, represents a different and opposing tendency. This is the associative tendency.

Ebbinghaus explained the thinking of the ill in terms of the divergence of these two tendencies, in terms of the fission of the obsessive state and state of galloping ideas. Both these tendencies are inherent to normal consciousness. In psychosis, they are found is a fissioned form.

Ebbinghaus explains the child's development in the following way. The very young child manifests the perseverative tendency with extraordinary clarity. He gets stuck on an interesting impression, calling it up untiringly over and over again. He returns repeatedly to the object that occupies him. Thus, the perseverative tendency, the tendency that gives the whole process a certain unity, is characteristic of the very young child. The associative tendency, the tendency for change in activity or representations, is also characteristic of the very young child. The problem is that these tendencies are not unified in the child; they do not work harmoniously or systematically

with one another. As a consequence, we do not find the logical thinking that we find in the adult.

For associative psychology, then, the development of the child's thinking is reduced to a single concept. Specifically, the elements from which the thinking function is constructed, that is, the associative and the perseverative tendencies, are initially not unified. It is in development that they become unified. Thus, the development of the child's thinking involves the cementing these two tendencies.

In experimentation, the inadequacy of this perspective quickly became apparent. This led to the most recent theoretical attempt to salvage the basic skeleton of the associative conception of thinking, an attempt made the German psychologist, Ach.

In his initial experiments devoted to the problem of thinking, Ach began by recognizing the inadequacy of the attempt to explain thinking in terms of the associative and perseverative tendencies. Ach demonstrated that these tendencies do not provide the necessary foundation for an adequate explanation of the rational character of thinking. Even where we have a stability of representations combined with associative links moving away from this stable point in various directions, we may have something that has no connection with meaningful and rational movements of these associative chains.

The failure of this attempt to explain the meaningful and rational character of thought led researchers down one of three different paths.

One of these led to contemporary behaviorism, a reincarnation of the old theory. This perspective is represented by Watson and others who think along the same lines. Here, thinking is perceived as a simple associative change in primitive movements, manifested either in embryonic or open form. In trial and error theory, Watson took the idea of the unification of associative and perseverative tendencies to its logical end. Initially proposed as an explanation for the behavior of animals in difficult situations, this theory constitutes the purest possible expression of this combination of associative and perseverative tendencies. Acting in accordance with the method of trial and error, the animal behaves in precisely the same way as the hypothetical man described by Ebbinghaus. Thinking is reduced to a combination of associative and perseverative tendencies.

According to an important representative of this school, the key to is to explain how meaningful, rational activity arises from tendencies that operate mechanically. He argues that the resolution of this problem is similar to the resolution of the problem of Columbus' egg. We need only show that the so-called rational activity of human thinking is an illusion, that thinking only seems to be rational because it is useful in practical terms, because it leads to an adaptive result. In fact, thought always occurs in a trial and error form. It is the accidental result of the blind play of associative processes directed toward a perseverating stimulus, a stimulus that constantly drives these associative processes in a certain direction. This is the ultimate destination of the thinking of this group of psychologists.

A second group of psychologists have moved in the opposite direction. These psychologists lacked either a sufficient belief in the associative principles that they had previously defended, or the necessary courage, to reach a consistent conclusion concerning whether a model of rational activity can be constructed on the basis of nonrational elements. They tried to find a way to explain the rational character of human thinking without resorting to ideas that would destroy the basic premises of associative psychology.

This was the path taken by Ach in a whole series of studies that constituted an entire epoch in the study of thinking. Ach searched for the source of rational human thought, thought based on the blind play of mechanical tendencies, in will. He clari-

fied the relationship between will and thinking in his first work, *Volitional Activity and Thinking*. In his experimental work, Ach tried to show that volitional activity is associated with a new tendency. To the two tendencies that were recognized at that point by experimental psychology (i.e., the perseverative and the associative), Ach added a third that he called the determining tendency. He attempted to derive the rational character of human thinking from these three tendencies. In doing this, he took a path that was directly opposed to that of the behaviorists. The concept of the determining tendency implies that there is a separate representation besides the associative and perseverative tendencies. This representation has a determining force, a capacity to regulate the flow of the associative process, in the way that we regulate this process through conscious volitional effort when we try to think rationally, not allowing ourselves to be distracted from our ideas. In Ach's view, the capacity of the determining-associative representation is not inherent to all representations. It is characteristic only of the goal-representation, only of the representation that contains the goal of the activity.

Having assumed a teleological position in clarifying this phenomenon, Ach attempted place his theory in opposition to the extreme idealistic or vitalistic theory of the Wurzburg school on the one hand (a perspective that also assumed the teleological character of thinking) and the old mechanistic associative school on the other. By combining these three tendencies, Ach tried to explain the major foundations of thinking. He tried to show that it is by adding the goal-representation as the regulator of the blind play of the associative process that the rational character of our thinking arises. However, this was a blind alley. Both theoretically and experimentally, it was much like the path taken by associative psychology.

The preparations for the third path taken in response to this problem had been made by the entire historical development of psychology. This path, a reaction to the atomistic character of the associative school, was opened up through idealistic means. The Wurzburg school, a group of psychologists who were students of Kulpe, reassessed the basic concepts of the associative school. Their central concept, an idea reflected in all their experimental work, was that thinking must be strictly differentiated from other processes of mental activity. The associative laws were recognized in the domain of memory and other aspects of mental activity. With respect to thinking, however, they were declared inadequate.

The Wurzburg school emphasized the abstract, non-sensual, non-concrete, and imageless nature of thinking. Like the Paris school led by Binet (in this connection, they were working in concert with the Paris school), they demonstrated in several studies that states of consciousness that are rich in images (our dreams, for example) are lacking in thought. Correspondingly, they demonstrated that states that are rich in thought (the play of outstanding chess players studied by Binet, for example) are lacking in images. These studies demonstrated that thinking is a form of experience where it is extremely difficult to find anything like a concrete image. We frequently cannot even perceive a word that accompanies thought. Images and words do appear in our experience. They can be registered by self observation. Nonetheless, they seem to have an accidental and superficial relationship to our thinking. They never form the essential core of these processes. This dogma concerning the imageless and non-sensual character of thinking became the point of departure for the extremely idealistic conception of thinking that emerged from the Wurzburg school. Their basic philosophy was that thinking is a primary form of activity, comparable in this respect to sensation. This formulation of the perspective, developed by Kulpe, became the slogan of the whole movement.

Thus, in contrast to associative psychology, the Wurzburg school refused to derive thinking from the combination of more elementary tendencies. On the one hand, they argued that thinking is a completely distinct form of mental activity. On the other, they argued that thinking is a primary form of mental activity like sensation. As a consequence, they were led to the view that thinking does not depend on experience. Thinking was conceptualized as a necessary premise for human consciousness.

As Kulpe noted, when thinking is viewed in this way, a problem that had been irresolvable for previous generations of psychologists suddenly fell of its own accord, as if a magic wand had been waved. The difficulty psychologists working within the natural science tradition had in their analysis of thinking was in explaining its rational character. This was particularly true of the associative school. For the Wurzburg school, however, the rational character of thinking was taken as something primary, something inherent to thinking from the outset. It required no more explanation than the capacity of human consciousness for sensation.

Naturally, the Wurzburg school welcomed the emerging psychovitalism of Drish and others, a psychovitalism of which they were very much aware. The psychovitalists tried to show that psychology could begin with the higher forms of abstract thinking in the human adult and trace a path to extremely primitive life forms. This would demonstrate that the rational life force is not the product of a long developmental process, but something primal embodied in all forms of living matter. According to Drish, this assumption of the presence of a rational living beginning is equally necessary for the explanation of the development of human thinking and the explanation of the behavior of a worm. The vitalists conceptualized the goal-oriented nature of life as lying on the same plane as the rational goal-oriented activity that is manifested in the highest forms of human thinking.

These were the three paths taken as researchers attempted to extricate themselves from the blind alley where the problem of thinking had been left exhausted by the endless attempts of associative psychologists to derive the rational and meaningful character of human thinking from the meaningless play of associative tendencies.

I will not stop at this point to consider the more complex relationships between these schools in their theories of thinking, nor will I discuss more recent attempts to resolve these problems. Everyone knows that while both the Wurzburg school and contemporary behaviorists have their origins in the inadequacies of associative psychology, they remain polar opposites of one another. Indeed, to a certain extent behaviorism is a reaction to the theories of the Wurzburg school.

The structural theory of thinking occupies a unique position in the history of this problem. We have seen that the traditions that we have just mentioned arose in opposition to the associative school. Similarly, a correct understanding of Gestalt psychology is possible only if we consider the historical conditions of its appearance. Logically, Gestalt psychology arose in opposition to associative psychology. This produces the illusion that it followed associative psychology directly. This, however, was not the actual historical situation. Associative psychology gave birth to a whole series of research traditions. I noted three of the most important above. These traditions led to a blind alley that appeared in its purest form in the vitalistic and mechanistic traditions. It was only when these traditions had been led to ruin, when both had left experimental psychology at a dead end, that we find the emergence of structural psychology.

Structural psychology's central task was that of overcoming associative psychology without relying on either vitalistic or mechanistic thinking. Structural psychology attempted to shift the level of research such that the potential for the development of scientific research would be preserved without moving toward either of the two dead ends in bourgoise thought, that is, without moving toward either mechanism or vital-

ism. Since this entire polemic was presented clearly by Koffka, I will not dwell on it here. I will say only that the area that structural psychology turned out to be least productive was in the resolution of the problem of thinking. If we ignore for the moment Wertheimer's studies (*The Psychology of Productive Thinking*), and those of Gelbe and Goldstein on the psychopathology of thinking, the single work representing structural psychology in the domain of thinking is that of Kohler. A tremendous step forward in zoopsychology in its time, this work is sufficiently well known that I will not review it here.

It is no surprise that Kohler's work led to the emergence of a unique tendency in psychology, one most easily illustrated using the example of the conception of thinking in child psychology. I am referring to the biological tradition in the theory of thinking. Structural psychologists developed this approach in such a way, and with such intensity, in experimental research that they overcame the extreme idealistic perspective of the Wurzburg school.

The most complete expression of this approach that arose in connection with this new stage in the development of the theory of thinking is found in the well known second volume of Selz's research. An entire section of this volume is devoted to the relationship between the data from Kohler's experiments with chimpanzees and Selz's own data on the productive nature of human thinking. This approach is also reflected in Buhler's works. Like Buhler, Selz abandoned the Wurzburg school and took a position that unified the perspectives of the Wurzburg school with those of structural psychology. The reconciliation of the two was found in a biological conception of thinking.

The most extensive development of these views in child psychology is presented in Buhler's works. Buhler states directly that the biological perspective and childhood provided the exit that saved psychology from the crisis that grasped the Wurzburg school's theory of thinking, an exit that is outlined in Buhler's works on thinking. Here, the child's thinking activity is conceptualized primarily on the biological plane. It is represented as the missing link between the thinking of the higher apes and that of historically developed man. Placing the child's thinking between these extremes and viewing it as a transitional biological form between purely animal and purely human forms of thinking, these authors attempted to derive the specific characteristics of the child's thinking from his biological characteristics.

Though the claim may initially seem strange, it seems to me that, historically, Piaget's theories belong to this same tradition, to this same group of theories. We must mention this particular theory, however, because it is associated with the extremely rich empirical material that Piaget introduced into contemporary theory on the child's thinking and because several issues that are treated in rudimentary form by similar theories are taken to their logical limit by Piaget.

Fundamental to this theory is the concept of the co-relationships of the biological and social aspects in the development of thinking. Piaget's perspective on this issue is extremely simple. Following the psychoanalytic perspectives of Freud and Bleuler, Piaget assumes that the first stage in the development of the child's thinking is guided by the pleasure principle. The young child thinks in accordance with the same motive that guides his other activity, the motive of achieving pleasure. Like these other authors, Piaget represents the thinking of the young child as a purely biological activity, an activity of a semi-instinctual nature directed toward the attainment of pleasure. Bleuler refers to this form of thought in the child as autistic thought. Piaget refers to it either as undirected thought, in contrast to the logical, directed thought of the older child, or as dream thought, to the extent that it is clearly expressed in dreams, particu-

larly in those of the child. In any case, Piaget takes autistic thought as his point of departure. Autistic thought is not so much thought as a free soaring dream.

In development, however, the child finds himself in a constant encounter with the social environment. This environment demands an adjustment to adult thinking. Here the child is taught language. Language dictates the strict partitioning of thought, requiring the formation of socialized thought. In the social environment, the child's behavior demands the capability of understanding the thought of others, of responding to that thought, and of communicating ones own thought.

All these modes of social interaction form the foundation of a process that Piaget calls the socialization of the child's thought, a process that Piaget compares to the "socialization of private property." The child's thinking, something that belongs to the child and constitutes "his personal property" as a specific biological individual, is displaced by forms of thinking that are imposed on him by the surrounding environment. According to Piaget, the transitional or mixed form that lies between the child's autistic dream thought and mankind's socialized logical thought (thought that has lost the character of "personal property" because it is realized in logically controlled forms and concepts) is the egocentrism of the child's thought. This is the transitional stage between the child's thought and the socialized logical thought of the adult. Such is Piaget's approach to the basic issue of the problem of thinking.

This cursory and schematic review of the major theoretical positions that have developed in the psychology of thinking indicates that these varied traditions ultimately concentrate around a single general issue that emerged during the flowering of the associative school. In essence, it was different resolutions of this problem that gave rise to these varied schools. It was also this problem that has led to their downfall. What I have in mind here is the problem of thought, the problem of how to explain the emergence of its rational, meaningful character, the problem of how to explain the presence of meaning in this activity that is directed toward the establishment of the meaning of things. This problem of meaning, this problem of the rational character of thinking, is the central problem for a whole series of traditions that otherwise seem completely foreign to one another. Precisely because they are so foreign to one another, they precede from diametrically opposed attempts to resolve this problem. However, they all share a certain kinship in that they strive to collect themselves at a single point and, proceeding from this point, resolve this common problem.

If we take the positions of these schools as our point of departure, how do we understand the emergence of rational, goal-oriented thought activity alongside other mental functions?

On the one hand, the failure to resolve this problem dictated the openly idealistic movement toward Plato and his Ideas that was characteristic of the Wurzburg school. Kulpe himself formulated the matter in this way. On the other hand, the failure to resolve this problem led the behaviorists to the assertion that rationality is an illusion, the assertion that the meaningful character of this activity is simply an objectively useful or adaptive result of what is in essence a nonrational, trial and error process.

The attempt to resolve this issue of the origin of meaning permeates the whole of Piaget's work as well. As Piaget notes, he is guided by a several distinct theses borrowed from Claparede. Piaget writes that it is a strange contradiction that the child's thinking is at one and the same time rational and nonrational. Everyone knows that the child's thinking actually does manifest a certain duality in this respect. However, Piaget points out that given of this duality in the child's thinking, some researchers focus solely on the nonrational character of his thinking. They assume the task of demonstrating that the child's thinking is nonrational, that the child thinks nonlogically. They attempt to show that where we would expect logical operations, in the

child we find alogical operations. Piaget argues, however, that from the first moments, from the time his thinking begins to form, the child possesses a complete though undeveloped thinking apparatus.

It is commonly known that Buhler argued that thinking is contained in the simplest forms of the child's intellectual life, that the basic development of logical thinking is completed during the first three years of life. According to Buhler, no fundamentally new step in the domain of thinking is taken by the child in all the ensuing years of his life. There is nothing that is not contained in the inventory of the three year old child's thinking.

Thus, some attempt to vindicate the child's thinking, fusing it with that of the adult. They attempt to make absolute the logical character of the young child's thinking. Others try to demonstrate the child's stupidity, to demonstrate that the child is not capable of adult thinking. Emphasizing that both logical and alogical aspects of the child's thinking can be observed simultaneously, Piaget's task was to include both, to demonstrate how the child's thinking unites both logical and alogical features. To accomplish this, he argues that one must search for the source of this contradiction in two different springs, springs that rise from the earth in different locations.

Piaget derives the logical roots of thinking from the child's social life. He finds the alogical roots of thinking in the child's initial autistic thought. The picture of the child's thinking at each new age or stage is explained by the fact that there are different proportions in the mix of the logical (i.e., the socialized -- what comes from the outside) and the alogical (i.e., what is inherent to the child himself). According to Piaget, this idea provides the last path remaining for psychology to save thinking itself. This conception defines Piaget's scientific method, removing the problem from the dead end of behaviorism, where thinking is transformed into an activity that differs in no fundamental way from swimming or playing tennis.

It is in this failure to study the emergence of rational, meaningful forms of thinking that we find the dead end in which modern bourgoise psychology finds itself.

As in my earlier lectures, in the second part of this lecture I would like to move from a general analysis of theoretical issues to a discussion of empirical material and attempt to resolve a problem that stands at the center of all these research traditions. In my view, this problem is of central significance for contemporary research on the child's thinking. This is the problem of the meaning or rationality of the child's speech.

From what source and through what processes does the rational character of the child's thinking arise? As we have seen, this problem is central to all the theoretical conceptions I have discussed up to this point.

In my view, it is better to consider only a single narrow aspect of this problem. There is no other issue in child psychology as broad and rich in content, no other issue as difficult to exhaust in several short lectures. Therefore, we will focus on a single point that is central to several problems. That is, we will focus the issue of thinking and speech and their interrelationships in childhood.

In all the research traditions I have discussed, the problem of meaning and rationality in the child's speech ultimately depends on the issue of thinking and speech. As we noted earlier, the Wurzburg school saw the non-speech character of thinking as proof for its primary nature. A basic thesis of the Wurzburg theory of thinking is that the word is nothing more than the external clothing of thought, that it can act as a more or less reliable means of communicating thought but never has any essential significance for the structure or function of the processes of thinking.

Behaviorism is characterized by the opposite tendency. This tendency is expressed in the thesis that thinking is speech. Striving to remove from thinking all that

cannot be contained within the framework of habit, the researcher views speech activity as thinking. Speech activity not only represents a verbal form of thinking, not only constitutes a certain aspect of thinking, it exhausts its entire content.

The problem of the relationship of speech and thinking lies at the center of the psychological facts that we will now consider. We will analyze this relationship using examples associated with the development of the child's speech.

It is well known that in the mastery of the external aspect of speech the child moves from separate words to the phrase, from the simple phrase to the complex phrase, and finally to the combinative phrase and the sentence. It is equally clear and commonly known that in mastering the semiotic (i.e., meaningful) aspect of speech, the child follows the opposite path.

In mastering the external aspect of speech, the child initially pronounces the word, then the 2-word sentence, then the sentence composed of 3-4 words. From the simple phrase, the complex phrase gradually develops. Only over the course of several years does the child master the complex sentence, the main clause and the subordinate clause, and the chain of sentences that constitutes a more or less connected form of discourse. Thus, the pattern of the child's development would seem to support the basic positions of associative psychology: the child moves from the part to the whole.

When child psychology was dominated by the dogma that the meaningful aspect of speech is merely a mold or copy of its external aspect, these data on the development of the external aspect of speech led to several mistaken conclusions. In particular, this assumption led to the thesis that the child follows the same path in the development of representations of external reality as he follows in the development of speech. Just as the child's speech begins with separate words, with nouns that designate separate concrete objects, several investigators (Stern in particular) argued that the perception of reality begins with the perception of separate objects. This is the celebrated "substantial" or "object stage" noted by Stern and others. In parallel with the appearance of the two word sentence in the child's external speech, that is, with the introduction of the predicate and the mastery of the verb, we have the appearance of action in perception. The perception of qualities and relationships follows the perception of action. In other words, it is assumed that there is a complete parallel between the development of the child's rational representations of the surrounding world and his mastery of the external aspect of speech.

To avoid oversimplifying this theory, I must add that Stern was aware when he first formulated this idea that the stages in the development of the child's representations (using Stern's terminology, the child's "apperceptions") do not coincide chronologically with the corresponding stages in the development of the external aspect of the child's speech. When the child is at the stage of the isolated word, he is at the object stage in perception. However, the data indicate that the object stage in perception extends longer than the stage of the isolated word. The same can be said of the stage of actions, when the child begins to pronounce the two word sentence. Here as well we find a chronological gap between the external aspect of speech and the child's meaningful activity. However, Stern and several other investigators have argued that in spite of this chronological gap there is a logically complete correspondence (as Stern expresses it) between the child's mastery of the logical structure of speech and his mastery of the external aspect of speech.

Piaget relied on this thesis in his attempt to clarify the problem of speech and thinking. For Piaget, speech is the basic source for the socialization of thought; it is the main factor through which logical laws are introduced into thought. Through speech, characteristics that allow the child to interact socially with others are intro-

duced into his thought. In contrast, all that is associated with the alogical roots of the child's own thought is nonverbal and nonmeaningful thought.

In all these theories, then, the problem of the meaningfulness, the problem of the rational character of thinking, ultimately leads to the issue of the relationship between thinking and speech.

I will not dwell on the various materials and reports that deal with this question. They have been widely discussed in several works, many of them in Russian. That question will remain outside the framework of this discussion. Here, I will focus on the critical points where the meaningful or rational nature of thinking is connected with speech. In other words, I will concentrate on those points where (as Piaget says) the finest thread separates the logical from the alogical in the child's thinking. This is a question that has begun to occupy an increasingly central position in contemporary experimental research.

I have not found a better way to outline this problem than to briefly consider the conclusions of the appropriate works. The major conclusion of these works is that verbal thinking is a complex formation that is heterogeneous in nature. In its functionally developed form, all meaningful speech has two aspects that must be clearly differentiated. First, there is what is commonly called the external aspect of speech in contemporary research. This is the verbal aspect of speech that is associated with its external aspect. In addition, there is the *semiotic* or semantic aspect of speech, that is, the meaningful aspect of speech. This involves the filling of what we say with meaning, the extraction of meaning from what we see, hear, and read.

The relationship between these two aspects of speech is usually formulated negatively. It has been firmly established that neither the external-verbal nor the semiotic-meaningful aspect of speech appears suddenly in its final form. Developmentally, these two aspects of speech do not move in parallel with one another. Neither is a copy of the other.

Consider a simple example, one that researchers frequently use in illustrating this idea. It is this example that Piaget used in showing that the logical stages through which the child's rational thinking passes are pulled along on the tail of the child's speech development. Piaget suggests that it is difficult to find more striking proof that it is speech that inculcates logical categories in the child's thinking, that without speech the child would never arrive at logic. Closed off entirely within himself, Piaget argues that the child would not breach even the most accessible gap in the wall of alogism that surrounds his thinking.

However, all that we know of the meaningful development of the child's speech contradicts this thesis. It is incomprehensible how powerful thinkers such as Stern have failed to notice the gaping contradiction in their system. The most interesting aspect of what Stern said in Moscow last year concerns his confession that he failed for decades to notice this simple thought, a thought that now seems to him as obvious "as a writing instrument on a desk."

The key is that the meaningful aspect of the child's first word is not a noun but a one word sentence. This is a conception that Stern himself described effectively. This makes it clear that when the child pronounces an individual word, what he places in the word is not his knowledge of the object (as is the case with the adult) but an entire and often complex sentence or chain of sentences. If the child's one word sentence were translated into adult language, it would require an entire phrase. As Wallon demonstrated, we need to use an expanded series of sentences to provide the equivalent of the child's one word sentence in adult thought. The advantage of the studies of these authors over those of Stern reflects the fact that the latter merely observed his own children while Wallon and others approached the problem experimentally. As a

consequence, they began to discover what is hidden behind the meaning of the child's first word.

In this way, we arrive at our initial conclusion, one that will provide a point of departure for our own analysis. I would formulate this conclusion in the following way: While in his mastery of the external aspect of speech the child moves from one word to the phrase and from the simple phrase to the combinative phrase, in his mastery of meaning he moves from the combinative phrase to the isolation of individual phrases and from the individual phrase to the isolation of combinations of words. Only at the end of this process does the child achieve the isolation of the individual word.

Thus, the development of the semiotic and the external aspects of the child's speech are not mirror images of one another. Indeed, in a certain sense, they are the reverse of one another.

I promised not to cite individual experimental studies in this context, but I cannot pass over this material without noting the significance of a problem that has only now become clear to us. In an experimental study of the development of the meaningful aspect of the child's speech, a study of its manifestation in the description of pictures, we were able to establish that all the stages we mentioned (the stages of the object, the action, etc.) are developmental stages not of the rational perception of reality but of speech. Studying the development of the activity of dramatization, we were able to show that development moves in the opposite direction here. The child who is at the phase of naming objects in speech, communicates the content as a whole in action. Analogous experiments conducted by Luise and others on the basis of comments by Wallon, have shown that when the child is placed in a position which requires that he systematize the meaning of his first word, he communicates this meaning in a connected manner. He does not simply indicate an individual object.

Though not aware of this work, Piaget came very close to this subject in an entirely different investigation, but he interpreted it from the same perspective that he had interpreted it earlier. Piaget noted that the categories of the child's thinking move in parallel with the development of speech, but they pass through these stages later, being pulled along on the tail of speech. He demonstrated that the child masters syntactic structures of speech such as "because," "since," "in spite of," "although," "if," and "after," he masters these complex speech structures that communicate causal, spatial, temporal, conditional and adversative dependencies and interrelationships between thoughts, long before these complex connections are differentiated in his thinking. Piaget introduces this as proof of his favorite concept, the concept that logic is inculcated in the child along with speech from without, the idea that the child masters external speech but not the corresponding forms of thinking while he is still at the egocentric stage. However, Piaget says that even with temporal relations there is no correspondence between the moment at which the speech expression of a complex sentence is mastered and the moment the synthesis and logical expression of these syntactic forms are mastered.

Piaget's subsequent research demonstrates that this lack of correspondence between the development of speech and thinking is not only chronological (as Piaget asserts) but structural. Not only do the sequences involved in the mastery of the logical structures expressed in the syntactic forms of speech fail to coincide temporally with those involved in the development of these syntactic speech forms, but the development of their structures follow opposite paths. Remember, the development of the child's speech moves from the word to the phrase while the development of meaning in the child's expressions moves from whole phrases to individual words.

Turning to another domain of contemporary experimental research it becomes apparent that the processes of thinking and speech do not coincide with one another in

developed human thought. The negative aspect of this thesis was known long ago, but it became accessible to the experimenter literally only a few years ago. These studies show something that had been generally established earlier through psychological and linguistic analysis, something that we succeeded in producing, analyzing, and uncovering experimentally in causal connection and dependency only recently.

If we consider any grammatical or syntactic form, any verbal sentence, it is immediately apparent that there is no direct correspondence between the grammatical form and the sense unity that it expresses.

The simplest examples come from the most elementary analysis of language forms. The old school of grammar taught that the noun is the name of an object. From a logical perspective, however, we know that the noun (which is a grammatical form) empirically designates various grammatical categories. The word "cottage" is a noun and the name of an object. Grammatically, the word "whiteness" is analogous to the word "cottage," though it names a quality. Similarly, words like "struggle" or "walking" are names of actions.

This lack of coincidence between logical meaning and grammatical form led to a struggle between schools with different approaches to the problem of differentiating language forms and types and tracing their fate. It also led to a struggle between schools with different approaches to the inclusion of meaning in these forms. Pershits' comparative studies of the expression of thought in languages with differing grammatical forms demonstrated that there is no correspondence here between the semantic filling of the phrase and the structural aspect of the phrase. In French, for example, there are several types of past tense and two types of future tense, while in Russian there is only one future tense. Finally, consider a series of experiments that were associated with a proposal by Peshkov, a scholar concerned with the psychological analysis of Russian syntax. These experiments demonstrated that in different psychological situations, thoughts that differ in their psychological nature are found in one and the same speech formulation. The psychological subject and predicate never coincide directly with the grammatical subject and predicate. The course of thought often takes a path that is the reverse of that involved in the construction of the phrase.

Taken together and supplemented with experimental observations and studies of pathological disturbances and disorders of speech and thinking, these facts led to the conclusion that while the external and meaningful aspects of verbal thinking are closely connected, that while they are two aspects of a unified and complex activity, they do not coincide with one another. They are not psychologically homogeneous, nor do they have the same developmental curves. Indeed, it is only through these different developmental patterns that the state of the child's speech or thinking at a given stage can be correctly explained.

Thus, neither the old conception that the meaningful aspect of speech is a simple reflection of its external verbal structure nor Piaget's view that meaningful structure and categories are dragged along on the tail of speech development is supported by the experimental findings. Both are contradicted by the experimental data.

Given these new experimental data, how can we characterize the relationships that exist between the word and its meaning, between speech activity and human thinking, in positive terms?

To provide a schematic representation of the direction that is being taken in several studies, I will consider two important features of a positive attempt to characterize this problem.

The first is a condensation of several heterogeneous studies carried out by different authors. I will formulate it in the following brief thesis: the meaning of the child's word develops. The child's work on a word is not finished when its meaning is learned.

Though an illusion is created that the child understands the words that are addressed to him, though he appears to use these words in such a way that we can understand him, and though it seems that the child has achieved a word meaning identical to our own, experimental analysis shows that this is only the first step in the development of the meaning of the child's word.

Several authors have focused on this problem of the development of word meaning in the child, attempting to clarify the stages in the formation of the semantic aspect of the child's speech.[13] In contemporary child psychology in particular, several concrete schemes have been proposed in the attempt to characterize some aspect of the development of word meanings in the child. None of these attempts can be considered a complete or even preliminary resolution of this problem. Taken together, however, they provide a rich source of material that represents the tremendous complexity of the development of the meaning of the child's words, the development of his knowledge. This initial approximation has revealed facts of extraordinary complexity. Here we find a level of complexity with which contemporary experimental thought can hardly cope, even if it takes as its task only the understanding of the level of difficulty inherent to the description of the processes that emerge here.

The conclusions that are drawn from this position are of fundamental significance for child psychology. In two respects, they are fundamental to the clarification of the whole problem of thinking.

The old conception that the development of the child's speech (or as Stern expressed it, the basic work in the development of the child's speech) is completed at the age of 5 years, at the age when the child has mastered the lexicon, the grammar, and the syntax of his native language, is wrong. Only the preliminary work is completed by the age of 5 years. For the old conception, the school age was perceived as a period where nothing new in the way of speech development occurred. It was perceived as a period where the only growth in the child's representations is quantitative, as an age where there is only a further definition of the elements and their connections within a given representation. Currently, however, the school age has been advanced to a primary position, as an age characterized by the richness and complexity of the processes that occur in the development of the child's word.

Methodologically, the significance of these studies is that they have taught psychologists the complex and difficult art of the hidden processes of the development of word meaning. You have before you a child. You can observe the development of his speech. You ascertain through simple observation that he moves from the simple word to the use of three words and then to the use of whole phrases. When you want to ascertain the path through which the child's knowledge moves in its development, however, you must penetrate processes that are not available to immediate observation. It is these processes that Selz has in mind when he refers to the hidden processes of development. The investigator concerned with this problem must now study psychology.

Psychology has significantly refined its methods, but perhaps the basic significance of these studies is that they have allowed psychology to provide a preliminary but nonetheless concrete, experimentally supported, answer to a central problem in the contemporary theory of the child's mental functions. This problem, one that I have mentioned many times, is that of the systemic relationships and connections between the child's separate mental functions in development.

Psychology has always accepted this thesis as a postulate, assuming that all mental functions act in concert, that they are connected with one another. The nature of these connections, however, has never been studied. Psychologists have never studied *how* the functions are connected or how these connections change the functions them-

selves. Moreover, psychologists have assumed that these connections remain unchanged throughout the child's development. Several studies have now demonstrated that this assumption is false. As a consequence, the postulate has became a problem. This unassessed thesis has become the object of actual investigations.

In our analyses of perception and memory, we have addressed problems that were irresolvable before the concept of the development of interfunctional connections and relationships was included in our attempt to explain the fate of these functions. We were able to briefly address this problem of systems of mental functions in our previous lectures. This allowed us to advance an hypothesis that seems not only fruitful but in a sense the only possible foundation for a whole series of studies. It derives from the hypothesis of child thinking in that plane about which I will speak. The essence of this hypothesis consists in the notion that any system of relations between functions will be defined by the form of thinking that is dominant at a particular stage of development. In other words, all systems of mental functions in the child will depend on the stage he has attained in the development of word meaning. Whether we have meaningful, orthoscopic, or syncretic perception will depend on the stage the child has attained in the development of word meaning. Thus, the development of thinking is central to the whole structure of consciousness, central to the entire system of mental functions.

A closely related concept is that of the intellectualization of the mental functions. This concept implies that the mental functions undergo a change when, at a given stage of development, thinking leads to their meaningful interpretation, to a situation where the child begins to relate rationally to his mental activity. As a consequence, functions whose action had previously been automatic, now begin to act with consciousness and logic. This conception of psychological research seems to provide a foundation for a whole series of studies that should lead to the practical verification of this hypothesis. This conception also provides a foundation for the attempt to demonstrate that a given stage in the development of the child's thought, a given stage in the development of his categories, will provide the psychological prerequisite for the development of a system of thought characterized by conscious awareness or by a lack of conscious awareness (this would seem to be the significance of this concept for pedagogy).

In the same way, the basic formal stages in the development of the child's personality are directly linked to the stages through which his thinking develops. How the mental apparatus partitions, analyzes, connects, and reworks the child's external and internal experience depends on the system of knowledge that realizes this experience. A central problem faced by our psychology is that of clarifying the paths that bring the child to polytechnical education and of identifying the paths through which polytechnical training acts in combining the child's practical activity with his learning of scientific knowledge. Nowhere in child psychology does this problem find a closer point of contiguity opening the way for real, concrete research than in the concept of the dependency of all the child's activity and thinking on external activity, than in the concept of the dependence of the child's activity on the development of the meaningful aspect of his speech.

Lecture 4

EMOTIONS AND THEIR DEVELOPMENT IN CHILDHOOD

The theory of emotions and its development are unique among the various domains of psychological research. Until recently, this domain was completely dominated by a pure naturalism of a kind profoundly foreign to other domains of psychological investigation. These other domains have shifted to purely naturalistic theories only with the emergence of behaviorism and similar behavioristic research traditions. Methodologically, the entire future of behaviorism is contained in the old theory of emotions, since both have developed as a reaction to the forms of spiritualistic introspective psychology that preceded them. Developing primarily on a naturalistic plane, research on the emotions stood out like a white raven from other domains of psychological research contemporary to it.

There are many reasons for the uniqueness of the theory of emotions. In this context, however, we need only note the proximal cause, a cause connected with the name of Charles Darwin. Bringing to completion an old and extensive tradition in biology, Darwin's "The Origin of the Expressive Movements in Man" linked man's emotions with the corresponding affective and instinctive reactions that can be observed in the animal world. In sketching the evolution and origin of human expressive movements, Darwin was pursuing his basic evolutionary concept. As he noted in a letter that has recently been published in Russian, it was important to him to show that man's feelings, considered until then the inner "sanctum" of the human soul, have the same animal origins as does man as a whole. Of course, the connection between man's emotional expressions and the emotional expressions of animals similar to man on the evolutionary scale is so obvious that it has rarely been disputed.

As a contemporary historian has noted, the English psychology of this period was temporarily dominated by scholastic thought and by the associated religious traditions rooted in the middle ages. The response of these psychologists to Darwin's arguments on the human emotions was shrewd. They accepted the Darwinian position as developed by Darwin's students with a great deal of sympathy. From their perspective, Darwin had shown that man's earthly passions, those concrete inclinations and emotions connected with his physical concerns, actually do have animal origins.

This provided an immediate impetus for two directions in psychological thought. On the one hand, extending the positive tradition of the Darwinian concept, psycholo-

gists began to develop the idea that human emotions have biological origins in the affective and instinctive reactions of animals (e.g., Spencer[14] and his students, the French positivists such as Ribot[15] and his school, and the biologically oriented German psychologists). This led to the development of the theory of emotions that is included in nearly all psychological textbooks, a theory commonly called the rudimentary theory of emotions.

This theory holds that the expressive movements that accompany human fear are rudimentary remnants of the animal reactions of flight and defense, that the expressive movements that accompany human anger are the remnants of movements that once accompanied the reaction of attack in our animal predecessors. According to one formula, fear is inhibited flight; anger - inhibited fight. In other words, all expressive movements came to be viewed retrospectively. Ribot noted that the emotions, like "a state within a state," are the sole domain of the human mind that can only be understood retrospectively. The emotions are "a dying tribe." They are "the gypsies of our mind." From this perspective, the only possible conclusion for psychological theory is that man's affective reactions are remnants of his animal existence, remnants that have been infinitely weakened in their external expression and their inner dynamics.

The general impression created is that the curve representing the development of the emotions moves downward. Recently, a student of Spencer has argued that if we compare animals with man, the child with the adult, or the primitive with the cultured man, we see that the emotions fall back to a less prominent plane as the developmental process moves forward. This gives rise to the concept that the man of the future will be without emotion, that the process will be taken to its logical end and man will lose the final remaining links to the emotional reactions whose significance is found in an ancient epoch of his existence.

From this perspective, the only chapter of the psychology of emotions that can be adequately developed is that concerned with the emotional reactions of animals and with the development of emotions in the animal world. It is indeed this chapter that has been most extensively and most thoroughly developed by contemporary psychology. Any potential for an adequate investigation of the specific characteristics of human emotions was excluded by the way these psychologists stated the issue. Rather than facilitating the investigation of the enrichment of the emotions in childhood, this statement of the issue led to the assumption that the emotional order characteristic of early childhood is suppressed and weakened. With respect to the issue of change in the strength of emotions from primal man to the present, we find the assumption of a direct continuation of an evolutionary process based on the premise that a step forward in the development of the human mind implies a step backward in the development of the emotions. According to Ribot, this is the glorious history of the dying out of this entire domain of mental life.

While a biological analysis of the emotions would seem to indicate that this whole sphere of mental life dies out, our immediate psychological experience and our experimental research demonstrate the absurdity this position.

Independently of one another, Lange[16] and James[13] assumed the task of locating the source of the vitality of the emotions in the human organism itself. In this way, they liberated themselves from the dominant retrospective approach to human emotions. Each followed his own path, James consciously as a psychologist and Lange as a physiologist. Both found the source of the vitality of the emotions in the organic reactions that accompany emotional processes. This theory is widely known, so there is no reason to discuss it in detail. I will remind you only that the key to this theory was the introduction of a change in the traditional view of the sequential relationship between the various components of the emotional reaction.

Before James and Lange, psychologists represented the emotional process in the following way. The first component is the external or internal event. The perception of this event elicits the emotion (an encounter with danger for example). This is followed by the experience of the emotion (i.e., the feeling of fear). Finally, we observe physical and organic expressions of the emotion (i.e., palpation, turning pale, shivering, and a dry throat). Rejecting this sequence of "perception - feeling - expression," James and Lange argued that the immediate perception of an event gives rise to reflexively elicited organic change (for Lange this was primarily vasiomotor change; for James, visceral change, change in the internal organs). These reflexive changes accompanying fear and other emotions can be perceived. Indeed, James and Lange argued that this perception of our own organic reactions provides the foundation for the emotions.

In their attempts to demonstrate their opposition to this theory, others have misinterpreted it in a variety of ways. James' classic formula, however, can be stated in the following manner: While we usually assume that we cry because we feel grief or that we shiver because we are frightened, we in fact feel grief because we cry and are frightened because we shiver.

According to James, one need only suppress the external manifestation of the emotion and it will disappear; one need only elicit an emotion's expression and the emotion itself will ensue.

This theoretically refined and comparatively developed theory has two strengths. First, it actually provides what seems to be a natural-scientific, biological basis for the emotional reactions. Second, in contrast to many other theories, it actually provides an explanation for the continued existence of the emotions, an explanation for why these remnants of our animal existence seem to remain so close to the nucleus of the personality (everyone knows that the experience that is most emotional is that which is inner and personal).

The James-Lange theory (the two theories were quickly united into a single general theory) initially met with substantial criticism because of its "materialistic nature." Critics argued that James and Lange wanted to reduce human feelings to the reflection of organic processes in consciousness. However, James' perspective was hardly materialistic. In his textbook on psychology, he replied to these initial reproaches with the following statement : "My theory cannot be called materialistic." Indeed, his theory was not materialistic, though there was some foundation for the perception that it was in its use of materialistic methods. However, James' theory led to results that were in direct opposition to materialism. Nowhere, for example, were the higher and the elementary functions separated so clearly as in James' theory of emotions. The further development of his theory was consistently based on this initial separation of the higher and lower emotions.

In answer to his critics, James took the path identified in Darwin's time in response to the criticism of the English scholastic psychologists. That is, he attempted to grant to God what is God's and to Caesar what is Caesar's. He argued that it is only the lower emotions such as fear, anger, despair, and rage, emotions inherited by man from his animal predecessors, that have an organic origin. What James called the "subtle" emotions, emotions such as religious feeling, the love of a man for a woman, or the esthetic experience, do not. Thus, James sharply differentiated the lower and the higher emotions, particularly in the intellectual domain (a domain of emotional experience that had not generally been noticed prior to James but has recently become the focus of experimental research). He isolated the emotional experiences that are directly intertwined with our thinking processes, those that constitute an inseparable part of the integral process of judgment, from organic foundations. He viewed these emotional experiences as processes *sui generis*, processes with a unique nature.

As a pragmatist, James had little interest in the nature of the phenomena that he studied. As far as society's practical interests are concerned, he argued that it is sufficient to be aware of the difference between the higher and lower emotions as it is manifested in empirical research. From a pragmatic perspective, what was important was that the higher emotions were saved from a materialistic or quasimaterialistic interpretation.

This theory led to a dualism similar to that characteristic of intuitive and descriptive psychology. Bergson himself, an extreme idealist whose psychological and philosophical perspectives coincided in several respects with those of James, adopted James' theory of emotions, appending his own theoretical and empirical considerations. With the dualism inherent in this distinction between the higher and the lower emotions, this theory cannot be called materialistic, as James himself correctly noted. It contains not a grain more materialism than does the assertion that we hear because our auditory nerve is stimulated by our oscillating eardrum. Not even the most deliberate spiritualist or idealist has rejected the simple fact that our sensations and perceptions are connected with the material processes that stimulate our sense organs. James' assertion that the emotions emerge as the consequence of an internal perception of organic changes is no closer to materialism than is the claim of parallelism that the light wave that elicits the stimulation of the visual nerve leads to the movement of a neural process which occurs in parallel with the mental experience of color, form, or size.

Finally, our third and most important point is that these theories provided the foundation for a variety of metaphysical theories of the emotions. In this respect, when compared with the works of Darwin and the Darwinian research tradition, the theories of James and Lange constitute a step backward. It was perhaps necessary to save the emotions, to show that they are not a dying tribe. In his attempt to accomplish this, however, James attached the emotions to organs associated with the most primitive levels of mankind's historical development. According to James, the internal organs provide the foundation for the emotions; the emotions are constructed from the perception of the subtlest reactions of the intestines and heart, of the internal cavity and the internal organs, and of vasomotor reactions and similar vegetative, visceral, or humoral changes. This theory stripped the emotions from consciousness, completing a task that had been started much earlier.

I have mentioned that Ribot and others represent the emotions as a state within a state in the human mind. They conceptualize the emotions in isolation. The emotions are torn from the unified whole, from the rest of man's mental life. The James-Lange theory provided the anatomical and physiological foundation for this notion. James himself emphasized this point, arguing that the organ of human thought is the brain, while the emotions are associated with the vegetative internal organs. Thus, the substratum of the emotions was transferred from the center to the periphery. Moreover, the theories of James and Lange made it even more difficult to pose the question of the development of emotional life. With a retrospective approach to the emotions, the human emotions were represented as phenomena that emerged at a certain point in the developmental process. James' theory excluded any potential for imagining the genesis of human emotions, despite of the emergence of new emotions in man's historical life.

Completing the circle, then, James and his followers returned to an idealistic conception of the emotions. James himself argued that it is in the historical period of man's development that higher human feelings of a kind unknown to animals have been developed and perfected. What man received from the animal has remained unchanged, since it is a simple function of organic activity. Thus, Darwin's theory, ini-

tially advanced to demonstrate the animal origin of the emotions, ended with the proof that there is no connection between what man received from the animal and what emerged in the historical period of man's development. What was God's was granted to God; what was Caesar's -- to Caesar. The attempt was made to demonstrate the purely spiritualistic nature of the higher emotions and the purely organic or physiological nature of the lower.

The experimental attack on this theory came from both physiological and psychological laboratories.

The former played the role of traitor to the theories of James and Lange. Physiologists had initially been inspired by these theories. Year after year, they introduced new data in support of them. These theories obviously contained some truth. There are extremely rich and varied organic changes that are specific to emotional reactions. If we compare what James had said in this connection with what we know now, it is obvious that James and Lange opened up a fruitful area for empirical studies. Their contribution was enormous.

Cannon's well known book,[17] now translated into Russian, assumed the treasonous role for the physiological laboratories. A duality which permeated this book was not immediately noted, partly because it was associated with an early stage in the development of this area of physiological research and partly because Zavadovskii's[18] introduction to the Russian translation recommended Cannon's book as concrete proof for the James-Lange theory. Still, a careful analysis of Cannon's experiments indicates that they lead to a rejection of the theory.

Two concepts were fundamental to the James-Lange theory. First, in biological terms, emotions are the reflection of physiological states in consciousness. Second, these physiological states are specific to each of the emotions.

You have probably read several books concerning the most recent work of Cannon and his school. Using extremely complex research methods that included extirpation, psychopharmacological agents, and complex biochemical analysis Cannon's experiments on cats, dogs, and other mammals have demonstrated that the states of rage, anger, and fear are associated with profound humoral changes, changes that are linked to reactions of the endocrine glands (especially the adrenal gland). These changes are also associated with profound changes in the entire visceral system to which all the internal organs react. As a consequence, each emotion is connected with significant changes in the state of the organism.

Even in his earliest work, however, Cannon encountered an extremely important fact. Specifically, the organic expressions of different emotions such as rage, fear, fright, and anger are identical. Thus, even in the book that Zavadovskii cited in support of the James-Lange theory, Cannon introduced a correction to the formula that had been advanced by James. James argued that we grieve because we cry. Cannon suggested that this formulation needs to be modified to read that we grieve, feel tenderness, feel moved, and generally experience the most varied emotions because we cry. On the basis of his experimental data, Cannon rejected the concept that there is any simple connection between an emotion and its physical expression. He demonstrated that the physical expression is nonspecific to the emotion. Data associated with a cardiogram, with humoral and visceral changes, with chemical analysis, or with the analysis of the blood, cannot help us distinguish whether an animal is experiencing fear or rage. We find identical physical changes associated with what are, psychologically, very different emotions.

However, while he rejected the specificity of the physical expression of each emotion, while he rejected the notion that there is a simple connection between a given type of emotion and the particular organization of its physical expression, Cannon did

not question James' basic thesis, the thesis that the emotions are the reflection in consciousness of organic changes. On the contrary, Cannon produced experimental data which indicated that organic changes are varied. This provided support for the James-Lange theory.

In his subsequent studies, however, Cannon was forced to conclude that the nonspecific nature of the physical expression of emotion required the rejection of the James-Lange theory. Though he repeatedly varied the situations used to elicit intense emotions in animals, Cannon found an unvarying physical expression of these emotions. It became clear that the clarity of these physical expressions was a function not of the quality of the emotion but of its strength.

Subsequently, Cannon conducted several complex experiments in which a significant part of the animal's sympathetic nervous system was removed. This eliminated any organic reaction. Two cats were compared. In the first, the sympathetic nervous system had been eliminated. Fear and rage did not stimulate the flow of adrenalin or other humoral changes. The second was a control in which these reactions were elicited by fear and rage. These cats behaved identically in analogous situations. The same emotions were observed in the cat whose sympathetic nervous system had been eliminated as in the control; she reacted in the same way when a dog approached her or her kittens, when food was taken away, or when she looked at food through a narrow aperture.

This experiment refuted a basic element of James' theory, his position concerning the subtraction of emotional symptoms. According to James, if we mentally subtract shivering, the bending of the knees, and the stopping of the heartbeat from the emotion of fear, we will find that nothing remains of the emotions. Cannon attempted this subtraction experimentally and found that the emotions remain. This research demonstrated that emotional states are present in animals that lack the corresponding vegetative reactions.

In another series of experiments, Cannon injected first animals and then humans to elicit artificial organic changes analogous to those observed in association with intense emotions. In animals, these organic changes were elicited with no manifestation of emotion. The changes in blood sugar and blood circulation characteristic of the emotional state were observed, but the emotions themselves did not appear.

In this way, James' second assertion met the same fate as his first. When we elicit the external expression that accompanies the emotion, the emotion itself does not appear.

The results of Cannon's experiments on human subjects were more complex. With most of his subjects, no emotions appeared. In a few, however, the injection did elicit an emotion. However, this occurred rarely and only when the subjects were to a certain extent ready to explode with emotion, only when they were prepared for an emotive discharge. In the subjects' explanations that followed the experiment, it became apparent that all the subjects who experience emotion had an external cause for grief or gladness. The injection acted as a source of excitation that reproduced these emotions. Moreover, introspective accounts indicated that none of the subjects actually felt fear, anger, or shyness. The subjects explained their state in the following way: I felt as if I were afraid, as if I were experiencing anger. Thus, the attempt to create an internal experience for the subject, the attempt to elicit the conscious perception of internal organic change, led to a state reminiscent of emotion. Emotion in the true psychological sense, however, was absent.

These experiments based on introspective analysis introduced an important correction to Cannon's data. They demonstrated that the organic expression of the emo-

tions is not as insignificant as Cannon had suggested on the basis of his experiments with animals.

The general implications of Cannon's research, and of other studies in this domain, can be stated in the following two basic propositions. First, these studies have led Cannon, and all other physiologists and psychophysiologists working in this domain, to reject the James-Lange theory. The James-Lange theory did not stand up to experimental evaluation. It was not verified by the facts. One of Cannon's works is entitled "An Alternative to the James-Lange Theory."

Second, as a biologist, Cannon had to explain the paradox that emerged from his experiments. If the profound organic changes that occur with intense emotional reactions in animals are completely inessential for the emotions, if the emotions are preserved despite the elimination of all these organic changes, why are these changes necessary from a biological perspective? In his earliest work, Cannon demonstrated the biological significance of the changes that occur in association with the emotions. Now Cannon was faced with the question of why the cat that had been deprived of its sympathetic nervous system, and thus the humoral and visceral reactions that accompany the affect of fear, still reacted to a threat to its kittens in the same way as the cat in which these reactions have been preserved. From a biological perspective, if these reactions do not play an essential role in the biological changes that occur in association with the emotions, they become incomprehensible and unnatural.

Cannon explained the contradiction in the following way: An intense emotional reaction in an animal is not the end but the beginning of an action. A reaction of this kind arises in a situation of critical life significance for the animal. Thus, the logical conclusion of an intense emotional reaction in an animal is a heightened level of activity. The logical conclusion of fear is flight. The logical conclusion of rage or anger is struggle or attack. The organic reactions associated with emotions exist not for the emotion as such but for what logically follows the emotion. All these changes, the increase in blood sugar and the mobilization of the organism's strength for struggle and flight, are important because an increase in the intensity of muscular activity will follow an intense emotional reaction. Whether this activity is flight, struggle, or attack is not significant. The preparation of the organism must occur.

Cannon argued that under laboratory conditions the cat that lacked the physiological symptoms of emotion behaved in the same way as the one in which these symptoms were present. However, this is true only under experimental laboratory conditions. Under natural conditions, the cat in which these symptoms are absent will die sooner. The animal with unorganized visceral processes, processes that fail to prepare the organism, will die sooner than a normal animal.

Other experiments carried out by Cannon provide the most significant experimental foundation for this hypothesis. First in experiments Cannon conducted with animals, and subsequently in experiments carried out by his students with people, intense muscular activity was elicited. In one experiment, for example, Cannon forced a cat into a channel in which there was a steadily flowing current (Durov[19] has conducted similar experiments here). This forced the animal run at maximum speed to save himself. It was found that this simple muscular work, these intense movements, resulted in the same organic changes as intense emotions. This indicated that the vegetative symptoms are merely the companions of the emotions; they are the expressions not of the emotions as such but of intense muscular activity.

Cannon's critics argued that these animals may have been frightened by the situations that were created in these experiments. In response to these arguments, Cannon conducted a further set of experiments that did not include elements that might frighten the animal. Here as well, Cannon found that an increase in muscular activity

elicited the changes that have generally been viewed as the companions of the emotions, changes that Cannon himself had earlier seen an essential feature of the emotions. Thus, these symptoms are not so much the companions of the emotions as supplements to certain emotional factors that are associated with instincts.

Cannon notes that Darwin's theory receives unexpected support from this perspective. There is no question that the expressive movements associated with several human emotions can actually be viewed as rudimentary in comparison with the expressive movements associated with these emotions in animals. The weakness of Darwin's theory is that he was unable to explain the progressive development of the emotions. He was only able to see their attenuation. What Cannon demonstrated was that it is not the emotions themselves that die away, but only their instinctive component. The role of the emotions in the human mind is different. They are isolated from the instinctive domain and transferred to an entirely new plane.

Thus, if we consider the theory of emotions within the general framework of its historical development, it quickly becomes apparent that while it originates from several different directions it has moved in a single direction. The basic conclusion of the work I have reviewed so far concerns the displacement of emotional life from the periphery to the center. This research has shown that the actual substratum of the emotional processes is not the biologically ancient internal organs, not the extracerebral mechanisms that led to the concept that the emotions are a separate state, but a cerebral mechanism. The basic result of this research has been that of connecting the mechanism of the emotions with the brain. This displacement of the center of emotional life from the organs of the periphery to the brain brings the emotional reactions within the same general anatomical-physiological context as the rest of the psychological functions. It creates an intimate connection between the emotional reactions and the rest of the human mind.

The result of this psychophysiological research becomes particularly significant when considered in the context of the work done by researchers concerned with the psychological aspect of the problem. This psychological research has demonstrated the intimate connection and dependency that exists between the development of the emotions and the development of other aspects of mental life.

This work has done for psychology something analogous to what Cannon and his students have accomplished in the domain of psychophysiology: It has shifted the emotions from the periphery to the center. In psychophysiological research, investigators began to recognize that the mechanism of the emotions is cerebral rather than extracerebral. This research demonstrated that the emotions are dependent on the same organ that controls all other reactions associated with the human mind. In psychological research, we again find the demise of the theory that man's emotional life constitutes "a state within a state." Experiments have identified a whole series of connections and dependencies that make it clear that the separation of the emotions into higher and lower forms (a separation that resulted from the James-Lange theory) into two classes that have nothing in common with one another, led to an impossible situation.

Chronologically, Freud is the first psychologist we must discuss in this connection. Freud, whose work was not experimental but clinical, was among the first to move in a direction of theory development compatible with later research in this domain. In his analysis of the psychopathology of emotional life, Freud rejected the primacy of analysis of the organic components that accompany the emotions. He suggested that there is nothing of less importance for the definition of the psychological nature of fear than knowledge of the organic changes that accompany it. Freud rejected the one-sided organic psychology of James and Lange, arguing that they had studied the husk and left

the psychological kernel unexplored. In its investigation of the activity of the organs that express the emotions, Freud felt that this psychology had contributed nothing to the study of the emotions as such. Freud provided extensive documentation of the extraordinary dynamics of emotional life.

Though the basic claims Freud makes in this connection are false, there is a great deal of truth in what he says if we limit ourselves to formal conclusions based on his studies. Freud's explanation of fear is based on the argument that a series of neurotic processes transform the sexual inclination into fear. Within this conceptual framework, fear becomes a neurotic state. It is the equivalent of inadequately suppressed or displaced desires. Freud successfully demonstrates how ambivalent this emotion can be in the early stages of development. His explanation of this ambivalence in the emotion is false. He is right, however, in his claim that the emotion of fear does not exist at the outset, that there is a differentiation of a kernel that contains opposing feelings.

Freud's major contribution in this domain is his demonstration that the emotions were not always as they are in adult life. The emotions characteristic of the young child are different from those of the adult. The emotions are not "a state within a state." They cannot be understood outside the dynamic of human life. It is within this context that the emotional processes acquire their meaning and sense. Of course, Freud was as much a naturalist as James. He interpreted the human mind as a purely natural process, approaching the dynamic changes of the emotions only within specific naturalistic limits. That, however, is a separate issue.

A comparable achievement in the development of the theory of emotions was made by Adler[20] and his school. Through observational methods, they demonstrated that in man the functional significance of the emotions is not linked exclusively to the instincts as it is in animals. The emotions are one of the features which constitute the character of an individual's general view of life. The structure of the individual's character is reflected in his emotional life and his character is defined by these emotional experiences.

This conception of character and emotion led to a situation where the theory of emotions became an inseparable and central aspect of the theory of human character. This provides a striking contrast to earlier perspectives, where the emotions had been perceived as a unique phenomenon, a dying tribe. Here the emotions are conceptualized in connection with character, in connection with the processes involved in the formation of the basic psychological structure of the personality.

Buhler's theory reflected an extremely interesting shift in how the emotions were treated in psychology, a shift associated with the relationship of the emotions to other mental processes. Buhler's experimental findings (his experiments are the best aspect of his work) can be stated crudely and schematically in the following way. First, Buhler takes the critique of the Freudian perspective on emotional life as his point of departure. He emphasizes that the early stages in the development of the child's mental life and activity are not exclusively defined by the pleasure principle. More significantly, however, he argues that pleasure itself -- as what impels an act or deed -- migrates, wanders, and shifts its position within the system of mental functions. Linking this concept to his division of the development of behavior into three stages (i.e., instinct, training, and intellect), Buhler attempts to show that the point when pleasure occurs in an activity shifts in accordance with the degree of the child's development, changing its relationship to other mental processes with which it is connected.

The first stage in this developmental sequence is referred to by Buhler as *Endlust*. Here, pleasure comes at the end of the action. In Buhler's view, this stage is characteristic of instinctive processes. It is connected primarily with hunger and thirst, experiences that themselves have an unpleasant character. The initial moments of satia-

tion are accompanied by a clear expression of pleasure. Thus, when the instinctive act is completed, *Endlust* appears. The emotional experience lies at the end of instinctive activity. The primitive and primal form of human sexual tendencies is of this nature. The central pleasurable moment is at the end. The end is the decisive moment for the instinctive act. In Buhler's view, the emotions generally, and the emotion of pleasure in particular, have this kind of ending or completing role in instinctive life. The emotions are the feature of mental life that insure the completion of the instinctive act.

According to Buhler, the second stage in this sequence is that of functional satisfaction (*Funktionslust*). This stage is manifested in the early forms of the child's play, when the child receives satisfaction not so much from the result of the activity as from the process itself. Here, pleasure is transferred from the end of the process to its content, its functioning. Buhler notes, for example, that this is a common characteristic of the child's eating. In late infancy, the child begins to express pleasure not only with satiation or the quenching of thirst but with the process of eating itself. The process itself acquires the potential for pleasure. The fact that the child can become a glutton reflects the emergence of *Funktionslust*.

Finally, Buhler distinguishes a third stage connected with the anticipation of pleasure. Here, the emotional coloring of experience emerges with the onset of the process itself. Neither the result of the action nor the actual process of carrying it out is the focal point of the child's integral experience. The focal point shifts to the beginning of the action (Vorlust). This is characteristic of the processes involved in creative play, finding the answer to a riddle, or solving a problem. Here, the child finds the solution and then realizes what he has found. What he receives as a consequence of the action has no essential significance for him.

If we consider the significance of these stages, it becomes apparent that they correspond with the three stages in the development of behavior outlined by Buhler. First, with instinctive activity, the dominant organization of emotional life is that connected with the final moment (Endlust). Second, pleasure received from the process of an activity is a necessary biological feature for the development of a skill or habit. Here, not the result of the activity but the activity itself must become the sustaining stimulus. Finally, the essence of early intellectual activity is what Buhler refers to as the reaction of "searching for the answer" (i.e. the "aha-reaction"). Here the dominant organization of emotional life is the child's experience of emotion at the beginning of the activity. Pleasure itself leads to a situation where the child's activity develops differently than it does in the two planes referred to earlier.

Another general conclusion of Buhler's research is that the emotional processes are not settled but nomadic. They do not have a secure, firmly established position. My own data convince me that the shift of pleasure from the result of the action to its anticipation is but a pale expression of the diverse range of potential shifts in emotional life, shifts that constitute the actual content of the development of the child's emotional life.

In concluding the empirical aspect of today's lecture, I will briefly mention several recent works, those of Claparede in particular. The unique value of Claparede's work lies in that he has combined research on normal and abnormal children with experimental studies of adults. In addition, I would like to discuss the works of the German structural psychologist, Lewin, who has studied the psychology of affective and volitional life. I will briefly note the central findings of these and several other works and then move directly to my conclusion.

Claparede's work is significant primarily because of his experimental success in differentiating the concepts and manifestations of emotion and feeling. In Claparede's view, though emotions and feelings are frequently encountered in similar situations,

they are fundamentally different. In this lecture, however, we must focus not on the classification of the emotions but on their nature. We will therefore have to ignore Claparede's theory concerning emotions and feeling and focus on the close connections he has identified between the emotions and the other processes of spiritual life and on his view of the diversity of the emotions themselves.

Freud was the first to question the traditional theory of the biological utility of the emotions. In his observations of the neurotic state in children and adults, Freud saw something that no psychologist could ignore. Specifically, the neurotic child or adult clearly illustrates how spiritual life can be disordered and deranged as a consequence of an emotional disturbance. Traditional perspectives assumed that the emotions are a biologically useful adaptation. Within this framework, it is difficult to understand why the emotions cause such profound and extended behavioral disorders, to understand why we cannot think consistently when we are ill, cannot act with consistency or according to plan when our feelings are disordered, cannot be responsible for our own behavior and control our actions in an intense affective state. In other words, why does an abrupt change in the emotional processes result in a change in the whole of consciousness, a change that displaces the normal dynamics of the functions that ensure the normal life of consciousness? Primitive biological and naturalistic interpretations of the human emotions make it impossible to understand why biological adaptations that are as ancient as man himself and as necessary as the need for food and water lead to such complex disturbances of human consciousness.

Claparede posed the second half of this question. Specifically, if the primary functional significance of the emotions is their biological utility, how do we explain the fact that human emotions become more varied with every step mankind takes on the path of historical development. This development and differentiation of the emotions leads not only to the kind of disorders of mental life that have been explored by Freud, but to the entire vast and diverse content of mankind's mental life including domains such as art. Why does every step in human development elicit these "biological" emotions? Why are the individual's intellectual experiences associated with such intense emotion? Why is every critical moment in the fate of the adult or child so clearly colored by emotion?

In his attempt to answer these questions, Claparede discusses the frightened rabbit which is afraid and runs, but fails to save himself precisely because he is afraid, because his running is disturbed. Taking this as his point of departure, Claparede attempts to demonstrate that alongside biological useful emotions there exist processes that can be called feelings. These feelings have catastrophic effects on behavior and arise where a biologically adequate reaction to a situation is impossible. When an animal becomes frightened and runs, this is an emotion. When an animal becomes frightened to the extent that it cannot run, we are dealing with a qualitatively different process.

The same is true of man. Despite the apparent similarity between feelings and emotions, these processes have different roles in mental life. Compare the man who is aware of a danger and arms himself in advance with the man who is not aware and is attacked, or compare the man who can run with the man who discovers the danger by surprise. In other words, compare the man who can find an adequate exit from the situation to the man who cannot. The psychological nature of the processes that are involved in the two situations are very different. In his experiments, Claparede studied reactions with different outcomes, leading to the differentiation of affective life into emotions and feelings. This distinction has tremendous significance because the old psychology mechanically confused these aspects of emotions and feelings, ascribing both to processes that do not exist.

Finally, we must note Lewin's work, where he demonstrated that the complex dynamics of the emotional reactions are part of the general system of mental processes. Lewin conducted the first experimental investigation of processes identified by the phrase "depth psychology," processes that in the hands of Freud and Adler were considered inaccessible to experimental investigation. Lewin demonstrated how one emotional state is transformed into another, how one emotional experience is substituted for another, and how an unresolved and uncompleted emotion may continue to exist in covert form. He also demonstrated how an affect enters into any structure with which it is connected. Lewin's basic concept was that affective or emotional reactions cannot be found in isolation as a special element of mental life, an element of mental life that is subsequently united with others. The emotional reaction is the unique result of a particular structure of mental processes. Lewin demonstrated that the primary emotional reactions can emerge in sporting activity based on external movements or in activity such as chess that is carried out in the mind. Different contents arise in correspondence with different reactions, but the structural position of the emotional processes in the whole remains the same.

In conclusion, we can say that both the major research traditions that I have discussed in this lecture have moved the emotions from the periphery to the center. Anatomical and physiological research has shifted the center of emotional life from extracerebral mechanisms to the brain itself. Psychological research has moved the emotions from the hinterlands to the forefront of the human mind, no longer treating them as an isolated "state within a state," but including them within the same structure as the other mental processes. As is always the case in the study of mental life, these two lines meet in psychopathology.

Developing in complete independence from researchers such as Cannon and Claparede, we find a splendid analogue in psychopathology that has provided clinicians with the foundation for formulating both sides of the thesis that results from the unification of the two sides of this single general theoretical perspective.

On the one hand, with nervous disorders and illnesses resulting from brain disease (particularly those associated with a disorder of the visual tuberal in the subcortical area), clinicians frequently observe cases where there is a forced laugh or smile that occurs every few minutes. Characteristically, this state is not associated with an emotion of gladness, but is experienced as torment. The imposed grimace sharply contrasts with the individual's actual state. I had the opportunity to study and describe a case characterized by this kind of imposed movement, a case that resulted from encephalitis. This woman experienced profound torment associated with the terrible contrast between what her face expressed and what she actually experienced. In the novel *The Man Who Laughed*, Victor Hugo used his imagination to produce something comparable to this pathological condition.

On the other hand, several clinicians have observed the reverse phenomenon (among these are Jackson and Head, to whom psychology owes such a great debt). With a onesided disorder of the visual tuberal, there can be an extremely intense transformation in emotional life. For example, a man who experiences a normal emotional reaction to a stimulus coming from the right side of his body, may experience a disturbed reaction to a stimulus coming from the left. I have had the opportunity to observe several similar cases. If you apply a poltice the right side of the body of this kind of individual, he may experience the usual pleasant sensation. If you apply it to the left, he may experience an immeasurable delight, with the feeling of pleasure increasing to pathological proportions. The same thing may occur when he touches something smooth or something cold. Kretschmer described a patient who had very different experiences depending on the ear with which he heard music.

These studies provide psychological data that support Cannon's position and demonstrate that the anatomical substratum of emotional reactions is apparently a cerebral mechanism located in the subcortical area (more precisely, in the area of the visual tuberal, an area connected by many pathways with the cortical lobes). As a consequence, the cortical-subcortical localization of the emotions has been defined as closely as the localization of the motor speech centers in Broca's[21] area and the sensory speech centers in Wernicke's[22] area.

These studies are also of relevance to psychopathology in the narrow sense of the term, to the pathology of schizophrenia in particular. Bleuler has shown that changes in emotional life are often observed in cases of pathology. In his view, the basic emotions are preserved, but the normal position of these emotions in the individual's spiritual life shifts and changes. The individual is able to react emotionally, but there is a disturbance of consciousness which reflects the fact that the emotions have lost their former structural position in spiritual life. The result is the emergence of a unique system of relationships between thinking and the emotions.

The autistic thinking that Bleuler has studied, and whose existence has been verified by K. Schneider, provides the clearest example of this kind of new psychological system. Autistic thinking has an analogue in normal consciousness, but is itself an expression of a psychopathological state. In autistic thinking, thought is directed not by the tasks the individual faces but by emotional tendencies. As a consequence, autistic thinking is subordinated to the logic of feelings. The way autistic thinking was initially conceptualized was inadequate. Our own thinking, which can be validly contrasted with autistic thinking, is not without its emotional components. Realistic thinking often elicits more significant and intensive emotions than autistic thinking. The investigator working with interest and inspiration on a problem is linked to emotional experiences no less and no more than the schizophrenic immersed in autistic thought. There is a certain synthesis of intellectual and emotional processes in both autistic and realistic thinking. In realistic thinking, however, the emotional process plays a supporting and subordinate role rather than a leading role. In autistic thinking, the emotional process takes the leading role. The intellectual process assumes the supporting role.

In short, contemporary research on autistic thinking has shown that it is a unique psychological system. What is disordered in this system is not the intellectual or emotional processes themselves, but their relationship. Autistic thinking must be compared to the imagination of the adult and child. This will be the topic of our next lecture, where I hope to discuss an extremely important concept. We will see that in the development of emotional life there is a systematic migration or change in the position of the mental function within the system and that this is what determines the significance of the mental function over the entire course of the development of emotional life.

In this way, we will be able to follow a consistent thread from today's lecture to our next. In discussing the theme of imagination, we will be concerned with another concrete psychological system of the kind that we have identified in our analyses of thinking and the emotions. With this I will conclude, postponing theoretical conclusions for the next lecture.

Lecture 5

IMAGINATION AND ITS DEVELOPMENT IN CHILDHOOD

For the old psychology, which viewed all forms of man's mental activity as associative combinations of accumulated impressions, the problem of imagination was an irresolvable puzzle. This psychology was forced to reduce imagination to other functions. The essential feature that distinguishes imagination from other forms of mental activity is that it does not repeat combinations of accumulated impressions but builds a new series of impressions from them. The very foundation of the activity that we refer to as imagination is the introduction of something new into the flow of our impressions, the transformation of these impressions such that something new, an image that did not previously exist, emerges. The problem of imagination was therefore inherently irresolvable for associative psychology since it represented all activity as a combination of elements and images that are already present in consciousness.

Thus, the reduction of imagination to other mental functions provided the foundation for the old psychological theory of imagination. This theory was expressed clearly in Ribot's work, where he distinguished between two forms of imagination, specifically, reproductive imagination and creative or reconstructive imagination.

Reproductive imagination is the same as memory. Psychologists used the phrase "reproductive imagination" to refer to a mental activity where we reproduce a series of images in consciousness that we have experienced, though there is no immediate reason for the restoration of these images. In this activity of memory, images that have previously been experienced arise in consciousness unconnected with any actual proximal cause for their reproduction. It is this form of memory that the old psychologists called reproductive imagination.

Psychologists distinguished this form of imagination from true memory in the following way: If, while viewing some landscape, I recall a similar one that I have seen elsewhere, this is the activity of memory. Here, the existing image or landscape elicits the image that had been experienced earlier. This is the normal movement of associations that provides the foundation for the function of memory. In contrast, I may be immersed in meditation or dream, seeing no landscape, and nonetheless reproduce in memory a landscape that I have seen at some previous time. This activity differs from that of memory in that its immediate impetus is not an eliciting impression. Thus, despite other limitations in their perspective, these psychologists did recognize that the

activity of imagination, even where it operates on existing images, has a different nature than the activity of memory.

However, there is no essential difference between remembering a landscape that I have seen before when looking a different landscape or when a word flashes through my head (e.g., the name of the locale). Within this framework, the difference between memory and imagination lies not in the processes themselves but in their eliciting causes. The mental activity itself is very similar in the two situations. Once we have assumed the perspective of an atomistic psychology, a psychology that constructs complex forms of activity from elements, any explanation of imagination must begin with the proposition that every image is elicited by the images associated with it. With this approach, the problem of reproductive imagination is inevitably fused with the problem of memory. Reproductive imagination becomes one of many functions of memory.

The issues become more complex when we consider the activity that psychologists refer to as creative imagination. Earlier, I mentioned the most prominent distinction between creative and reproductive imagination. Fundamental to creative imagination is the production of new images, images that have never existed in consciousness or in past experience.

Psychologists working within the framework of associative psychology have explained the emergence of new images in terms of an accidental combination of elements. New combinations of elements appear in creative imagination. The elements themselves, however, are not new. This was the basic law of imagination for the old psychology, a law stated by both Wundt and Ribot. In their view, imagination is capable of creating infinite combinations of previous elements. It cannot, however, create new elements.

The work completed by these psychologists was very significant. They demonstrated the sensual nature of imagination. As has been stated before, these psychologists demonstrated that our dreams do not soar according to whim or caprice. Our dreams are linked to the experience of the individual that is dreaming. The most fantastic representations can ultimately be reduced to combinations of elements that have been encountered in an individual's previous experience. Even in dreaming, we see nothing that we have not experienced in some form when awake. In terms of the elements that compose them, the most fantastic representations are not fantasy. These psychologists clearly demonstrated the real foundation of imagination, the connection between imagination and the impressions accumulated in previous experience.

On the other hand, they failed to resolve the other half of the problem, to show how imagination represents these accumulated impressions in an entirely new form, in new combinations. Rather than resolving this problem they avoided it. Their response to this question was simple. They argued that these new combinations arise purely by accident. The new combination in imagination arises from new constellations, from new relationships between the separate elements. In his theory of dreaming, Wundt attempted to show that every element of the dream is an impression experienced by consciousness in the waking state. The fantastic combination of elements in the dream reflects a unique constellation or combination of elements that emerge because our "sleep" (dream) consciousness operates under very special conditions. This form of consciousness is deaf and blind to impressions from the outside world. The sleeping individual does not see or hear. He does not perceive external stimuli through the sense organs. These stimuli reach consciousness only in a distorted form. What the "sleep" consciousness does perceive are internal organic stimuli. Finally, the "revival" of various images through association occurs in an accidental manner. In

sleep, there is a unique distribution of the processes of excitation in the brain stem that leads to an accidental combination of images.

According to Wundt, then, dreaming is an accidental constellation that results from a combination of isolated impressions that have been torn from their original contexts. Normally, when we remember something about an individual, we connect him with a certain kind of situation. In the dream, however, this individual is connected with an entirely different situation, a situation related to a different associative chain. This results in the meaningless nonsense that provides the foundation for dreaming. From an analytic perspective, however, this nonsense is a fully determined structure of images.

Like other psychologists who assumed this perspective, Wundt believed that an individual's fantasy was limited by the number of images that he had acquired through associative processes. He did not believe that imagination could add new, extra-experiential, connections between elements. In his view, imagination has no creative foundation. The range of potential combinations in imagination is limited. Psychologists who adopted this perspective noted the repetitive nature of dreams. A single dream or set of dreams can be repeated throughout an individual's life. In their view, this reflects the limitations that exist in the potential for new combinations.

This attempt to show that imagination is determined, that the flight of fantasy occurs lawfully, was well justified. These psychologists gathered some extremely important material in support of this idea. Nonetheless, they avoided the problem of the emergence of new elements in imagination. Wundt's law held that the impression, thought, or contemplation of fate can lead to the opposite representation, for example, to the representation of eternal separation or the grave. Thus, a given representation can remind the individual of its opposite, but not of something entirely unrelated. The impression of fate cannot cause the individual to think about a toothache. Fate and toothaches are not connected. In other words, imagination is deeply rooted in memory.

Within this framework, creative imagination is not fused with the activity with memory. It is viewed as a special and unique form of memory activity.

Once again, then, the old psychology left the essence of the matter unresolved. Atomistic psychology was powerless to explain how thinking, or rational goal-oriented activity, arises. It was also powerless to explain the emergence of creative imagination. Its theory of these processes contained contradictions that led to the sharp differentiation of psychology into causal psychology and descriptive or intuitive psychology. Taking as its point of departure the incapacity of associative psychology to explain the creative nature of imagination, intuitive psychology repeated in this domain what it had done in the domain of thinking. In Goethe's words, the problem was made a postulate.

In response to the question of how creative activity arises in consciousness, the idealists argued that creative imagination is inherent to consciousness. Consciousness creates *a priori* forms. These forms are inherent to consciousness and produce all impressions of external reality. The intuitivists argued that the fundamental error of associative psychologists was their attempt to begin with man's experience, with his sensations and perceptions. Their error was their attempt to represent sensations and perceptions as the initial features of mind. On this foundation, the associative psychologists could not explain how the creative activity of imagination could arise. In contrast, the intuitivists argued that all the activity of human consciousness has a creative foundation. Perception is possible only because man brings something of himself to what is perceived in external reality. In contemporary idealistic theory, then, the two psychological functions changed places. Where associative psychology had re-

duced imagination to memory, intuitive psychologists tried to demonstrate that memory is nothing but a special form of imagination. Following this path, the idealists began to view perception as a special form of imagination. In their view, perception is a form of imagination that constructs an image of reality. Of course, this image of reality requires the external impression as part of its foundation. Nonetheless, for the origin or emergence of this image, man is indebted first to the creative activity of cognition itself.

Thus, the controversy between idealism and materialism on the problem of imagination parallels that on thinking. Is imagination a primal characteristic of cognition, a characteristic of cognition from which all other forms of mental activity develop, or should imagination itself be understood as a complex developed form of consciousness that arises on the foundation of more primal functions?

The mutual failure of atomistic and idealistic perspectives to resolve this issue had a common foundation. Both approached the problem metaphysically, representing the activity of consciousness as inherently reproductive. In this way, they precluded any explanation of the development of creative activity. Wundt thought it absurd to suppose that an impression or thought of fate can be connected with the thought of a toothache in imagination. In this he ignored the fact that our imagination makes much more audacious leaps, it connects much more disparate things, than these. In his work on fantasy as the foundation for art that he carried out near the end of his life, Wundt was forced to recognize this. Idealism was powerless in this connection because it ascribed an immanent creativity to consciousness, because it included imagination among the inherent creative activities of consciousness. According to Drish, Bergson, and other vitalists and intuitivists, these aspects of consciousness are inherent to it from its very emergence. Bergson argued that imagination is as inherent to consciousness as free will. This free activity occurs in the material world and therefore becomes intertwined with it in a variety of ways. It is, however, autonomous. James' perspective was similar. In discussing will -- that which directs creative activity -- James said that every volitional act contains a "fiat," the divine word through which God created the world.

This discussion must be extended to fully clarify the statement of this problem in contemporary idealistic psychology. Of particular importance is the fact that this psychology transferred the issue of imagination to the genetic or developmental plane. The resolution of this issue began to be pursued in child psychology. One can no longer address this issue as a problem of general psychology while ignoring the material that has been accumulated in child psychology. We will consider the most significant developments that have occurred in child psychology in connection with this issue. We cannot trace the entire history of these developments, but we must consider this history.

The idea that imagination is primal, that it is a form of the child's consciousness that is present from the outset and gives birth to the consciousness of the personality, is represented first by psychoanalysis and its founder, Freud. According to Freud, there are two principals that regulate the child's mental activity: the pleasure principle and the reality principle. Initially, the child strives to receive enjoyment or pleasure. In the young child, the pleasure principle is dominant.

The child is a being whose biological needs are met by the adult. He does not obtain his own food or clothing. The adult does this for him. In Freud's view, the child is the only being that is completely emancipated from reality. He is immersed in pleasure. As a consequence, the child's consciousness develops as the consciousness of a dreamer. The basic function of this consciousness is not reflecting the reality in which the child lives or processing impressions but serving the child's wishes and sensual ten-

dencies. The child does not have perceptions of reality. His consciousness is hallucinatory.

Piaget has developed this idea in connection with problems that are of interest to us. Piaget's point of departure is the idea that it is not the activity of imagination or thinking directed toward reality that is primal. In his view, there is a transitional or intermediate form between the infant's thinking, which is not directed toward reality at all, and the realistic thinking of the adult. This transitional or mixed form that lies between imagination and real thought is the child's egocentric thought. In Piaget's view, then, the child's egocentrism is a transitional stage between imagination and realistic thinking. It is a transitional stage between thinking reminiscent of light dreaming or daydreaming (Piaget refers to it as a kind of mirage construction that soars in the domain of what is unreal but wished) and thinking whose task is adaptation to and action on reality.

We are indebted to Piaget for several interesting experimental studies of infancy. Piaget has empirically demonstrated that the infant does not differentiate adequately between impressions that are received from the outside world and impressions that have their origins within himself. The infant's "I" and his external reality are inadequately differentiated in consciousness. He frequently confuses the two. Consequently, the infant does not distinguish clearly between his own actions and actions that originate from without. On the contrary, he develops a set of confused connections, connections that have been brilliantly and convincingly demonstrated by Piaget's experiments.

Thus, if an infant carries out some movement that coincides temporally with a pleasant impression, he tends to view the impression as the result (speaking in adult language) of the movement. If the impression does not occur again, the child repeatedly performs the movement in order to elicit it.

In this connection, Piaget conducted an experiment with a five month old girl. The child, who was playing with a pencil, discovered that when she hit it against the bottom of a tin box a bell rang in the room or the experimenter gave a cry similar to that of a bird. The child struck the box again. This time, however, she hit it in a completely different way. Specifically, she hit it once and waited. When the cry was produced, she repeated the movement -- clearly in order to elicit the impression. This time, however, the cry was not produced. The child then angrily and repeatedly struck the bottom of the box. Beginning to cry, she then began to hit the other side of the box, without satisfaction. Through her behavior, the child demonstrated that what had coincided accidentally with her movement had been interpreted as the direct result of that movement.

Recognizing that this research alone was not sufficient, Piaget extended his analysis through interpolation to the development of the child. In his view, the younger the child, the stronger his egocentrism will be, that is, the more his thought will be directed toward the satisfaction of his wishes. Egocentrism is stronger in the seven year old than in the ten year old. It is stronger in the three year old than in the five year old. Extending this logic, the early stages of child development must be governed by absolute egocentrism.

What is the nature of egocentrism? Piaget answers that it is pure solipsism, a pure state of consciousness that does not know any reality other than itself, a state of consciousness that lives in a world of its own construction. Child solipsism is a state that is generally present in the initial phases in the development of the child's consciousness. Through the intermediate form of egocentrism, the child's consciousness gradually develops into the adult's logical, realistic thought.

To move from this to the theory of imagination in childhood, we must briefly outline the basic features of the development of the child's consciousness, beginning with early childhood and following the process through its development. Like other researchers, Piaget owes a great deal to Freud in this connection. The initial form of imagination is subconscious, differing in this respect from realistic thinking, which is a conscious activity. In realistic thinking, the individual considers the goal, the task, and the motives that impel his thought to action. In contrast, thinking that is guided by fantasy is not associated with conscious awareness of task, goal, and motive. All this remains in the subconscious. Thus, the first distinction between realistic thought and fantasy is that the former is conscious while the latter is subconscious.

The second difference between these processes is associated with their relationship to reality. The realistic development of consciousness prepares activity that is connected with reality. The function of imagination is different. In this respect, the activity of imagination reflects the principle of satisfaction.

The third difference between realistic thinking and imagination is reflected in the fact that realistic thought can be verbally reported. It is social and verbal. It is social in the sense that to the extent that it reflects an external reality that is similar for consciousnesses that are structured in similar ways, it can be communicated or transmitted. Since the basic means of social interaction or transmission is the word, realistic thought is both social and verbal thought. The adult transmits the contents and course of his thought more or less completely. In contrast, autistic thinking is not social but individual. It serves wishes that have nothing in common with man's social reality. It is a nonverbal form of thinking, a form of thinking based on images and symbols. These images and symbols penetrate the structure of fantasy and are not communicable.

We could discuss several other differences between these two forms of thought. In the present context, however, this is sufficient. In its initial forms, imagination is seen as a subconscious activity, as an activity conditioned not by the cognition of reality, but by the attainment of pleasure. It is seen as a nonsocial and noncommunicable form of activity.

This perspective met its first and most essential opposition in the thinking of psychologists with a strong biological orientation. In the sense that this perspective represents man as a being whose initial development is not social, as a being for whom social activity is something brought in from without, this perspective seems to have been dominated by ultrabiological views.

These psychologists established two basic facts. The first concerned the thinking and imagination of animals. In an excellent and extremely interesting experiment carried out by the Dutch researcher, Boitendeik, it was demonstrated there are few elements of autistic thinking or true fantasy in the animal world. From a biological perspective, it is difficult to imagine that thinking first arises phylogenetically not in the cognition of reality but as a function serving pleasure or satisfaction. As Bleuler argues, no animal would survive a single day if his mental activity was not intimately connected with the whole of his life activity. If his thinking were emancipated from reality, if it did not provide an accurate representation of his surroundings, he would perish. Thus, Boitendeik's research provides an empirical demonstration of what is already obvious from the perspective of theoretical biology: In phylogenesis, imagination and thinking cannot be directed toward the reception of pleasure, the mirage structure of the dream cannot be more primitive than thinking directed toward reality.

The second was based on observations of children. Researchers have shown that we do not find the hallucinatory reception of pleasure even at the youngest ages. The reception of pleasure in the child is connected with a real rather than hallucinatory

satisfaction of needs. Bleuler addressed this issue clearly. In his research, he did not see single child who experienced hallucinatory satisfaction from imagined food. He saw children who obtained satisfaction and pleasure from the reception of real food. The child's reception of satisfaction, his initial enjoyment and delight, is closely connected with real needs satisfied in real activity. This is the initial form of consciousness.

If we consider its simplest forms, real satisfaction is connected with the satisfaction of needs. The satisfaction of needs is among the basic forms of life, among the basic activities of animate beings. Consciousness plays a role in the satisfaction of needs from the earliest stages of its emergence. As Bleuler notes, from the earliest ages the path to real satisfaction lies through reality, not through some departure from that reality. The satisfaction of the simplest needs in early childhood is associated with intense satisfaction. This satisfaction moves to the forefront and dominates all the remaining aspects of consciousness.

Researchers have refuted the thesis of the primary nature of imagination and autistic thinking from all sides. Of those studies that have refuted the thesis of the dream-like form of child thought on the basis of empirical data, we must emphasize those that have clarified the relationship between the development of the child's speech and the development of his imagination.

From the perspectives of Freud and Piaget, an essential characteristic of primal child fantasy is the fact that this is a nonverbal, and consequently noncommunicable, form of thought. An opposition between verbal and autistic thought is erected on the basis of their verbal and nonverbal character. However, studies have shown that the mastery of speech represents an important step in the development of the child's imagination. Children with inhibited speech development also manifest retardation in the development of imagination. Deaf children, who remain fully or partially mute as a consequence of their deafness, tend to exhibit poor, meager, and even rudimentary forms of imagination. In contrast, if we accept Freud's thesis, we would expect that an underdevelopment of speech in the child would provide particularly favorable conditions for the development of primal, noncommunicable, and nonverbal forms of imagination.

We find some of the most convincing and eloquent data on this issue in the domain of pathology. With the analysis of nervous disorders in depth psychology, we have become aware of an extremely interesting fact, a fact that was given its first adequate interpretation in the neurological studies of German structural psychology. In brief, aphasics, those who have lost the capacity either to understand or produce speech as the result of a brain disorder or injury, manifest a sharp decline in fantasy and imagination. Frequently, these individuals are unable even to repeat something that does not correspond with reality as it is immediately perceived. Of course, the independent composition of a similar statement is much more difficult.

At the Frankfort institute, a case was described in which an individual with a right sided paralysis -- who nonetheless retained the abilities to repeat words that he heard, understand speech, and write -- was unable to repeat the phrase: "I can write well with my right hand." Since he could now actually write only with his left hand, he consistently substituted the word "left" for the word "right." In general, he found it impossible to repeat a phrase that did not correspond with reality. He was not able to look out a window during good weather and repeat sentences such as "Today it is raining." or "Today the weather is bad." It was impossible for him to imagine what he was not seeing at a given moment. He had even more difficulty when he was asked to use a word that did not correspond with the perceived reality by constructing a sentence of his own, when, for example, he was shown a yellow pencil and asked to say that it was

not yellow. If he was asked to call it green, however, the task became even more difficult for him. He could not refer to an object in a way inconsistent with its actual characteristics. He could not, for example, say "black snow." He could not produce a phrase if it contained this kind of false word combination. Thus, research indicates that a sharp disturbance of the verbal function is connected with the destruction of the individual's imagination.

Bleuler and his school have also gathered data relevant to this issue, having shown why the development of speech is such a powerful impetus for the development of imagination. Speech frees the child from the immediate impression of an object. It gives the child the power to represent and think about an object that he has not seen. Speech gives the child the power to free himself from the force of immediate impressions and go beyond their limits. The child can express in words something that does not coincide with the precise arrangement of objects or representations. This provides him with the power to move with extraordinary freedom in the sphere of impressions, designating them with words.

Studies have shown that not only speech but the further development of the child's life serves the development of his imagination. Such a role is played, for example, by school. Here the child can meditate on some imagined form before he acts on it. This is why it is during the school age that we find the first forms of true daydreaming, the potential and capacity to consciously surrender oneself to a certain intellectual construction independent of its function in realistic thinking.

Finally, the formation of concepts that signals the onset of the transitional age is an extremely important factor in the development of the most varied and complex combinations, unifications, and connections that can be established between the elements of experience. Thus, not only the appearance of speech, but the onset of the major stages in its development, are critical to the development of the child's imagination.

Thus, empirical research does not support the thesis that the child's imagination is a form of nonverbal, autistic, or undirected thought. On the contrary, these studies consistently demonstrate that the development of the child's imagination, like the development of other higher mental functions, is linked in an essential way with the child's speech. The development of imagination is linked to the development of speech, to the development of the child's social interaction with those around him, to the basic forms of the collective social activity of the child's consciousness.

Bleuler advanced yet another important thesis concerning the nature of imagination, a thesis that has also been verified by empirical research. Specifically, he argued that imagination can be a directed form of activity, that the individual can often describe the goals and motives that impel this activity.

Consider, for example, what are commonly called utopian constructions. These are deliberate representations of fantasy, representations that are clearly differentiated in consciousness from realistic planes of thought. Clearly, these representations are developed not subconsciously but consciously. The subject manifests a clear psychological set associated with the task of constructing a fantasy image relating either to the future or the past. We could also consider the domain of artistic creativity in this connection. This domain of activity is accessible to the child at a young age. If we consider the products of this creativity in drawing or story telling, it quickly becomes apparent that this imagination has a directed nature. It is not a subconscious activity. Finally, if we consider the child's constructive imagination, the creative activity of consciousness associated with technical-constructive or building activity, we see consistently that real inventive imagination is among the basic functions underlying this ac-

tivity. In this type of activity, fantasy is highly directed. From beginning to end, it is directed toward a goal that the individual is pursuing.

Cumulatively, these facts provide a clear demonstration that the way that the child's imagination had been defined as unique -- like the very concept of its primal nature -- is false.

I would like to briefly consider another issue related to the domain of imagination, specifically, the emotional aspect of imagination.

Child psychologists have made some important empirical observations related to the problem of imagination, observations that are reflected in what has been called *the law of real feeling* in fantasy. The essence of this law is simple. Briefly, the movement of our feelings is closely connected with the activity of imagination. A certain construction may turn out to lack reality from a rational perspective. Nonetheless, this construction is real in the emotional sense.

This can be illustrated using a common and rather crude example. Suppose that on entering a room I mistake a hanging cloak for a thief. I know that my fright was false. Nonetheless, the feeling of fear was a real experience. There is no real sensation of fear in comparison to which this sensation appears as fantasy. This is an important component in the explanation of the unique development of the emotions in childhood and in the explanation of the multitude of the forms of fantasy in adult life. The activity of imagination has exceedingly rich emotional aspects. Indeed, it was on this foundation that psychologists argued for the primal nature of imagination, assuming that the primary mover of imagination was affect.

As you know, autistic thinking was studied clinically using observational methods. The dominant idea in this research has been the notion that the role of the emotions in realistic thinking is insignificant, that realistic thinking moves independently of subjective wishes, while autistic or fantasy thinking moves under the influence of affect. Of course, there is no question that the imagined image, the fantasy construction resulting from autistic thought, is an important feature in the development of the emotional processes. This produces a unique relationship between the emotional processes and the child's thinking. If we can express it in this way, in autistic thought, the child's thinking serves his emotional inclinations. This happens when reality diverges sharply in some respect from the child's potentials or needs or when the child develops a false or distorted psychological set *vis a vis* reality. What results is a unique form of thinking that is manifested in somewhat different forms in any developed adult and in the normally developing child. The essence of this form of thinking is that it is subordinated to emotional interests. This form of activity is carried out primarily because of the immediate satisfaction that derives from it, because good experiences are associated with it, and because emotional interests and inclinations receive an apparent or fictive satisfaction that substitutes for a real satisfaction of the emotional processes.

In autistic thinking, then, thinking becomes the servant of the passions. It takes a subordinate position to emotional impulses and interests. What we have here, then, is a form of mental activity characterized by a unique relationship with the emotions. The result is the alloy that we refer to as the imagination of day-dreaming.

It is important, however, to consider two other issues here. As we will see, the combination of autistic thinking with the emotions is not the sole foundation of imagination. Moreover, imagination is not the only form of thinking that is linked with the emotions.

When associated with a task that is important to the individual, when associated with a task that somehow has its roots in the center of the individual's personality, realistic thinking calls to life much more significant emotional experiences than imagination or day-dreaming. Consider, for example, the realistic thinking of the revolution-

ary contemplating or studying a complex political situation. When we consider an act of thinking concerned with the resolution of a task of vital significance to the personality, it becomes clear that the connections between realistic thinking and the emotions are often infinitely deeper, stronger, more impelling, and more significant than the connections between the emotions and the day dream.

The essential difference between the connections of imagination and realistic thinking with the emotions lies in the nature of the connection itself. In the imagination of day-dreaming, thinking serves emotional interests. In contrast, in realistic thinking, there is no simple dominance of logic by feeling. Here, the relationship between these functions is more complex.

However, if we consider the form of imagination that is associated with invention and other forms of action on reality, we find that imagination is not subordinated to the subjective caprice of emotional logic. An inventor who has used his imagination to construct a sketch or plan of what must be done differs radically from the individual whose thinking is directed by the subjective logic of the emotions. We find very different systems, very different forms of complex activity, in the two cases.

Approaching this issue from the perspective of classification, it becomes apparent that we cannot view imagination as a function existing alongside other functions. It is not a homogeneous, recurrent form of brain activity. Imagination is a complex form of mental activity that is based on the unification of several functions in unique relationships. This kind of complex activity, one that exceeds the boundaries of the processes that we habitually call functions, can be called a *psychological system*. It is a complex functional system. The essential characteristic of this kind of system are the interfunctional connections and relationships that dominate it. The analysis of the varied forms of imagination and thinking demonstrates that it is only by approaching these forms of activity as systems that we can begin to describe the very important changes that occur in them, that we can begin to describe the dependencies and connections that are manifested in them.

I will now attempt to draw some conclusions from what we have said up to this point. First, does the kind of consistent antagonism or opposition that has been established between directed realistic thought and day-dreaming, fantasy, or autistic thought actually exist? As we have seen, the verbal character of thought is inherent to both imagination and realistic thinking. We have also seen that the directedness or consciousness of thought, the presence of motives and goals, is found in both autistic and realistic forms of thinking. Moreover, the individual frequently lacks full conscious awareness of his true motives, goals, and tasks in realistic thinking. Finally, both imagination and realistic thinking are often characterized by high levels of affect or emotion. There is no opposition between the two in this connection. Not all forms of imagination are subordinated to the logic of emotions and feelings. In sum, the apparent, metaphysical, and primal opposition that has been established between realistic and autistic thinking is both fictive and false. The differences between realistic and autistic thinking are not absolute but relative.

If we now attempt to characterize the relationship between thinking and imagination in positive rather than negative terms, we must emphasize two extremely important points. First, we must emphasize the extraordinary kinship that exists between thinking and imagination. The basic achievements of both are manifested in the same genetic features. The key transition point in the development of both thinking and imagination corresponds with the appearance of speech; the school age is the critical point in the development of the child's realistic thinking as well as the development of his autistic thinking. There is an intimate interconnection in the development of these two forms of thinking. A careful analysis might permit a bolder formulation of this

statement. In brief, the two processes develop as a unity. There is no essential independence of the two developmental processes. Moreover, by observing the forms of imagination that are linked with creativity, that is, the forms of imagination that are directed toward reality, we find that the boundary between realistic thinking and imagination is erased. Imagination is a necessary, integral aspect of realistic thinking.

There is a contradiction inherent in the problem as it actually exists. No accurate cognition of reality is possible without a certain element of imagination, a certain flight from the immediate, concrete, solitary impressions in which this reality is presented in the elementary acts of consciousness. The processes of invention or artistic creativity demand a substantial participation by both realistic thinking and imagination. The two act as a unity.

Nonetheless, it would be a serious error to identify realistic thinking and imagination or overlook the opposition that does exist between them. The essential feature of imagination is that consciousness departs from reality. Imagination is a comparatively autonomous activity of consciousness in which there is a departure from any immediate cognition of reality. Alongside the images that are constructed in the immediate cognition of reality, man constructs images that he recognizes as part of the domain of imagination. At advanced levels in the development of thinking, we find the construction of images that are not found in completed form in reality. By recognizing this, we can begin to understand the complex relationship between the activity of realistic thinking and the activity of advanced forms of imagination. Each step in the child's achievement of a more profound penetration of reality is linked with his continued liberation from earlier, more primitive forms of cognition. A more profound penetration of reality demands that consciousness attain a freer relationship to the elements of that reality, that consciousness depart from the external and apparent aspect of reality that is given directly in perception. The result is that the processes through which the cognition of reality is achieved become more complex and richer.

Finally, I would add that the internal connection that exists between imagination and realistic thinking brings us to a new problem associated with volition or freedom in human activity and consciousness. The potential for free action that we find associated with the emergence of human consciousness is closely connected with imagination, with the unique psychological set of consciousness *vis a vis* reality that is manifested in imagination. Thus, interconnected in this single knot, we find three of the greatest problems of contemporary psychology, and of contemporary child psychology in particular: the problem of thinking, the problem of imagination, and the problem of will. Our next and final lecture will be devoted to the problem of will.

Lecture 6

THE PROBLEM OF WILL AND ITS DEVELOPMENT IN CHILDHOOD

As in our previous lectures, we will begin today with a schematic historical introduction to the contemporary state of the problem of will in psychology. It is widely known that the attempt to interpret and develop the problem of will on a theoretical level and the attempt to analyze its manifestations in the adult and child have moved in two directions, that characteristic of heteronomous theories and that characteristic of autonomous theories.

The phrase *heteronomous theory* denotes theoretical or experimental studies that attempt to explain man's volitional activity by reducing it to complex mental processes of a nonvolitional character, by reducing it to associative or intellectual processes for example. Thus, any theory that searches for the explanation of the volitional processes outside will itself is heteronomous. *Autonomous or voluntaristic theories* base their explanations of will on the unity and independence of volitional processes and volitional experiences. They attempt to explain will by taking laws inherent to the volitional action itself as their point of departure.

What is most essential to these traditions can be seen most clearly if we begin by considering several specific manifestations of each, and then analyze these traditions in more general terms.

The heteronomous theories are among the oldest theories of will and are represented by associative as well as intellectualistic traditions. Since these theories are primarily of historical interest, I will limit myself to a schematic analysis of them.

In essence, associative theories that attempted to study the problem of will approached it in the same spirit as reflexology and behaviorism. According to this perspective, the central aspects of will can be outlined in the following way. First, any association is reversible. In an experiment on memory, if I establish an association between a nonsense syllable "a" and a second nonsense syllable "b," I will subsequently pronounce syllable "b" when I hear syllable "a." Of course, the reverse is also true. In its time, this simple phenomenon was called the law of the reversibility of associations.

The essence of this law is the concept that both the child and the adult initially act blindly, involuntarily, impulsively, and reactively. In a situation where a goal is achieved, their activity is entirely nonfree and irrational. Nonetheless, though this activity is completely irrational, it inevitably leads to some result. This, in turn, leads to

the establishment of an association between the activity and its result. Because this associative connection is reversible, however, there can be a simple reversal of the beginning and the end of the process in the course of development.

I will use an example suggested by Ebbinghaus. If, initially, the child reaches for food instinctively, a continuing series of experiences will establish an associative connection between satiation and the components of the process of satiation. These connections are sufficient for the emergence of the reverse process, where the child consciously searches for food when he experiences hunger. As Ebbinghaus defined it, will is an instinct that develops on the foundation of reverse associations. In his words, will is "an instinct that can see," an instinct that is conscious of its goal.

Intellectualistic theories attempted to show that action which appears to be volitional is actually a complex combination of intellectual mental processes. Several French, German, and English psychologists, of whom Herbardt is typical, represent this tradition.

From the perspective of the intellectualists, the associative connection is not sufficient to explain volitional processes. The intellectualists explain these processes not in terms of the concept of "association," but in terms of the concept of the "volitional process," a function that changes in development. They understood the volitional process in the following way. At the lower stages of development, we find instinctive, reactive, or impulsive action. At somewhat more advanced stages, we find action that has developed through the formation of habit. Finally, we find action associated with the participation of reason, that is, volitional action. Herbardt's students argue that to the extent a deed is rational, it is volitional.

These associative and intellectualistic theories are both characterized by the attempt to reduce the volitional process to a simpler process that lies outside will itself. This was the essential inadequacy of these theories (if for the moment we ignore the fact that the basic assumptions of both associationism and intellectualism are false). We cannot dwell on this point today, however. Here, it is much more important to emphasize what is positive in these theories of will, to emphasize how they raised the discussion of this problem to a higher level, to emphasize what these theories pushed aside in the way that they opposed voluntaristic theories. The truth they contained, the inspiration they communicated to the entire problem of will, was that of determinism. These theories constituted an attempt to oppose the spiritualistic theories of the Middle Ages, theories that spoke of will as a "basic spiritual force" that could not be subordinated to a deterministic analysis. The associationists and the determinists attempted provide a theoretical explanation for how man's volitional, goal-oriented, or free activity can arise; they attempted to establish the path, cause, and deterministic basis of that activity.

What is interesting about intellectualistic theories is their insistence that the experiment must be primary in the attempt to resolve any problem. First and foremost, analysis must function to interpret the situation as it exists for the individual himself. It must interpret the internal connection between the individual's understanding of the situation and the action as well as interpret the free and voluntary character of this action.

The difficulty with these theories is that they were unable to explain what is most essential to will. They were unable to explain the volitional nature of acts, the voluntary nature of the act as such. They could not explain the internal freedom that the individual experiences in making a decision or the external structural variability that distinguishes the volitional action from the nonvolitional action.

We have seen that the old theories could not explain what is most important to intellect. That is, they could not explain how nonrational activity becomes rational. In

the same way, they were unable to explain how nonvolitional action becomes volitional. This led to the development of several psychological theories that attempted to resolve this question through nonscientific means, that is, through metaphysical constructions. The most significant among these were the autonomous theories, theories that attempted to resolve the problem of will by understanding it as something primal, as a unity that cannot be derived from other mental processes.

A second group of theories, the affective theories of will, provided a transitional link between heteronomous and autonomous theories. Wundt, who is known as a voluntarist, was among the most important representatives of this tradition. In fact, Wundt was not a voluntarist, since he derived will from affect. We can summarize his perspective in the following way: Associative and intellectualistic theories explain the volitional processes by deriving them from what is least essential for will, by excluding the aspects of efficacy and reality. From the subjective side, these features are uniquely experienced. From the objective side, however, the mental experience most connected with the volitional processes is that associated with the individual's activity.

Wundt notes that associationists typically explain will through memory, while intellectualists explain it through intellect. According to Wundt, however, the real path to the explanation of will lies through affect. Affect is an active state. It is characterized by a clear and intense internal content and by the individual's active action. If we want to find the genetic prototype of action, argues Wundt, we must consider the individual who is incensed or frightened. These examples make it clear that the individual who is experiencing strong affect is not in a state of serious mental activity. This indicates that what is most essential for the volitional process is the activeness of this external action, an action that is directly connected with internal experiences. Thus, the prototype of will is affect. Through a transformation, the true volitional process emerges on the foundation of affective action.

I will not attempt a detailed analysis of this theory, nor will I analyze other emotional or affective theories of will that may have been more clearly formulated. For us it is important only to note the various components in the development of this problem. Wundt himself stood with one leg in a voluntarist position (he become known as a voluntarist in psychology because he was open to the philosophical perspective of voluntarism) and one leg in heteronomous theory. Here, we will see how historically one-sided the development of the theory of will was, moving to a large extent in a false direction. This was precisely what led to the internal decay of these theories, nullifying even what was positive in them.

The autonomous theory of will took as its point of departure the notion that the path for the explanation of will lies not through memory, intellect, or affect but through will itself. For these theories, activeness is a primal beginning. Proponents of this theory, such as Hartman and Schopenhauer, argued that a superhuman beginning, a kind of universal activeness, leads will. This activeness or superhuman beginning acts constantly, subordinating all man's powers to itself, irrespective of the reasoning that leads to specific goals.

The concept of the unconscious was introduced along with this conception of will. Associated with this is a fact that has long restricted the further development of the theory of will. Through the inculcation of the concept of the unconscious in contemporary psychology, the intellectualistic form of idealism was overcome. Nearly all the advocates of the theory of the unconscious were followers of Schopenhauer. That is, they began with a voluntaristic understanding of the human mind, an understanding that scholars such as Freud have recently adopted.

We cannot consider the many aspects and variants of voluntaristic theory in detail. We will simply identify the two extreme poles between which these theories os-

cillated. Subsequently, we will attempt to identify what is common to all these theories and what they contributed to science.

At the first of these poles, we find the conception of will as something primal, something that is foreign to the conscious aspect of human personality. Here, will is represented as a kind of primal force that moves both the material and the spiritual aspects of life. At the other pole, we find the theories of the spiritualists. Historically, these theories are associated with Descartes' philosophy and, through Descartes, with the Christian philosophy of the Middle Ages. Cartesian theory takes as its foundation a spiritual beginning that directs the entirety of man's spiritual life, and, consequently, all his behavior.

It was this Cartesian theory, reincarnated and further developed in several spiritualistic theories of will, that governed idealistic psychology during the final quarter of the past century. One such theory was that of James. We have unified James' system with the most varied theories and tendencies. As a pragmatist, James attempted to avoid spiritualistic or metaphysical explanations in all problems except the problem of will. James developed a theory of will that he referred to using the Latin word "fiat," taken from the Bible. This word means, "Yes, it will be!" with the help of God the Creator who created the world. In James' view, in every volitional act there is some fraction of the kind of volitional force that gives preference to the weakest of the mental processes. James argues that when a sick man on the surgeon's table is experiencing the most horrible pain and the need to cry out but nonetheless lies entirely calm and leaves the doctor to his business, we are dealing with a clear example of will, a clear example of voluntary behavior. One might ask what impels this man to act in opposition to immediate impulses, in opposition to the tendencies that exist for other actions.

According to James, the entire inadequacy of a Wundtian affective theory of will is illustrated by this example. In accordance with Wundt's theory, this example is explained by arguing that the affect is stronger than the pain, that this affect forces the man to lie still. James argues that it is absurd to suppose that this man's wish not to cry out is greater than his wish to cry out. This man obviously has a much greater desire to cry out than to be silent. This lack of correspondence between the introspective and objective analyses of human behavior indicates that here behavior follows the line of greatest resistance, presenting us with an exception to a universal law of physics. How are we understand this connection between spiritual and physical phenomena?

James argued that as long as this perspective is maintained these facts are inexplicable. To retain it, we must assume that if the man continues to lie on the operating table he is following the line of least resistance. That is, we must find support for the laws of physics, rather than exceptions to them. According to James, there is only one way to answer this question. Specifically, we must assume the existence of some kind of spiritual energy that unites with the weakest impulse and ensures its victory over the strongest. As James expressed it in a letter to Stumpf,[23] any volitional act is reminiscent of David's struggle against Goliath, where David's victory was attained through God's assistance. Here, some fraction of this spiritual energy or creative beginning interferes with the flow of the process and alters its course.

What is taken as a point of departure in other theories, particularly that of Bergson, is what Bergson called "analysis of the immediate data of consciousness." Bergson derives his proof for free will, for the independence and primacy of will, from the analysis of immediate experience. Like James, he actually did succeed in demonstrating that we can distinguish actions that we experience as nonfree from actions that we experience as free or independent.

Thus, there are two basic types of voluntaristic theories. The first views will as a primal and universal force that is manifested in a given individual. The second conceives of will as a spiritual beginning that interferes in material and nervous processes, ensuring the victory of the weakest. What these theories share is their acceptance of the notion that will is something primal, something that exists from the beginning. Neither sees will as belonging to a group that includes the other basic mental processes. Neither sees will as compatible with a determinist or causal explanation.

It was in connection with volitional actions that the idea of teleological psychology first emerged in causal psychology. Here, the volitional action was explained in terms of the goal that impels the action rather than in terms of a cause.

Given the extreme reactionism of many of the ideas about will that have developed in the history of psychology, it can at least be said that these voluntaristic theories have consistently focused the attention of psychologists on the unique phenomena of will. They have consistently stood in opposition to perspectives that have attempted to abandon as hopeless the study of the volitional processes. These theories also played a second important role in the history of psychology. That is, they were the first to divide psychology into two separate traditions, the causal or natural scientific tradition and the teleological tradition.

We will now attempt to draw some conclusions from this discussion. We will attempt to identify the basic difficulties that have been encountered by contemporary investigators in their attempts to solve the problem of will, identify the traditions to which these investigators belong, and identify the puzzle that has made this problem so difficult.

The crux of the problem can be outlined in the following way. On the one hand, there is the problem of explaining the volitional process in a deterministic, caused, or conditioned way. That is, there is the problem of providing a scientific conception of this process, of avoiding a religious explanation. On the other hand, there is the problem of preserving what is inherent to will, what causes us to refer to an act as a volitional act, while retaining this scientific approach to its explanation. Thus, the key problem is that of preserving what makes some of the individual's determined, causal, and conditioned actions free, while taking a scientific approach the study of this phenomenon.

A few more comments on contemporary experimental studies of will are appropriate here. An extremely interesting attempt to distinguish experimentally between intellectual and volitional actions was made by Koffka, a member of the Berlin school. It was once thought that all actions are volitional, including impulsive, automatic, and voluntary actions. Just as this notion has been rejected, Koffka argues that rational actions are not, in and of themselves, volitional. Partly through the reproduction of Kohler's experiments, and partly through new experiments carried out on animals and people, Koffka was able to show that several actions that are carried out by man are not, in structural terms, volitional in the true sense of the word. Koffka was also able to show that there are true volitional actions where the intellectual functions are not clearly expressed. In this way, his work differentiated rational actions from volitional actions. This led, on the one hand, to a narrowing of the domain of volitional actions and, on the other, to an increase in the number of recognized types of human action.

Similar work on affective-volitional processes was carried out by Lewin, who studied the structure of affective-volitional actions and attempted to show that human affective activity and volitional activity are constructed on the same foundation. Very quickly, however, Lewin made observations that he generalized in the following way: The affective action is not in any sense a volitional action. Several actions that psychologists have always considered as typical volitional actions are not truly volitional.

Lewin's initial research in this area involved a modification of Ach's experiments, experiments that were typical of the old psychology. This study focused on an experimentally developed action, that is, a response to a conditioned signal. Subsequently, Lewin's research was extended to the study of several actions, in particular, actions based on intentions. Basic to this work was the finding that many actions related to the future, actions associated with intention, are volitional affective actions. In other words, they are associated with a state that Lewin called tense (*Spannung*). Lewin drew the same conclusion from another similar set of experiments. If I write a letter and place it in the pocket of my coat with the intention of dropping it in the mail box, this action is fulfilled automatically and nonvoluntarily despite the fact that in its external structure it is very similar to an action carried out in accordance with a preestablished plan, that is, it is very similar to a volitional action.

As in Koffka's experiments, then, what we have here are volitional actions that are associated with affective and involuntary actions. The latter are structurally similar to volitional actions but are not themselves volitional. Subsequently, Lewin illustrated the variety of human actions that manifest the same regularities.

Here, Lewin had encountered the problem of will, though from its negative side. Conducting experiments with children and adults, he turned his attention to an extremely interesting issue. In particular, while the adult can form any intention, even a meaningless one, the child is powerless to do this. In the early stages in the development of will, the child is not capable of forming any given intention. The child's situation defines the range of the possible intentions that he can form. As Lewin expressed it, this is an embryo but not an innate intention. Lewin studied the formation of meaningless intentions in adults and the voluntary nature of their formation. He found that there is a limiting condition on the voluntary nature of the formation of intentions even with adultsf. Like children, adults are limited in the meaningless intentions that they can form voluntarily. We cannot form intentions that contradict our basic psychological set or our moral views. Within the wide range of actions that do not conflict with our psychological set, however, we can form any intention. This differentiates the adult's developed will from the child's underdeveloped will.

Lewin also clarified the structure of the volitional act, showing that in its primitive forms it has extremely unique manifestations. This was later studied by Goldstein and Gelb, who attempted to provide a neurological explanation for it.

In experiments involving meaningless situations, Lewin found that the subject searches for some point of support that is external to him and that he defines his own behavior through this external support. In one set of experiments, for example, the experimenter left the subject and did not return, but observed him from a separate room. Generally, the subject waited for 10-20 minutes. Then, not understanding what he should do, he remained in a state of oscillation, confusion, and indecisiveness for some time. Nearly all the adults searched for some external point of support. For example, one subject defined his actions in terms of the striking of the clock. Looking at the clock, he thought: "When the hand moves to the vertical position, I will leave." The subject transformed the situation in this way, establishing that he would wait until 2:30 and then leave. When the time came, the action occurred automatically. By changing the psychological field, the subject created a new situation for himself in this field. He transformed the meaningless situation into one that had a clear meaning.

Recently, when Koffka was in Moscow, I cited analogous experiments carried out by Dembo.[24] In these experiments, the experimenter observed the subject as he carried out several meaningless tasks. Of particular interest was the subjects' tendency to attribute meaning to these tasks by creating a new situation, by changing the psychological field, producing a meaningful rather than a meaningless action.

Permit me a brief discussion of a mechanism identified by Goldstein that is of tremendous significance for the development of the volitional function in the child. In experiments on subjects with various neurological problems, Goldstein focused his attention on an interesting mechanism that is encountered by every psychologist. Specifically, the subject may fail to carry out an action with one set of verbal instructions and succeed with another. The patient may be asked, for example, to close his eyes. When he attempts to carry out this assignment, he fails. He is then asked to: "Show me how you lie down to sleep." In demonstrating this, the patient closes his eyes. Subsequently, when asked to close his eyes, he succeeds. Stated simply, the patient is able to complete the action with one set of instructions but unable to do so with another.

Goldstein explains this in terms of purely structural factors. In patients who have difficulty with movements due to encephalitis, there is a change in the structure of consciousness that makes it impossible to carry out separate, isolated actions. From the perspective of the old neurology, the stimulus "shut the eyes" falls on a certain brain center but does not find the necessary transmission paths to the centers controlling eye movement. The patient understands what is meant by the phrase, "Shut the eyes." He also wants to comply and has the physical capacity to do so. Due to his illness, however, his potential for carrying out the action has been destroyed. No connections exist between the two centers. Modern neuropathologists would say that what is involved here is an extremely complex structure that developed on the foundation of a specific situation. What is impossible for this patient is the formation of a structure or action that is not elicited by the situation. When the patient is asked to demonstrate how he lies down to sleep, he is dealing not with isolated actions that must be introduced into a new complex structure, but with a more or less integral situation.

In Goldstein's view, the neurological construction of the normal volitional act involves the formation not of a direct connection between two points on the cortex but of a structure that leads only indirectly to the completion of the action. The beginning point for this process leads to a complex internal fabrication of a new structure that allows the previous structure through the construction of an auxiliary structure. It is only here that we are dealing with a true volitional process. In addition to established, reinforced paths between two points, there are complex mediated connections between separate structures. These connections are complex mediating structural formations that become active when two points cannot be connected directly with one another. The result is the emergence of new structures that unite all three aspects.

In Goldstein's view, this was the mechanism that was established by the subject who decided to leave in accordance with the signal from the hand of the clock. What is novel in what Goldstein brings to the analysis of this fact, is his attribution of tremendous significance to external speech. Goldstein recognized the inadequacy of the old view that the more complex the control over an activity the more immediate or direct the action. It appears that we are dealing here with structures in which the individual listens to himself when he is speaking and carries out his own instructions.

The development of the child's will begins with primitive voluntary movements, then moves to verbal instruction, and is completed with the emergence of complex volitional actions. This development is directly dependent on the child's collective action.

To what extent do primitive forms of volitional activity in the child represent his applying modes of action to himself that were previously applied to him by adults? To what extent is the child's volitional activity a unique form of his social behavior *vis a vis* himself? If you frequently force a child to do something such as diving into the water

in accordance with a cadence such as, "One, two, three.", the child acquires the habit of doing precisely the same thing. As adults, we frequently find ourselves needing to do something that we do not want to do. We find ourselves unable to find the stimulus that will allow us to move ourselves. James cites the example of being unable to rise from a couch, when a stimulus coming from the outside helps us to stand. As James states it, we find ourselves standing without noticing that we have carried out the action. To follow all these problems in their development, to define the stages through which they pass in the development of the child's will, is an extremely important task.

I will conclude by noting that in this domain we have one of those comparatively rare cases where there is a correspondence between research from pathological psychology (as it has been theoretically interpreted by neuropsychology) and genetic psychology. This has provided us with the potential for a novel resolution of what is among the most important issues in psychology, the problem of will.

AFTERWORD TO THE RUSSIAN EDITION

A. R. Luria

I

The present volume includes Vygotsky's classic monograph *Thinking and Speech* and his *Lectures on Psychology*. These are works which concretize and begin to realize the program for the construction of a new and general psychological theory which is described in somewhat more programmatic terms than in the works appearing in the volume on *Questions of the Theory and History of Psychology*. Both these volumes reflect Vygotsky's general psychological perspectives and research findings and include several works that form a unified system. The connection between the two volumes is obvious. In the publication by the Soviet Academy of Pedagogy, *Questions of the Theory and History of Psychology* preceded the present volume and was labeled Volume I.*

Thinking and Speech is among Vygotsky's most important works. Devoted to the issue of the relationship between thinking and speech, this work is Vygotsky's most significant attempt to develop his general theory. It also includes critical analyses of the most important attempts by others to resolve this problem, attempts based on perspectives that dominated the psychology of Western Europe in the 1920's and early 1930's.

There were two traditions in psychology associated with the attempt to resolve the problem of thinking and its relationship to speech. One of these was associationism, which reached its apogee in the 19th century. Here, thinking was reduced to the more basic element of the representation. In particular, it was reduced to the representation that stands behind the isolated word. The associationists attempted to show that thinking can be reduced to the associations or connections between these elements. This approach was typical of most of the texts used to educate psychologists and of

* The sequencing of volumes in the publication of the American translations was, however, changed because the editors believed that the English-reading community would be most interested in a complete and accurate translation of *Thinking and Speech* inasmuch as the earlier, avowedly free and interpretive translation by Eugenia Hanfmann and Gertrude Vakar (published by MIT in 1962) had contributed so much to stimulating interest in Vygotsky. [Because Professor Luria referred to *Questions of the Theory and History of Psychology* as Volume I and to the contents of the present volume as Volume II, it became advisable to modify the translation of the first paragraph of Luria's afterword. Editors' note.]

most of the leaders in the field. Of course, beginning with the identification of the elements that constitute thinking, the associationists could not describe thinking as an integral process. The specific characteristics of man's intellectual activity dropped out.

This approach to the psychology of thinking first encountered serious opposition in the beginning of the 20th century. Having made thinking the object of their research, the members of the Wurzburg school (i.e., Kulpe, Ach, Buhler, and others) assumed a position that was in direct opposition to the associative perspective. In their view, *thinking is unique*, involving mental processes that cannot be reduced to the association or connection of representations. Thinking is characterized by intention, by the subject's directedness on the solution of problems that arise, and is manifested in a primary judgment of relations. It does not necessarily include concrete images (i.e. representations) or elements of speech (i.e. words).

Their attempt to approach thinking as a unique form of mental activity was the most important contribution of the Wurzburg school. The specific resolution of the problem that they proposed, however, met with well justified opposition. The proponents of this tradition used a subjective, phenomenological method (i.e. a description of the experiences that accompany the act of thinking) and described thinking in extremely general and abstract terms. From the outset, these scholars had rejected the possibility of approaching thinking as a concrete mental activity. They isolated thinking from all other processes of mental life, including practical activity and speech. They closed thinking off within a domain of purely subjective, phenomenalistic descriptions. Thus, from the outset, they failed to recognize the possibility of studying the historical roots of the development of thinking.

Though developed on an entirely different conceptual foundation, a similar position was assumed by the German Gestalt psychologists (i.e., Wertheimer, Kohler, and Koffka). This group began with a detailed analysis of the processes of perception, an analysis of perception as an integral form of mental activity that cannot be broken down further. Their conceptions of these integral laws were then transferred to the description of thinking. In their view, the foundation of thinking is the law of the perception of relationships. Having noted the integral nature of thinking, these authors identified the laws of thinking with the laws of perception. As was inevitable, this led the Gestalt psychologists to schemes that were equally abstract as those of the Wurzburg school. They too lost any potential of analyzing thinking as a concrete mental activity that has its own history and its own roots closely connected with man's practical activity and language.

Both these traditions closed off the study of thinking within a set of abstract schemes. No real investigation of the activity of thinking or its history was impossible. This led to a profound crisis in psychology, a crisis that Vygotsky attempted to overcome.

The attempt to overcome this crisis had to move in two directions. First, it was necessary to isolate the *actual units* that provide the foundation for thinking. That is, as opposed to simplified associations or abstract schemes such as "the judgment of relationships," it was important to identify components that preserve all the qualities of thinking but cannot be further broken down. It was also important to find these components or units in the child's concrete practical activity. Second, there was an need to approach the processes of thinking in the context of their development. That is, keeping Marx's formula in mind: "We know only one science - history." (Marx and Engels, *Collected Works*, vol. 3, p. 16), there was a need to trace the actual stages through which the adult's developed thinking passes.

Naturally, in resolving these problems, Vygotsky began with existing theories, preserving the concrete data that they described but opposing false interpretations of

these data with a true and consistent materialistic approach. In the 1920's, there had already been several attempts within psychology to study the actual roots of thinking, to relate thinking to the child's activity on the one hand and to his speech development on the other. Unique among these works were those of Piaget, who focused on the development of the child's speech and thinking, and those of the German psychologist Stern, who dealt more generally with the child's psychological development. Piaget and Stern both attempted to carefully describe the world in which the child lives. Moreover, both attempted to study the structure of the child's speech and its interaction with thinking. In his attempt to address the issue of the relationship between thinking and speech, Vygotsky could not bypass the work of these scholars.

For Piaget, the child's development involved the socialization of a being who initially failed to separate the external world from his own experience, a being who was closed off within the circle of autism. In Piaget's view, this explained why the young child's speech is initially egocentric, why it is not oriented toward the adult.

Vygotsky began with the opposite thesis. Though initially the infant is physically linked to the mother and continues to be linked to her biologically for some time, Vygotsky argued that the infant is nonetheless a social being from the outset. That is, from the beginning, the infant's activity is permeated by an orientation to adults, by social interaction with them. This thesis forced Vygotsky to question the notion that the child's speech, which always reflects reality and serves as a form of social interaction, is in its early stages egocentric in nature. This thesis caused him to question the notion that the child's speech is a tool of autistic experience rather than a means of social interaction and of reflecting the real world. This is what forced Vygotsky to turn to the early stages of the child's development and attempt to determine the *actual* function of Piaget's egocentric speech.

Vygotsky's experimental studies allowed him to clarify the function of what Piaget had called egocentric speech. The data Vygotsky gathered in these studies were extremely significant and have found a permanent place in the psychological literature. The child's egocentric speech is of real significance. It appears where the child encounters some difficulty, a difficulty that he can resolve only with the help of an adult. Thus, what Piaget called egocentric speech actually turned out to be an active form of verbal probing. That is, egocentric speech turned out to be directly intertwined with the child's practical probing in his attempt to solve a problem. Egocentric speech plays an objective role in helping the child to reflect or "feel out" the situation, to analyze it and then plan his future action. This is why the analysis of Piaget's work with which Vygotsky begins *Thinking and Speech* is as much "experimental-philosophical" as experimental-investigative in nature. Vygotsky stripped the appearance of egocentrism from the child's speech. His research was the first empirical attempt to identify the role of the child's early speech in his practical activity. Moreover, Vygotsky's observations indicated that this external, developed, and quasi-egocentric speech is subsequently transformed into abbreviated, whispered speech. Ultimately it becomes inner speech, one of the most important tools of human thinking.

Though it has been nearly 50 years since the publication of Vygotsky's work, the concept of the active and social nature of the child's speech and the concept of its subsequent internalization as the foundation of the complex mechanisms of verbal thinking have retained their significance. These concepts are currently being explored by many Soviet psychologists.

Beyond Piaget's theory of egocentric speech stands the concepts of depth psychology, autism, and ultimately psychoanalysis. Stern's work is based on entirely different conceptual foundations. Beyond his theses concerning the characteristics of the child's speech stands the concepts of idealistic personalism. This conceptual frame-

work undermined any potential for a truly genetic approach to the analysis of the development of the child's speech or of the development of the role of speech in thinking. Stern asserted that between one and two years of age the child makes the greatest discovery of his life, the discovery that every thing has a name. In Stern's view, this discovery introduces the child to the world of established meanings and immediately sets him on the path toward the mastery of intellectual operations. Vygotsky argued that Stern's basic mistake was that of *making the problem a postulate.* That is, rather than attempting to study the actual development of word meanings, Stern simply proposed that the child discovers the developed world of word meanings.

These analyses of Piaget and Stern provided Vygotsky with a point of departure for all his subsequent arguments in *Thinking and Speech.* Refusing to accept Piaget's conception of egocentric speech or Stern's notion that word meaning is simply discovered, Vygotsky assumed the task of *exploring the genetic roots of thinking and speech* and providing the experimental methods necessary for studying precisely how these processes develop.

Chapter 4, "The Genetic Roots of Thinking and Speech," is fundamental to the central argument of this monograph. Numerous studies have proposed that the genetic roots of thinking are closely connected with those of speech. These studies suggest that the word is always the carrier of the concept and that the concept provides the foundation for thinking. That is, they suggest that the fundamental relationship between thinking and speech remains unchanged throughout the various stages of development.

In this chapter, Vygotsky decisively rejected this position, arguing that the development of human thinking has two independent roots, one that derives from the animal's *practical action* and one that derives from the animal's *use of speech* as a means of social interaction. This conclusion was fully supported by existing psychological data. By the beginning of the 1920's, Kohler had firmly established that the anthropoid apes are able to carry out complex intellectual actions. These animals analyze the concrete situation, perceive the concrete relationships and connections within it, and are able to solve simple tasks. However, it is impossible to find even a hint of any designation of distinct objects in the sound that reflects the animal's emotions states (e.g. of pleasure or displeasure). The affective sounds of the apes have an entirely different function than the words of human language. They do not designate particular objects or reflect the connections and relationships among these objects.* Consequently, as Vygotsky argued, there are *pre-speech forms of concrete-active intellect* as well as affective *preintellectual forms of auditory reactions.*

On the one hand, then, it was clear to Vygotsky that the roots of intellect must be sought not in abstract logical operations expressed in language but in the *actual activity of the animal.* Moreover, Vygotsky recognized that the sounds characteristic of animal behavior have a completely different functional significance than those of man. They are not part of intellectual actions. On the other hand, it became clear to Vygotsky that along with the forms of development that follow "pure lines," that is, those that ensure the maturation of the "seed" of a particular mental function, there are forms of development that move along "mixed lines." This required a search for the point at which thinking becomes verbal, the point at which speech is incorporated into the practical solution of tasks, acquiring new functions in the process.

This led Vygotsky to a thesis that he never tired of repeating. Where Goethe had replaced the Biblical dictum: "In the beginning was the word." with: "In the beginning

* Experiments with anthropoid apes on the formation of sounds or illustrations that have acquired some meaning and have been used to designate objects did not go beyond artificial experiments and did not validate the theses that their authors had advanced. A. Luria.

was the deed.," Vygotsky argued that the accent on the latter needed to be changed to isolate the first phrase: "*In the beginning* was the deed." That is, Vygotsky emphasized the necessity of discovering how the unification of "deed" and "word" led to the emergence of the higher forms of verbal thinking that give the human "deed" fundamentally new characteristics, moving it far beyond the perceived concrete object situation and transforming man from a "slave of the visual field" into its master.

All this led Vygotsky to his next step, that is, to the analysis of the path that word meaning takes in its development, to the analysis of the most elementary means of reflecting reality, what Vygotsky called the "microcosm of human consciousness." It was in this connection that Vygotsky carried out the decisive set of experiments that brought him worldwide recognition.

Several investigators had shown that the animal's practical action and the child's elementary action with tools (*Werkzeugdenken*) have their own history, their own stages of development, and their own changing psychological structures. Why, then, can't one study the analogous development of the *word* itself, of that basic unit of language that, in its mature form, expresses the *concept*, thereby creating a new foundation for the development of thinking itself? It was this question that Vygotsky addressed in Chapter 5 of *Thinking and Speech*, "An Experimental Investigation of Concept Development."

It had long been known that the unit of speech is the word, that the word designates an object, and that, at more complex stages of development, the word expresses a certain abstract concept. Despite the large number of studies that had been devoted to this issue, however, the development of word meaning had been ignored. It had been assumed that word meaning is constant. It seemed obvious that the word "chair" or the word "apple" designates the same thing for both the child and the adult. This led to the assumption that the development of speech is associated only with the enrichment and extension of the vocabulary or with the acquisition of new abstract words.

To Vygotsky, there seemed to be little basis for this approach. He found unconvincing the assertion that the child simply "grows into culture," constantly acquiring new words. Vygotsky opposed the associative perspective, which maintained that generalized word meanings develop through trial and error, as well as the idealistic conception that the abstracted meaning of the word is introduced directly to the teenager. Vygotsky took a fundamentally different approach that reflected the dramatic process of concept development. In Vygotsky's view, the critical task was that of tracing the actual psychological process through which the word loses its diffuse subjective character and becomes a true tool for the reflection of the complex connections and relationships between words and the objects they designate. To the extent that Vygotsky has been recognized in world psychological literature, it has largely been as a consequence of the success he had in resolving this problem.

Vygotsky began by differentiating the word's two basic functions. On the one hand, the word always indicates some object, action, or quality. It acts as a substitute for the object or, in the words of the Russian linguist Potebnia, serves as its representation. Vygotsky justifiably referred to this function of the word as its object relatedness. The word's object relatedness is identical for both the child and the adult (i.e, "chair" is always chair and "window" is always window), indicating that object relatedness is among the word's most important functions. This easily conceals, however, the profound changes that the content of the word undergoes during the child's development.

In this connection, Vygotsky isolated a second function of the word, a more complex function, that he called *the function of meaning*. This aspect of the word under-

goes profound transformations during of the development of the child's speech. When he spoke of meaning, Vygotsky was concerned with the fact that the word is not limited to the function of indicating objects. The word *introduces the object* into a system of connections and relationships, analyzing and generalizing it. The term "chernil'nitsa" [inkwell] is not merely a direct indication of an object on a table. It is, rather, an indication that this object has a relationship to color or hue (**cher-** [black]), that it is related to other objects that are used as tools (the suffix **-il**),* and that it is a receptacle like a "sakhar**nitsa**" [sugar-bowl] or a "pepel'**nitsa**" [ashtray] (the suffix **(n)its**). Consequently, the word not only indicates the object but realizes an extremely complex *analysis* of it, an analysis that formed was in the linguistic code in social history.

The word also introduces the object into a certain system of connections. "Garden" inevitably elicits connections such as "earth," "beds," or "cucumbers." It is also sometimes related to a more abstract system of categories such as "agriculture," "vegetable diet, or "commodity value."

Finally, as Lenin indicated, any word (speech) *generalizes* (v. 29, p. 246)[sic]. When we say "table" we have in mind any table. When we say "clock" - any clock.

Isolating word *meaning* as the systems of connections that are concealed behind the word -- the systems of connections that are elicited by it -- has been among the most important steps taken by linguistics, psychology, and psycholinguistics. Vygotsky managed to clarify the most important point: While a word's object relatedness may be preserved through various stages of mental development, *word meaning*, the word's inner semantic structure, *develops*.

To demonstrate the development of word meaning, Vygotsky used an original method (developed in cooperation with L.S. Sakharov) which made it possible to identify the systems of connections that stand behind the word and trace the concept's formation. In using this method, artificial, meaningless words were related to objects with complex features. For example, the word "RAS" was used to designate objects that are small and flat while "GATSUN" was used to designate objects that are large and tall. Cardboard figures representing these objects -- with the appropriate word written on the bottom -- were presented to the subject. The name on one of the figures was then shown to the child and the child was asked to select all the figures designated by that word. If the child's selection of objects was unsuccessful, the experiment continued, with the experimenter asking the child to guess what other figures might be designated by this artificial word.

This method produced some extremely important findings. It was shown that the meaning of the artificial word is constructed differently in various stages of the child's development. It is included in nonequivalent mental systems. In the earliest stages, the child ignored the word that was given to him and selected objects in accordance with an arbitrary feature, indicating that at this stage the word either has no essential meaning for the child or that its meaning is syncretic and diffuse. At the next stage in development, the word has already acquired its functional meaning, but still does not function as a carrier of an abstract concept. When a large green triangle is presented to the child in association with a word, he selects all the green figures, all the triangular figures, or all the large figures. Thus, around the artificial word "GATSUN," there is formed an entire family of objects, with each member of this family included in the group on its own basis. That is, the green square is included because of it color and the blue triangle because of its form, just as Ivan is included in the family because he is the brother of Peter, Olga because she is the wife of Peter, and Nikolai because he is Peter's son. Sometimes this complex acquires the characteristics of a chain, forming a

* L.S. Vygotsky calls this part of a word a *particle*. Editors' note.

chain whose members maintain their connection only with the figure that precedes them, losing any connection with the initial figure. At later stages of development, the picture changes once again. The child begins to isolate the object's basic feature, subordinating this feature to a category. Vygotsky called this the stage of the pseudoconcept, because the results manifested their true face through the easy slide to nonessential features. Finally, during the school age, the classification process changes fundamentally. Here we begin to see the isolation of features and the creation of hypothetical categories with verbal definitions, eventually leading to true verbal (verbal-logical) thinking.

Vygotsky's experiments not only demonstrated that *word meaning develops*. They made it possible to trace the process of concept formation, a process that initially moved along an direct plane and only subsequently began to depend on abstract, categorical word meaning.

The development of word meaning from the diffuse to the concrete (i.e., the situational) and later to the categorical (i.e., the verbal-logical) has been studied by many researchers since Vygotsky's death, not only in connection with the child's thinking but in connection with the thinking of people at various stages of cultural development. It has been clearly shown how word meaning, the basic tool for reflecting reality, forms.

II

Thus, the fifth chapter of *Thinking and Speech* provided the initial foundation for the thesis that word meaning develops and introduced the basic stages of concept development. The following chapter, which is the largest in this monograph, is entitled "The Development of Scientific Concepts in Childhood." In this chapter, Vygotsky analyzes the narrower issue of the development of the *scientific* concept. This chapter greatly broadens the conceptual framework of the whole of Vygotsky's work. It focuses on the issue of what it is that introduces the highest form of concept into the child's consciousness. It focuses on the relationship between the two basic factors in the formation of consciousness, that is, on the relationship between development and instruction. This allows us to say that it is in this chapter that the larger scope of Vygotsky's philosophical, psychological, and practical views are revealed.

Prior to Vygotsky's work, psychologists had differentiated two basic types of concepts that are formed in the child's development. One of these, often called spontaneous concepts (Vygotsky preferred the phrase "everyday concept"), is formed in the child's immediate practical activity. Typical examples of this type of concept, a type of concept that emerges in the preschool age, are "house," "dog," and "brother." The other type of concept was often called a nonspontaneous concept (Vygotsky preferred the phrase "scientific concept"). These concepts emerge only in instruction, appearing during the school age. In this group, we find concepts such as "straight line," "Archimedes law," and "class struggle."

Do these two forms of concepts develop in accordance with the same laws? Do they have identical psychological structures? Do they play the same role in the child's mental development?

When Vygotsky wrote *Thinking and Speech*, there was no simple answer to these questions. Certain psychologists felt that everyday and scientific concepts develop in accordance with the same laws. They argued that scientific concepts are simply learned when their everyday equivalents are sufficiently mature. The scientific analysis of the differences in the psychological structures of everyday and scientific concepts

had not been carried out. The question of the role that these two types of concepts play in the child's mental development had not been framed.

Vygotsky's *Thinking and Speech* and his *The Development of the Higher Mental Functions* (included in the third volume of the Collected Works [Russian Edition]) were the first attempts to approach the solution of these issues in a careful and principled way. Even the initial attempt to analyze these two types of concepts indicated the profound differences in their genesis, psychological structure, and function. Everyday concepts arise as the result of the child's immediate, individual, and concrete experience. Behind the everyday concept stands the concrete image of reality. In contrast, scientific concepts are introduced by the teacher in school. Generally, we do not find the child's concrete individual experience behind these concepts.

Everyday concepts are well known to the child. He knows what a house is, what a dog is, and what a brother is. He uses these concepts effectively, but cannot provide verbal definitions for them. Everyday concepts do not enter the child's conscious practice in a direct way. The opposite features characterize scientific concepts. Scientific concepts are introduced by the teacher through verbal means even before the pupil has any concrete experience with what stands behind them. As a consequence, the pupil can easily formulate the scientific concept verbally. This does not mean, however, that he can use the concept fluently.

Everyday concepts, used by the child in practice, may remain involuntary. The child's concept "dog" does not emerge through any special activity and can be used without any conscious awareness of its verbal meaning. Scientific concepts, introduced in school, are of necessity not only conscious but voluntary. They are always the object of a certain theoretical activity. They are the product of special work that has been carried out on them, that is, the product of the work involved in defining them, contrasting them with other concepts, and so on.

There is still another feature that differentiates these two types of concepts. Indeed, this may be the most important distinction between them. The everyday concept includes the object reflected in it in a specific concrete situation of life. It does not, however, necessarily introduce this object into a well defined logical system. In contrast, the basic feature of the scientific concept is that is necessarily introduces the object that it designates into *a system of logical categories and oppositions*. The straight line is contrasted with the curve, capitalism is contrasted with socialism.

This indicates that everyday and scientific concepts differ not only in their origin but in their psychological structure. The everyday, practical concept reflects reality, but the system of concealed connections that lies behind that reality may not enter conscious awareness. Scientific concepts, as cells within a definite system, are not only formed as a consequence of verbal definition, but always remain in conscious awareness as part of the system of connections and relationships in which they are included.

The differences between everyday and scientific concepts are not limited to the examples we have introduced here. They extend much further.

The child's oral speech is a practical everyday activity. It expresses object, desire, and experience. In using oral speech, the child is not necessarily consciously aware of its structure or of the components that constitute it. This is why, when the child is asked how many words there are in the sentence, "There are 12 chairs in the room.", he will answer without hesitation that there are twelve. Written speech has an entirely different structure than oral speech. From the outset, its object is the isolated sound as denoted by the letters of the alphabet. In oral speech, the child is not consciously aware of the sounds of which speech is constituted. In the learning of written speech, this focus on letters is followed a focus on syllables and morphemes and then by a focus on lexemes and syntagms. All these components exist outside conscious awareness

in oral speech, but enter conscious awareness and are applied voluntarily in written speech.

The same argument can be developed in connection with calculation. Mastering practical everyday forms of calculation, the child is not consciously aware of the rules of calculation. He is limited to activity with concrete objects. With the transition to algebra, however, concrete objects are pushed aside. The object of consciousness, the object of the child's voluntary activity, are the basic formal laws of the operations of calculation.

In all the initial forms of activity that we have mentioned, we are dealing with *practical* actions. In all the subsequent forms, we are dealing with *theoretical* actions. Practical and theoretical actions have different objects and different psychological structures. The opposition between everyday and scientific concepts that Vygotsky explored in such detail in this chapter of his book acts only as a model in which this general opposition of the spontaneous and the voluntary, the absence of conscious awareness and the presence of conscious awareness, and the nonsystemic and the systemic in mental activity, emerges with particular clarity.

There remains, however, a final issue that Vygotsky considered in this connection, specifically, the issue of the *dynamics* (more precisely, the dialectics) of the development of scientific and everyday concepts. We noted earlier that psychologists had resolved this issue in different ways. Some assumed that the child's spontaneous development must achieve a certain level of maturation to allow the mastery of scientific concepts. The preschooler can hardly learn algebra. Instruction must follow development, riding on its tail. Others thought that the two processes move in parallel, interacting with one another.

Vygotsky's contribution to the resolution of this issue consisted in the concept that there is not and cannot be a single, constant relationship between development and instruction. Naturally, the spontaneous development of everyday concepts prepare the child for the mastery of scientific concepts. However, the child's study of scientific concepts also makes a tremendous contribution to his mental development. It brings the child's reflection of reality within a definite system. It makes his mental activity conscious and voluntary. This aspect of the problem, the influence of the scientific concept on the everyday concept, had not received adequate attention prior to Vygotsky's work. We are indebted to Vygotsky for his isolation of the rational kernal in formal instruction, for his identification of the influence that the child's formal learning of scientific concepts can have on his everyday representations. Vygotsky demonstrated that learning scientific concepts leads to a fundamental reconstruction of the child's reflection of reality, to the creation of new psychological formations of a kind that the child's spontaneous development could never have achieved. What the child can do today with they aid of a teacher, said Vygotsky, he will be able to do tomorrow on his own. Vygotsky's concept of the zone of proximal development is among his most productive ideas.

This chapter's significance is not limited to theoretical considerations. In it we find the foundation for a scientifically based reorganization of instruction itself, for a change in the many concepts introduced by teachers in kindergarden, for what was in Vygotsky's time the novel idea of initiating school instruction not with the most concrete but with the most general and abstract, with that which can restructure the child's everyday concepts and move him along the path to the mastery of theoretical activity and the development of complex forms of categorical thinking.

In the 48 years since Vygotsky's death, many of his followers have put his plans into practice and convincingly demonstrated the tremendous implications that his ideas have for the rational reconstruction of pedagogical science and practice.

III

The chapter that we have just discussed presented a clearer development of the problem of *word meaning*. It conceptualized this problem as that of generalizing and examining the stages in the ascent of word meaning, beginning with the generalization of the concrete situation and culminating in the introduction of word meaning into a system of logical meanings that have different degrees of generality and that ensure the free movement of thought. This analysis of the genetic aspect of word meaning brings us closer to genetic logic, in Vygotsky's words, closer to the experimental philosophy of the subsequent stages through which the word passes in its generalization of external reality.

The final chapter of *Thinking and Speech*, which Vygotsky called "Thought and Word," moves in a different direction. This chapter deals with the *inner mechanisms* of the formation of word meaning. It focuses on an issue that had been left entirely unexplored, the issue of the relationship between *meaning and sense*. We have seen that Vygotsky rejected the associative concept in accordance with which thought is nothing more than a chain of concrete or verbal associations. He also rejected Platonic conceptions of pure thought, thought that is merely embodied in the word, acquiring nothing more than a verbal form in a process comparable to that of a man putting on a coat. Vygotsky began with a more complex conception. In his view, thought is merely an initial and sometimes inadequate intention that reflects a general tendency of the subject, a tendency that is *not embodied in the word but completed and formed in it.* This thesis attributes a new function to the word, a function that had not been described earlier. The way it represents the birth of thought as a verbal expression is incomparably more complex and more dynamic than earlier conceptions.

Vygotsky argued that thought and word develop in opposing directions, that thought develops from the whole to the part while the word develops from the part to the whole. He also argued that there is a lack of correspondence between the grammatical subject and predicate and the expression's inner structure. This forced Vygotsky to introduce a new component into the process through which thought is formed in the developed expression, a component of great significance to this process. This component was *inner speech* or the inner word. Abbreviated and amorphous in structure, predicative in function, this inner speech contains the potential for making thought more precise and materializing it -- for bringing it to its full, developed expression.

Born in external speech and further developed in egocentric speech, inner speech preserves all the functions of social interaction. While reflecting what the subject wants to express, it simultaneously isolates the central component of the expression. It becomes a means for the formation of developed speech. Vygotsky argued that the final transition of egocentric speech into inner speech indicates not the dying out of speech but the *birth of a new form of speech*, a form of speech that creates the necessary conditions for the further development of expressions. One of Vygotsky's most significant contributions was his analysis of the formation of the inner word, with all its morphological and functional features. This phenomenon had previously been completely unknown. It was only several decades after Vygotsky's death that contemporary psycholinguistics timidly began to study this important psychological formation.

This perspective helped to clarify the relationship between written speech (i.e. the most developed and full form of speech) and oral speech (i.e., speech that permits elision), as well as the relationship between monologic and dialogic speech. This perspective also made the variations in the predicative structure of speech clearer. Indeed, Vygotsky illuminated this key element of the nature of expressions more com-

pletely than the linguists who were carrying out this kind of work independently of him.

At this point, we can consider the final thesis Vygotsky developed in this chapter. So far, we have mentioned two aspects of the word or expression. We have discussed *its object relatedness and its meaning*. There is, however, a third and no less important functional aspect of the word. This is the word's *sense*, the inner meaning it has for the speaker himself, the *subtext* of the expression. The phase "Bring me a carriage! A carriage!" with which A.S. Griboedov's comedy *Grief from the Mind* ends, communicates more than the simple fact that Chatskii wants a carriage. The inner *sense* of this expression is that Chatskii is breaking with a society that is no longer acceptable to him. In this exclamation, he is not merely communicating a concrete event. There is a "condensation of sense" that stands behind the expression. Thus, inner speech is not merely a stage between the initial intention and the developed verbal expression. It is idiomatic, developing *sense*. The task of the writer or the actor is to communicate this profound *sense* of the expression to the reader or listener.

This brings Vygotsky to his final thesis in this work. It is not only sense that stands beyond the word. Sense is not the final link in this chain. Beyond the word stands the expression's goal and motive. Beyond the word stands affect and emotion. Without the exploration of the relationship of the word to motive, emotion, and personality, the analysis of the problem of "thinking and speech" remains incomplete.

Vygotsky was not able to explore these issues in detail. It is important to emphasize, however, that the relationship between meaning and sense, and the relationship of intellect to affect, were the focus of much of Vygotsky's work in the last years of his life.

With this we end our commentary on *Thinking and Speech*. We must note briefly what this book has taught us. In his assertion that word meaning develops, in his assertion that it is at a comparatively late stage that word meaning is isolated from practical activity and introduces the individual into an entirely new system of connections and relationships, Vygotsky makes it possible for us to read Goethe's thesis in an entirely different way. The thesis, "In the beginning was the deed.," which Goethe contrasted with the biblical: "In the beginning was the word" was repeated by Vygotsky with a new accent: "*In the beginning* was the deed." With this, the thesis acquired a new sense. The word, born in practice, transforms it: "The word is the end that crowns the deed."

A second and equally important thesis must also be emphasized however. Whatever the structure of the word, at whatever stage of development it stands, it always *reflects reality*. At the later stages of development, however, this reflection of reality is entirely different than it is at the earlier stages of development. In the later stages, reality is refracted through the word, the word becomes a critical factor in the interpretation of reality, a critical process mediating the reflection of reality. It is this that allows Vygotsky to conclude *Thinking and Speech* by saying that: "The meaningful word is a microcosm of human consciousness."

IV

The *Lectures on Psychology*, read by Vygotsky at the Leningrad Pedagogical Institute in 1932 (i.e., two years before his death), are published in this volume directly following his classic monograph, *Thinking and Speech*. Though included in the same volume, these works differ from one another in two respects. First, while *Thinking and Speech* is a carefully developed monograph devoted to an important issue in psychology, the *Lectures on Psychology* deal with a much broader range of problems, including

perception, memory, thinking, the emotions, imagination, and will. Naturally, given this broad range of problems, each is not discussed in the detail characteristic of Vygotsky's analysis of the relationship between thinking and speech. Second, the styles of these works are different. Where *Thinking and Speech* is a detailed, consistent, and developed exposition of theoretical and experimental material, the *Lectures* communicate little more than Vygotsky's general positions. The *Lectures* are attempts to identify a path for resolving certain problems, though this path can only bear fruit in the future.

The *Lectures on Psychology* are not, however, the usual course in psychology. Two interrelated concepts provide their foundation. The first is a concept that occupied Vygotsky in the last years of his life, the concept of the *development* of the higher mental functions (remember: "There is only one science - history."). The second is the concept that the relationships of each of these functions to the other functions is not constant but continually changing, the concept that these functions form mobile and constantly changing *interfunctional systems*. In their many forms, these concepts permeate the whole of this material.

The lecture on *perception* begins with the classic comparison of the associative understanding of perception, which represented perception as a chain of interconnected sensations, with the understanding of perception developed by Gestalt psychology, which represented perception as a unified, integral act. Vygotsky argued that both these conceptions led to an inevitable dead end. Neither the associationists nor the Gestalt psychologists understood perception as a process that undergoes development in life, as a process that changes its structure in development. Nevertheless, the extremely rich data on perception demonstrate beyond any doubt that this kind of development does occur. In its initial stages, perception is unified with movement, forming a unified sensorimotor complex. In development, it overcomes this relationship. It becomes connected with other, more complex processes, including speech. This change in perception's interfunctional relationships -- its entry into *new systems* -- explains phenomena such as the constancy and conscious awareness of perception and the orthoscopic, differentiated, meaningful, and mobile nature of perceptual images.

In his analysis of *memory* and its development in childhood, Vygotsky followed a similar path. In the historical development of the theory of memory, the mechanistic (i.e. natural science) conception of memory emerged with particular clarity in the work of the associationists. It also appeared in Bergson's idealistic conception, which viewed memory as a purely spiritual activity, contrasting the so-called memory of the spirit with the memory of the body. Psychology, as well as the philosophical conceptions that stand behind it, had reached a dead end here. These attempts to explain the formation of the higher forms of memory in deterministic terms failed. Vygotsky demonstrated that Bleuler's attempts to reduce memory to the neutral factor of the "psychoid,"and the attempts by Gestalt psychology to interpret the laws of memory in terms of the laws of perception, were equally fruitless. For Vygotsky, the resolution of this problem required that one trace the development of the processes through which memory enters into new interfunctional relationships, through which it is included in the activity of speech and the new functional systems that develop as a result. For the child, to think means to remember. For the adult, to remember means to think. Reflected clearly in this formula we find a thesis that Vygotsky had formulated earlier, the thesis that *development involves changes in interfunctional connections, that development involves the formation of new functional systems*.

Vygotsky's lecture on *thinking* and its development in childhood is among the most complex. This reflects both by the complexity of the problem itself and the fact that it is here that Vygotsky had the broadest range of material at his disposal. This

lecture demonstrates the failure of the associationist attempt to derive thinking from a chain of associations, a chain supplemented by the perseverative tendency, which holds a member of the associative chain in consciousness. This approach, which was manifested in a somewhat different form in behaviorism, could not even take the first step in clarifying the source of the meaningful nature of thinking, in clarifying the source of the central characteristic of thinking. The Wurzburg school, which indicated that the meaningful nature of thinking is introduced as a primal characteristic of the spiritual world, also encountered a dead end in this area. Moreover, Vygotsky demonstrated that a similar dead end awaits Gestalt psychology, which identifies the laws of thinking with the laws of perception.

All this forced Vygotsky to turn to the problem of the relationship between thinking and speech, a problem that psycholinguistics began to address 30 years after his death. In Vygotsky's view, existing theories either conceptualized thought and word as completely independent processes or they identified them with one another. The common failure of both perspectives was their assumption that the relationship between these processes remains constant over the entire course of the child's development. Only the introduction of the concept of "word meaning," and of the thesis that word meaning develops, allowed Vygotsky to overcome this crisis, to sort out the complex dialectic of the external (i.e., phasic) and the inner (i.e., semantic) aspects of speech. Only these concepts allowed him to show how the development of speech activity, which begins with the use of a structurally complex *word meaning*, leads to the resolution of the issue of the development of the child's thinking. Only these concepts allowed him to understand the changing, systemic structure of word meaning, which gives birth simultaneously to an incomparably more profound analysis of the external world and an incomparably freer movement of thought. Though Vygotsky merely identified this distinction, he was able to consider the issue of the objective forms of activity that lead to the development of true meaning (i.e., those in which the direct components move to the rear while the system of abstracted connections begins to dominate). The path that Vygotsky outlined in this lecture is unquestionably a productive one.

The three remaining lectures were theoretical in nature, focusing on research that had already been carried out.

In his lecture on the *emotions*, Vygotsky decisively criticized narrow biological approaches to the emotions, approaches that are generally discussed in courses on psychology from a naturalistic rather than a psychological perspective. Sharply criticizing the peripheral theory of the emotions proposed by James and Lange, Vygotsky simultaneously argued that the centrist theory of emotions proposed by Cannon failed to analyze the psychological mechanisms of the higher emotions. He argued that these mechanisms can be revealed only through an analysis of the relationships that are created between the emotions and the structure of activity. The observed shifting of emotional experiences from the *end* of the activity (*Endlust*), to the course of the activity itself (Functionlust), and, finally, to the anticipation of the activity (*Vorlust*), was seen by Vygotsky as a model for a future systems approach to the development of emotional states, as a model for a systems approach to the various structures of activity. While the theory of the systemic structure of the emotions had not yet been created, Vygotsky's outline of these theses was an important impetus for subsequent attempts to development this domain of psychological theory and research.

Vygotsky's lecture on *imagination* also had the characteristics of a draft or plan. Noting that classical psychology either reduced the problem of imagination to the problem of memory (i.e. reproductive imagination) or interpreted imagination as the manifestation of a primal, spiritual beginning (i.e., creative imagination), Vygotsky at-

tempted to connect imagination with the structure of human activity, and with man's speech activity in particular. Vygotsky attempted to connect imagination with the development of word meaning, which on the one hand reflects reality and on the other frees man's conscious activity from complete dependency on reality as it is immediately perceived. Once again, the dialectic relationships between perception, memory, and speech generalization provided Vygotsky with the key to a systems analysis of the processes of imagination and their development.

Vygotsky's final lecture, his lecture on *will*, is similar in many respects. Vygotsky first demonstrated the unacceptable nature of three types of theories of will. First, Vygotsky criticized heterogenous theories (for Vygotsky, heteronomous theories), theories that reduce the volitional act to associations between representations, actions, the results of actions. On similar grounds, he rejected theories that reduce the volitional act to affect. Despite their inadequacies, however, Vygotsky noted that these two groups of theories shared a positive feature in their attempt to take a deterministic approach the explanation of the volitional act. Their common fault was that they lost sight of the most essential features of the volitional act. At the same time, Vygotsky noted the inadequacy of autonomous theories, theories that view the volitional act either as the manifestation of some primal or subconscious activeness in the individual or as a direct spiritual force. In Vygotsky's view, the positive aspect of these theories was their attempt to describe the volitional action. The description of the integral volitional act had been completely overlooked in research efforts based on heterogenic theories of will. Nonetheless, Vygotsky argued that this kind of idealistic approach to man's volitional actions clearly leads to a dead end.

At the time Vygotsky read these lectures, there was no alternative to these theories of will in psychology. Vygotsky made only a tentative effort to find an exit from this conceptual crisis. He discussed Lewin's theory in particular in this connection. Lewin's theory derived the volitional act from difficulties that emerge in activity. It identified these difficulties as the source of the subject's tendency to turn to social auxiliary means that provide an external stimulus with the characteristics of a conditioned stimulus. This results in an individual who subordinates his action to a conditionally created stimulus: "When the hand of the clock reaches 12, I will get up." Characteristically, however, Vygotsky saw in this example a manifestation of a more general mechanism. He saw it as an example of an individual's application to himself of the means that others have previously applied to him. Among the most important of Vygotsky's theses, is his identification of the social roots of the volitional act.

V

This completes our analysis of the works contained in this first volume of Vygotsky's collected works. In concluding, I will once again isolate the common essence that passes through these works as a unifying thread. This thread is Vygotsky's methodology, the new perspective on mental phenomena that he introduced. One can isolate two central aspects of Vygotsky's methodology, aspects that are so closely connected that they are actually two sides of the same coin. These aspects, identified frequently by Vygotsky himself, are integralness and historicism. For Vygotsky, integralness meant the necessity of searching for complex structural units of mental activity, units whose structure is determined by the entire process of their formation in ontogenesis and phylogenesis. For Vygotsky, historicism meant the analysis of the history of the formation of the initial cells or units of mind.

Vygotsky did not provide us with any universal algorithm for identifying the units of mind. Indeed, this was hardly possible. He provided us with only a single very important index for identifying these units. He argued that these units must contain within themselves the *opposing* aspects of the dialectical unity. Of course, he did provide us with some important concrete examples of the search for these units. In particular, in the diagnosis of the mentally retarded child, Vygotsky arrived at fundamentally new results primarily because he sought a new unit of analysis where intellect and affect are fused in a unified whole.*

Nor did Vygotsky provide us with a universal recipe for applying the historical method in psychology, though all his work can be viewed as a model of its application. Having applied the historical method to the problem of concept formation, Vygotsky constructed a new typology of concepts, resolving several fundamental problems in the psychology of thinking and instruction. Having applied the historical method to the problems of localization, he initiated the construction of new field of science, the science of neuropsychology.**

In terms of the inner logic and the homogeneity of Vygotsky's work, however, the critical point is that at each stage in his application of the historical method, he consistently sought new units of mind. Vygotsky's methodology, the integralness and the historicism of his approach, is the cornerstone of his work. Even today, it provides a model that has not been surpassed. It is precisely the integralness and historicism of his approach that guarantee the relevance and the constructiveness of his ideas.

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* See: "The Problem of Mental Retardation" in the volume *Fundamentals of Defectology*. For other discussions of the problem of "units of analysis" see Chapter 1 of *Thinking and Speech* and "The Seven Year Crisis" in the volume *Child Psychology*. N.M.

** See: "Psychology and the Theory of the Localization of the Mental Functions" in the volume *Questions of Theory and Method in Psychology*. N.M.

NOTES TO THE RUSSIAN EDITION

Thinking and Speech

1. This book, published in 1934, is the best known of Vygotsky's works. It is a summary of the findings of his scientific efforts and an attempt to identify possible directions for further research.

By the end of 1933 and the beginning of 1934, Vygotsky and his colleagues (A.N. Leont'ev, A.R. Luria, A.V. Zaporozhets, L.S. Sakharov, Zh.I. Shif, L.I. Bozhovich, N.G. Morozova, L.S. Slavina, I.M. Solov'ev, L.V. Zankov, E.I. Pashkovskaia, and others) had completed their initial research within the framework of cultural-historical theory. The hypothesis that provided the foundation for this theory, that the higher mental functions are mediated by "psychological tools," had been verified on the basis of material relevant to most of the mental functions (for example, on memory see: A.N. Leont'ev, *Razvitie Pamiati* [The Development of Memory], Moscow, 1931; on attention see: L.S. Vygotsky, "The Problem of the Child's Cultural Development", *Pedalogiia* [pedagogy], 1928, No.1; on thinking see: L.S. Sakharov, "Methods for the Study of Concepts," *Psikhologiia* [Psychology], 1930, vol. 3, no. 1; Zh. I. Shif, *Razvitie Nauchnykh Poniatii u Shkol'nika* [The Development of Scientific Concepts in the Schoolchild], Moscow, 1935. All these studies were carried out under Vygotsky's supervision in 1932.). This produced the need to summarize these works and identify prospects for further research.

However, there were also important external circumstances motivating this work. What had formerly been a unified "Vygotskian school" had divided. Leont'ev, Zaporozhets, Bozhovich, and several others had moved to the Ukrainian Psychoneurological Academy in Khar'kov where they had begun to develop their own theoretical program. Because of this, and because of the sharp criticism that was being directed on the basic positions of cultural-historical theory, Vygotsky felt the necessity of explicating his perspectives. This was the purpose of his 1931-1932 manuscript *Istoriia Razvitiia Vysshikh Psikhicheskikh Funktsii* [The History of the Development of the Higher Mental Functions] (Part I of this manuscript was published in 1960 in: L.S. Vygotsky, *Razvitie Vysshikh Psikhicheskikh Funktsii: Iz Neopublikovannykh Trudov* [The Development of the Higher Mental Functions: from the Unpublished Works]; Part II is published for the first time in the third volume of this collected works), of the conference that had been planned for 1933-1934 to address basic issues in Vygotsky's theory (see: L.S. Vygotsky, "From the Unpublished Materials," in: *Psikhologiia Grammatiki* [The Psychology of Grammar], Moscow, 1968), and of his work *Thinking and Speech*.

Thinking and Speech is a collection of Vygotsky's articles that can be viewed as a finished work, unified by a consistent set of problems, methods, and findings. The article "The Genetic Roots of Thinking and Speech" (see: *Estestvoznanie i Marksizm* [Natural Science and Marxism], 1929, No.2) was the first in the collection to be written and constitutes the fourth chapter of *Thinking and Speech*. It focuses on Kohler's positions and their relationship to cultural-historical theory, a question that was very important to Vygotsky. An article first published as an introduction to Piaget's book *Rech' i Myshlenie Rebenka* [The Speech and Thinking of the Child] and titled "The Problem of the Speech and Thinking of the Child in Pi-

aget's Theory" constitutes the second chapter of *Thinking and Speech*. This analysis of Piaget's theory was no less significant for Vygotsky than his analysis of Kohler's theory. The fifth chapter of the book, "The Experimental Investigation of Concept Development," was closely related to the work of Vygotsky's student Sakharov (i.e., "Methods of Investigating Concepts") and to Vygotsky's report to the Leningrad Pedagogical Institute on the 20th of May in 1933 "The Development of Everyday and Scientific Concepts in the School Age" (see: L.S. Vygotsky, *Umstvennoe Razvitie Detei v Protsesse Obucheniia* [The Intellectual Development of Children in the Process of Education], Moscow-Leningrad, 1935).

As Vygotsky notes in the introduction, the remaining chapters of *Thinking and Speech* were written especially for this book, which was completed in 1934. It was reprinted in 1956 in: L.S. Vygotsky, *Izbrannye Psikhologicheskie Issledovaniia*[Selected Psychological Investigations], Moscow. In 1962, it was translated into English and published in the United States, with an introduction by Jerome Bruner and an afterward by Jean Piaget. It has since been published in many foreign languages. For our "Collected Works," we have taken the 1956 edition. This edition was prepared by Leont'ev and Luria with the help of Vygotsky's daughter, G.L Vygodskaya.

2. *The Wurzburg school* -- a tradition in the study of the psychology of thinking that developed in the beginning of the 20th century in the psychological institute in Wurzburg, Germany with Kulpe as its founder and Ach and Buhler as its most prominent members. Philosophically, the school relied on the phenomenology of Brentano and Husserl. In its psychology, the school opposed concepts dominating associative psychology at the end of the 19th century that reduced thinking to the combination of representations in accordance with the laws of association. The Wurzburg school argued that imageless thinking is possible. What the individual experiences is not images, but relationships and integral sets. The school developed a series of methods (all forms of refined self observation) for studying of thinking and gathered a large amount of data. The Wurzburg school was very different from Vygotsky both philosophically and methodologically. Their concrete research methods, however, had a unmistakable influence on him. This was particularly true of Ach's research methods (see Chapters 5 and 7 for more detail).

3. *This concept of two methods of analysis* in accordance with "units" and "elements" was one of Vygotsky's favorite notions. With his example of the isolation of the molecule of water into atoms of hydrogen and oxygen, he first expressed it in *Psikhologii iskusstva* [The Psychology of Art] in 1923.

4. *Associative psychology* or associationism is a tradition that dominated philosophy and psychology in Europe between the 17th and 19th centuries (T. Hobbes, Spinoza, Locke, Berkeley, Hartley, Mill, Bain, and others). There were a multitude of different schools and varieties of associationism. Hartley's materialistic associationism and Berkeley's idealistic associationism were particularly significant. Associationism began to develop as a tradition of scientific psychology in the 19th century. The presence of the single principle of association is the common feature of all varieties of associationism. All the mental processes (i.e., memory, attention, thinking, and so on) are explained in terms of this single principle. Several different kinds of associations were proposed, association in accordance with contiguity, similarity, and so forth. The 20th century began as a century of crisis for associative psychology, with several new traditions emerging as alternatives. By the time that *Thinking and Speech* was written, associative psychology had been completely undermined.

5. *Phonology* -- a discipline within linguistics that studies the structure and function of phonemes. Phonology differs from phonetics in that it views phonemes not in physical terms but with respect to their role as components of morphemes or syllables. The emergence of phonology was influenced by the works of de Saussure, Baudouin de Courtenay, and Buhler. As a developed research tradition, phonology emerged in the 1920's and 1930's in the Prague linguistic circle (Trubetzkoy, Jacobson, and others).

6. *Jean Piaget* (1896-1980) -- Swiss and French psychologist. From 1955, professor at the Sorbonne and director of the International Center of Epistemological Studies in Geneva which he created. Foreign member of the United States National Academy of Sciences. On Piaget's views in the 1930's and his influence on Vygotsky, see Chapters 2, 6, and 7 of this work. On the evolution of Piaget's views through the 1950's and his evaluation of Vygotsky's theory, see Piaget's "Reply to Vygotsky," 1962 [Note: In *Thought and Language*, The MIT Press.].

7. *Edouard Claparede* (1873-1940) -- Swiss functional psychologist who maintained that mental functions develop to satisfy certain needs and that they come into conscious awareness when some im-

pediment is encountered in the course of satisfying these needs. He developed a conception of qualitatively different levels of generalization that influenced Piaget. He also developed a theory of play. Vygotsky cited him primarily in connection with Piaget, as the author of the introduction to the book *Rech' i Myshlenie Rebenka* (*The Speech and Thinking of the Child*).

8. *Charles Blondel* (1976-1939) -- French psychologist and member of Durkheim's sociological school. Philosophically, he relied on the ideas of Bergson.

9. *Lucien Levi-Bruhl* (1857-1939) -- French philosopher, psychologist, and representative of the sociological school whose views were very close to those of Durkheim. His well known studies on ethnopsychology appeared in the 1920's and 1930's (especially his studies on so-called undeveloped peoples). Vygotsky cited him in precisely this connection. Levy-Bruhl opposed "Europomorphism," the concept that primitive man thinks in accordance with the same laws of logic as the 19th century European. Following Durkheim, he developed support for the view that collective representations are the governing form of thought in the "lower societies." In his view, this form of thought differs fundamentally from the individual representations found in European Cultures. This led to the development of the conception of "prelogical thinking." Levy-Bruhl can be considered one of the predecessors of contemporary semiotics.

10. *Franz Brentano* (1838-1917) -- German philosopher and psychologist and among the first to oppose traditional associationism. Founder of intentionalism, among the precursors of Husserl's phenomenology.

11. *Eugen Bleuler* (1857-1939) -- Swiss psychiatrist and psychologist whose perspective was comparable to that of the psychoanalytic tradition. With Jung, he developed the method of the associative experiment. He introduced terms such as "autism" and "schizophrenia" into the psychological vocabulary.

12. *Psychoanalysis* -- a tradition within medicine, psychology, philosophy, sociology, history, ethnography, literature, and art that influenced many aspects of the development of Western European and American culture in the 20th century. It emerged in the work of Freud near the end of the 19th century in psychiatry and psychology and spread quickly to other fields. In its view of man, psychoanalysis focused on unconscious mental tendencies, tendencies that were interpreted by the various schools of psychoanalysis as having more or less sexual origins.

Psychoanalysis had no particular influence on Vygotsky. In this connection, see his criticism of Luria's early enthusiasm for psychoanalysis in, "The Historical Significance of the Psychological Crisis," (Vol.1) and his introduction to the Russian translation of Freud's book *Beyond the Pleasure Principle* (1925).

13. *Pierre Janet* (1859-1947) -- French psychologist and psychiatrist (influenced by behaviorism and psychoanalysis) and one of the leaders of the French psychological school. Student of Jean Charcot, he developed the theory of neurosis. In the 1920's and 1930's, he developed a general psychological theory that took as its point of departure a conception of psychology as a science of behavior. Nonetheless, in distinction from the behaviorists, he did not ignore the problem of consciousness. According to Janet, the mind is an energetic system with several levels of complexity that correspond to levels of behavior. Janet attempted to provide a detailed description of the evolution of these levels. According to Janet, thinking is a substitute for real action which functions in the form of internal speech. Janet trained many psychologists, including Piaget.

The question of Janet's influence on Vygotsky has not been sufficiently studied. Although Vygotsky rarely cited Janet's works, Janet's integral-historical approach to the mind and his view that labor plays a role in mental development is in many respects harmonious with Vygotsky's ideas. Janet's influence on Vygotsky can be evaluated indirectly through an evaluation of the influence Janet had on Leont'ev's study *Razvitie Pamiati* (*The Development of Memory*) (1931), a work written entirely in the spirit of Vygotsky's ideas.

14. *Alexander Romanovich Luria* (1902-1977) -- Soviet psychologist and student of Vygotsky. Academician of the Academy of Psychological Sciences of the Soviet Union (APN SSSR) and foreign member of the National Academy of Sciences of the United States. In the 1920's and 1930's, he developed the accompanied motor method for revealing covert affective complexes. He worked with Vygotsky in the latter half of the 1920's and in the early 1930's. Toward the end of the 1930's, based on material related to lo-

calized injuries to the brain (primarily to the frontal lobes, he developed neuropsychology as a new field of scientific research.

15. *Aleksei Nikolaevich Leont'ev* (1903-1979) -- Soviet psychologist and student of Vygotsky. Academician of the Academy of Psychological Sciences of the Soviet Union (APN SSSR), honorary member of the Hungarian Academy of Sciences, and Lenin prize laureate. In the 1920's and 1930's, Leont'ev worked under Vygotsky, developing a variant of the method of dual stimulation and applying it to the study of the development of memory. Beginning in the 1930's, he developed the general psychological theory of activity. Creator and leader of the Faculty of Psychology of the Moscow Federal University (MGU), he was the leader of a large school of psychologists.

16. *Rosa Evgen'evna Levina* (Born: 1908) -- Soviet psychologist and student of Vygotsky who specialized in child psychology, defectology, and speech pathologies in children.

17. *John B. Watson* (1878-1958) -- American psychologist and the founder and leader of behaviorism. Following the 1920's, he left scientific work and entered advertising, later to become a businessman.

18. *Narciss Ach* (1871-1946) -- German psychologist and a leader of the Wurzburg school. In opposition to the associationists, he developed the idea that the processes of thinking and problem solving are determined by a certain tendency contained in the conditions of the task (i.e., the "determining tendency"). He developed the method of nonsense syllables. With respect to his influence on Vygotsky, see Chapter 5 of the present book.

19. *James Mark Baldwin* (1861-1934) -- American psychologist, historian of diplomacy, and among the founders of American social psychology. Vygotsky knew him as a child psychologist. In his works on child psychology, Baldwin viewed the child's mental development in terms of the biogenetic law.

20. *Francis Bacon* (1561-1626) -- English philosopher, political activist, and one of the founders of modern epistemology and philosophy. Vygotsky frequently quoted his expression: "Neither the bare hand nor reason in and of themselves are capable of anything. They are completed only by tools and auxiliary means." (*The New Organum*). Vygotsky saw in this expression support for the central idea of his theory, the concept of psychological tools and the mediated nature of the mind.

21. *Emile Durkheim* (1858-1917) -- French sociologist, one of the creators of modern scientific sociology and social psychology, and the head of the French sociological school. Durkheim attempted to analyze social phenomena objectively, "as things," and to study them through scientific methods. He developed a theory of suicide.

22. *Aleksandr Aleksandrovich Bogdanov* (1873-1928) -- Russian economist, philosopher, political activist, trained naturalist (founder of the Institute for Blood Transfusions), one of the pioneers of the systems approach, and author of novels of fantasy. Lenin analyzed his philosophical perspectives in *Materialism and Empirio-criticism*.

23. *Ernst Mach* (1838-1916) -- Austrian physicist and philosopher. Lenin analyzed his philosophical perspectives in *Materialism and Empirio-criticism*.

24. *William Stern* (1871-1938) -- German psychologist specializing in genetic, general, and forensic psychology. It was in connection with his work in genetic psychology that he influenced Vygotsky. He was among the pioneers in the development of psychological tests. He introduced the concept of the "coefficient of intellect." In psychology and philosophy, he maintained a personalistic orientation. See Chapter Three of *Thinking and Speech* for details on his influence on Vygotsky.

25. *Maria Montessori* (1870-1952) -- Italian educator, theoretician, and practitioner of the theory of "free child rearing." Among the founders of contemporary pedagogy in the West, she was the creator of children's homes and methods for the development of the sense organs in mentally retarded children.

26. *Personalism* -- a religious tradition in philosophy and psychology that recognizes the personality as the first reality and the whole world as a manifestation of the creative reality of God. Related philosophically to existentialism.

27. *Karl Buhler* (1879-1963) -- German psychologist who worked in the United States after 1938. He was a member of the Wurzburg school and a student of Kulpe, specializing in the psychology of the intellectual processes and the development of speech. In 1927 he authored a book entitled *The Crisis in Psychology*. In distinction from Vygotsky, he attempt to overcome this crisis from a position of pluralism.

28. *Edmund Husserl* (1859-1938) -- German philosopher and founder of phenomenology who influenced existentionalist philosophy. In Vygotsky's view, Husserl's work was a model of idealism in philosophy and psychology. (See: "The Historical Significance of the Psychological Crisis" in *Problems of the Theory and History of Psychology*.)

29. *Henri Wallon* (1879-1962) -- French psychologist and specialist in child, pathological, and applied psychology.

30. *Kurt Koffka* (1886-1941) -- German psychologist, student of Stumpf, and one of the leading figures in Gestalt psychology. Koffka was among the first of the Gestalt psychologists to turn to the problem of child psychology. This is what attracted Vygotsky to his work. For a detailed treatment of Koffka's views by Vygotsky see: "Structural Psychology" and ""The Problem of Development in Structural Psychology" in *Problems of the Theory and History of Psychology*.

31. *Henri Delacroix* (1873-1937) -- French psychologist and specialist in child psychology and the psychology of art.

32. *Ivan Petrovich Pavlov* (1849-1936) -- Russian physiologist, scholar, and Nobel prize laureate who specialized in the physiology of digestion and the ANS. Pavlov worked to clearly differentiate physiology and psychology. The results of Pavlov's work made a profound impression on Vygotsky, as they did on all Soviet psychologists of the 1920's. In his early work, Vygotsky considered himself "more of a reflexologist than Pavlov himself" and argued that "consciousness is a reflex of reflexes." However, he quickly abandoned these views.

33. *Wilhelm Karl Ament* (1876-?) -- German psychologist and specialist in the study of the child's memory.

34. *Wilhelm Wundt* (1832-1920) -- German psychologist and physiologist. Philosophically a dualist, Wundt was the creator of experimental psychology. He was a member of many of the world's scientific academies, including the Russian Academy of Sciences. He was a specialist in ethnopsychology, and assigned the will a central role in spiritual life. Though Wundt probably had an influence on Vygotsky, Vygotsky rarely cited him directly. It would be particularly interesting to compare the cultural-historical orientations of Wundt and Vygotsky.

35. *Ernst Meumann* (1862-1915) -- German psychologist and specialist in child psychology, pedagogy, and esthetics.

36. *Henrich Anton Idelberger* (1873-?) -- German psychologist and specialist in child psychology and the psychology of speech.

37. *Wolfgang Kohler* (1987-1967) -- German psychologist and one of the leading Gestalt psychologists, Kohler worked on the methodological issues of Gestalt psychology and attempted to relate this perspective to quantum mechanics. Kohler also dealt with numerous experimental questions and is known especially for his work with apes that was carried out between 1914 and 1917. For Vygotsky, the results of these studies were important because they supported his idea of the role of "psychological tools" and signs in the mediation of mental functions. On Vygotsky's interpretation of Kohler's work, see Chapter Four of this monograph as well as the introduction to the Russian translation of Kohler's book *Research on the Intellect of the Humanoid Apes* (1930), a book that was translated on Vygotsky's initiative.

38. *Robert Yerkes* (1876-1956) -- American psychologist and behaviorist who was a specialist in zoopsychology, comparative psychology, and, in particular, studies of the apes.

39. *Henri Bergson* (1859-1941) -- French philosopher, writer, and psychologist who was a member of the French Academy and a Nobel Prize laureate in literature. Bergson was one of the creators of intuitivism and the philosophy of life and had a substantial influence on existentialism. According to Bergson, the primary reality is life, a reality which differs from both matter and spirit. For Bergson, the latter are the product of the disintegration of life. The essence of life can be comprehended only intuitively. In psychology, he created an original conception of memory.

40. *Edward Thorndike* (1874-1949) -- American psychologist and the first behaviorist. Specialist in comparative psychology and the psychology of learning. Thorndike formulated a law in accordance with which learning occurs through trial and error and developed a method of studying animal behavior by using a "problem-box" (i.e., a box with a secret mechanism which the animal himself had to "discover").

41. *Vladimir Aleksandrovich Vagner* (1849-1934) -- Russian biologist, zoologist, and psychologist and founder of comparative psychology in Russia. Vagner developed the idea of evolution along pure and mixed lines. This idea had a tremendous influence on Vygotsky in the later period of his life, with the creation of his conception of functional systems.

42. *Vladimir Maksimovich Borovskii* (1882-?) --Russian psychologist and specialist in animal psychology who later abandoned scientific psychology and took up zoology.

43. *Leonard Hobhouse* (1864-1929) -- English zoologist and philosopher who attempted to apply anthropological and physiological data in social research.

44. *Karl Frisch* (born 1886) -- Austrian physiologist, ethologist, and Nobel Prize laureate who deciphered the mechanism through which bees transmit information.

45. *Charlotte Buhler* (born 1893) -- Austrian psychologist, wife and coauthor of Karl Buhler, who was a specialist in child psychology.

46. *Georgii Valentinovich Plekhanov* (1856-1918) -- Russian Marxist philosopher and one of the founders of the #RSDRP. In the 1920's, Plekhanov's works were extremely popular and were particularly widely used in attempts to construct a Marxist psychology. Vygotsky used them in this connection (see: "The Historical Significance of the Psychological Crisis," *Problems of the Theory and History of Pyschology*).

47. *Hellen Keller* (1880-?) -- American deaf and blind woman who became a writer.

48. *Franz Rimat* (?)[sic] -- German psychologist and specialist in the psychology of thinking.

49. *Determining tendency* (according to Ach) -- a tendency that defines thinking and is given birth by the task that the individual is trying to resolve.

50. *Dmitrii Nikolaevich Uznadze* (1886-1950) -- Soviet psychologist, Academician of the Academy of Sciences of the Georgian Republic of the Soviet Union, and founder of the Georgian psychological school. Uznadze worked on the problem of set, relying in many respects on the works of Ach, especially on his idea of the determining tendency. Vygotsky knew Uznadze and highly respected his work, considering him one of the leading Soviet psychologists.

51. *Lev Solomonovich Sakharov* (?-1928) -- Soviet psychologist and one of Vygotsky's closest followers who developed, with Vygotsky, the method of dual stimulation (i.e., the Vygotsky-Sakharov method).

52. *Iulia Vladimirovna Kotelova* (1905-1980) -- Soviet psychologist and student of both Vygotsky and I.N. Shpil'reina. Kotelova worked first in child psychology and later in labor psychology.

53. *Georg Elias Muller* (1850-1934) -- German psychologist, experimenter, and advocate of the theory of associationism who was a specialist in the psychology of representations and memory. Muller developed the theory of "perserverative tendencies," in accordance with which representations that have been present in consciousness have a tendency to return.

54. *Pavel Petrovich Blonskii* (1884-1941) -- Soviet psychologist, pedagogue, and historian of philosophy. One of the founders of the theory of labor school. With K.N. Kornilov, began to develop the idea of a Marxist psychology.

55. *Arnold Gesell* (1880-1961) -- One of the founders of American child psychology.

56. *Karl von den Steinen* (1855-1929) -- German traveler, geographer, and anthropologist who provided detailed descriptions of his travels in central Brazil in 1884.

57. *Richard Turnwald* (1869-1954) -- English anthropologist and traveler. Vygotsky made extensive use of his work, along with that of Levi-Bruhl.

58. *Aleksandr Afanas'evich Potebnia* (1835-1891) -- Russian philologist and corresponding member of the Academy of Sciences who was a specialist in literary theory, especially, language and thinking, the nature of poetry, the psychology of the esthetic experience, poetry and genre, and the theory of the "internal form of the word." Potebnia represented the school of "historical linguistics" in the Humboldt-Steinthal tradition. His work had a tremendous influence on Vygotsky (see: *Psikhologiia Iskustva* [The Psychology of Art], 1968.

59. *Aleksandr L'vovich Pogodin* (1872-1947) -- Russian historian, philologist, and psychologist who was a positivist in philosophy. Vygotsky apparently used his book *Iazyk kak Tvorchestvo* [Language as Creativity] (1913). Pogodin emigrated in 1919.

60. *Ernst Kretschmer* (1888-1964) -- German psychiatrist and one of the founders of the constitutionalistic tradition in psychiatry. Kretschmer established connections between body type and several mental illnesses (i.e., schizophrenia, epilepsy, and manic-depressive psychosis) which subsequently found some support.

61. *Oswald Kulpe* (1862-1915) -- German psychologist and founder of the Wurzburg school.

62. *Karl Groos* (1861-1915) -- German psychologist specializing in child psychology. Groos developed a widely known theory of play in which he demonstrated from a biological orientation that play is a means of development and training for certain of the organism's functions.

63. *Oswald Kroh* (1887-?) -- German psychologist and specialist in the psychology of learning and child rearing.

64. *Gustav Adolf Lindner* (1828-1887) -- Czech philosopher and pedagogue associated with the theories of Herbart and Spencer.

65. *Zhozefina Il'inichna Shif* (1905-1977) -- Soviet psychologist and student of Vygotsky. Following her studies on the formation of scientific and everyday concepts, Shif worked in defectology.

66. Here, Vygotsky is thinking primarily of his articles: "The Problem of the Cultural Development of the Child," *Pedalogiia* [pedagogy], 1928, No. 1; "The Development of Active Attention in Childhood,~ in: *Voprosy Marksistskoi Pedagogiki: Trudy Akademii Pedagogicheskogo Vospitaniia* [Problems of Marxist pedagogy: Works of the Academy of Child Rearing], 1929, No. 1; "The Development of the Higher Forms of Attention," in: L.S. Vygotsky, *Izbrannye Psikhologicheskie Issledovaniia* [Selected Psychological Research], Moscow, 1956.

67. Here Vygotsky is apparently referring to: "The Problem of the Development and Disintegration of the Higher Mental Functions," in: L.S. Vygotsky, *Razvitie Vysshikh Psikhicheskikh Funktsii* [*The Development of the Higher Mental Functions*], Moscow, 1960; "Psychology and the Theory of Localization," in:

Pervyi Vseukrainskii S'ezd Nevropatologov i Psikhonevrologov: Tezisy Dokladov [The First All-Ukrainian Conference of Neuropathologists and Psychoneurologists: Theses of Reports], Khar'kov, 1934; or in: L.S. Vygotsky, *Razvitie Vysshikh Psikhicheskikh Funktsii [The Development of the Higher Mental Functions]*, Moscow, 1960.

It is interesting that these works were written in 1934, nearly simultaneously with his best known work, *Thinking and Speech*.

68. *William James* (1842-1910) -- American psychologist, philosopher, and founder of the philosophy of pragmatism. The pragmatic criterion of truth: that which is true is that which answers practical success in action. The sole reality for pragmatism is immediate sensual experience. In psychology, James worked on problems related to the psychology of religion and the theory of the "stream of consciousness" (i.e., the stream of continually changing integral mental states). Vygotsky was familiar with James' basic works, and James' critique of the traditional subjective-empirical psychology of consciousness made an important impression on him (see: "Consciousness as a Problem of the Psychology of Behavior," *Problems of the Theory and History of Psychology*).

69. *Reflexology* -- a tradition in 20th century psychology that attempted to view the whole of man's mental life as an aggregate of conditioned reflexes. The word is sometimes used in a narrower sense to designate one of the schools within this tradition, that of V.M. Bekhterev. In any case, Vygotsky's perspectives differed radically from those of the reflexologists. Following a brief period when he was attracted to reflexology, Vygotsky categorically rejected all manifestations of this general perspective. His methodological analysis of reflexology can be seen in: "The Historical Significance of the Psychological Crisis," *Problems of the Theory and History of Psychology*).

70. *Johann Friedrich Herbart* (1776-1841) -- German philosopher, psychologist, and pedagogue who was among the founders of scientific pedagogy. Herbart developed the theory of classical education, which emphasized instruction in mathematics and the classical languages (i.e., Latin and Ancient Greek). Herbart's theory was criticised as early as the 19th century. The theory of non-classical [German Realschule] education was developed in opposition to it. In Russia, for example, two types of middle schools were formed, the classical gymnasium and the non-classical [technical] institute. The theory of classical education was criticized with particular intensity in Soviet pedagogy of the 1920's and 1930's.

71. *Henry Head* (1861-1940) -- English neurologist specializing in aphasia.

72. *Hugo de Vries (de Frise)* (1848-1935) -- Dutch botanist who rediscovered the basic laws of genetics (i.e., Mendel's laws) and developed the theory of mutation. [The *Britannica* cites de Vries as having developed an experimental approach to testing Darwinian theory. ASC]

73. For more detail see: L.S. Vygotsky, "The Problem of Instruction and Mental Development in the School Age: Instruction and Development in the Preschool Age, in: *Umstvennoe Razvitie v Protsesse Obucheniia* [Intellectual Development in the Process of Instruction], Moscow-Leningrad, 1935.

74. *Kurt Lewin* (1890-1947) -- German psychologist who later worked in the USA. He was a methodologist, theoretician, and psychological experimenter who attempted to apply the general principles of Gestalt psychology to the domain of personality. He developed what is commonly called dynamic field theory. In the later years of his life, he worked in social psychology. His school now occupies a leading position in social psychology in the USA. Vygotsky turned to Lewin's works in the last years of his life when he attempted to deal witht he problematic of the psychology of emotions, the psychology of personality, and so on. His most detailed analysis of Lewin's works was in his article "The problem of mental retardation" (1934).

75. *[Saint] Augustine* -- Christian theologian, canonized as a Saint by the Catholic church. In philosophy a neoplatonist, who anticipated some of Descartes ideas.

76. *Rene Descartes* (1596-1650) -- French philosopher, psychologist, mathematician, and physiologist. Vygotsky analyzed Descartes' theories in his last unfinished manuscript "The Theory of Emotions" ("The Theory of Spinoza and Descartes on the Passions in Light of Contemporary Psychoneurology," in *Scientific Archive*, also in the Russian Edition of the *Collected Works*, Volume 6).

77. *Ludwig Uhland* (1787-1862) -- German romantic poet. The reference here is to the prologue to Uland's historical drama "Ernst, the Duke of Shvabskii" (1818).

78. *Herman Paul* (1846-1921) -- German philologist and one of the leaders of what is called the young grammatical or neo-grammatical tradition in philology.

79. *Wilhelm Humboldt* (1767-1835) -- German philologist, philosopher, and political activist who founded a school of historical linguistics which, through A. A. Potebnia, had a great influence on Vygotsky.

80. *Vladimir Mikhailovich Bekhterev* (1857-1927) -- Russian psychologist, psychiatrist, neuropathologist, physiologist, morphologist and founder of reflexology.

81. *Ivan Mikhailovich Sechenov* (1829-1905) -- Russian physiologist and psychologist who developed the theory of interiorization. Vygotsky, like most psychologists of the 1920's, underestimated the significance of Sechenov's ideas for psychology, though he was familiar with his basic works.

82. *Kurt Goldstein* (1878-1965) -- German neurologist specializing in aphasia and disturbances in the optical sphere.

83. *Lev Petrovich Iaubinskii* (1892-1945) -- Russian linguist and specialist in literature.

84. *Evgenii Dmitrievich Polivanov* (1891-1938) -- Russian orientalist and linguist.

85. *Gabriel Tarde* (1843-1904) -- French sociologist and criminologist who developed one of the first social-psychological conceptions that placed the individual at the center. According to Tarde, the basic law of social life is imitation.

86. *Fedor Mikhailovich Dostoevskii* (1821-1881) -- Russian writer whose work had an extremely strong influence on Vygotsky from his youth (see: *Psikhologiia Iskusstva* [The Psychology of Art], 1968. "Commentary"). Vygotsky wrote a paper on Dostoevskii's work in 1913-1914, but the manuscript has been lost.

87. Vygotsky borrowed the example from Dostoevskii, as he did the following example from Uspenskii, from A.G. Gorifel'd's book *The Torment of the Word* SPB (1906), a book Vygotsky studied in working on his *Psychology of Art*.

88. *Lev Vladimirovich Shcherba* (1880-1944) -- Soviet linguist, specialist in literature, and academic who specialized in general linguistics and the Slavic and Romance languages. Shcherba was the founder of the Leningrad phonological school and a student of Baudouin de Courtenay.

89. *Apperception* is a term introduced by Leibnitz. For him, it designated conscious awareness that had still not attained consciousness of impressions. For Kant, it designated the unity of representations in consciousness. In psychology, the concept of apperception occupied a central place in Wundt's system, for which it designated conscious awareness of the perceived, its integral nature, and its dependence on previous experience. In this conception, the idea is related to ideas such as Gestalt and set.

90. *Frederick Paulhan* (1856-1931) -- French psychologist who studied issues related to the psychology of the cognitive processes (in particular, thinking, memory, and speech) as well as the psychology of affects. Vygotsky used Polan's work on the psychology of speech.

91. *Gleb Uvanovich Uspenskii* (1843-1902) -- Russian writer and revolutionary democrat.

92. The citation, introduced from the poems of A. A. Feta, is an example of secondary citation from the volume: V. N. Voloshinov (1930). *Marxism and the Philosophy of Language*. Moscow.

93. The citation is from N. Gumilev's poem "Word."

94. *Velomir (Viktor Vladimirovich) Khlebnikov* (1885-1922) -- Russian futurist poet who coined many new words (in particular, the word "letchik" (i.e. pilot or flyer).

95. *Behaviorism* is a term introduced by James Watson which literally means the "science of behavior." Behaviorism has been an important tradition in American psychology. It emerged in the beginning of the 20th century (with a forefather in Thorndike) and has been dominant to the present time. Born of the struggle with subjective-empirical psychology, which recognized only the method of self observation, behaviorism placed itself in opposition to this tradition as an approach striving to study objective processes (i.e., behavior) through objective methods. Vygotsky was familiar only with the classic Watsonian model of behaviorism, which included the familiar "stimulus-reaction" scheme. In the 1920's, the influence of behaviorism in Soviet psychology was very strong. Vygotsky was therefore frequently obliged to cloth his ideas in behavioristic terminology, in spite of the internal contradictions between his theory and behaviorism. Thus, in his work of 1930, Vygotsky developed a three member scheme that he compared directly with the two member scheme of classic behaviorism (see: "The Instrumental Method in Psychology," *Problems of the Theory and History of Psychology*). After several years, the neobehaviorism of Tolman and Hull began to be recognized. Here, the two member scheme of classical behaviorism was replaced with a three member scheme that included a middle link reflecting the subject's internal state. In spite of the significant external similarity between this and Vygotsky's three member scheme, there was a fundamental methodological difference between them.

96. This is a case of secondary citation. There is reason to think that Vygotsky took this citation not directly from the Gumilev's poem but from Mandel'shtam's article "On the Nature of the Word." This citation served as the epigraph to the first publication of this article (1922) as a separate brochure, but was removed in latter editions.

97. "In the beginning was the word." -- John 1:1.

98. "In the beginning was the deed." -- Goethe, Faust, Chapter 1, Scene: "Faust's Workroom."

99. *Ludwig Feuerbach* (1804-1872) -- German philosopher. Vygotsky was very familiar with his work, and valued it highly. He felt that Feuerbach's ideas could be used as a point of departure for the construction of a Marxist materialistic psychology (see: "The Historical Significance of the Psychological Crisis," Volume 1).

Lectures on Psychology

1. This work is a stenogram of lectures read by Vygotsky in March and April of 1932 at the Leningrad Pedagogical Institute. Lecture 4 ("Emotions and Their Development in Childhood") was published in *Voprosy Psikhologii* [Issues in Psychology] (1959, No.3). All the lectures were published in the book: L.S. Vygotsky, *Razvitie Vysshikh Psikhicheskikh Funktsii* [*The Development of the Higher Mental Functions*], Moscow, 1960. Our edition is based on a collation of the 1960 publication with the stenographic texts of the lectures that are preserved in the archives of the A.I. Gertsen Leningrad Federal Pedagogical Institute [LGPI]. The lectures represent a complete course and can be viewed as a synopsis of Vygotsky's basic views as well as of the findings obtained by Vygotsky and his colleagues within the framework provided by the cultural-historical theory.

2. Gestalt Psychology (Gestaltism, structural psychology). The term was introduced by Christian von Ehrenfelz. A school of general psychology, Gestalt psychology initially emerged with an analysis of the processes of perception, where several new phenomena were discovered and explained with these theses (M. Wertheimer). Subsequently, the attempt was made to extend this explanatory scheme to the processes of problem solving (K. Duncker), the phylogenesis (Kohler) and ontogenesis (Koffka) of thinking, and the analysis of the psychology of personality and the motivational sphere (Lewin). In the 1930's, with the Nazis' rise to power in Germany, the leading figures in the school emigrated. This served as an external stimulus to the school's disintegration toward the end of the 1930's. Gestalt psychology (along with the French school) apparently had tremendous influence on Vygotsky. The most attractive aspect of

Gestalt psychology for Vygotsky was its attempt to approach all mental phenomena with the assumption of their integral nature. In distinction from the Gestalt psychologists, however, Vygotsky always combined this view of the nature of mental phenomena as integral with a historical approach to the analysis of mind (it was, at any rate, always his intention to combine these perspectives).

3. *Kurt Gottshaldt* (1902-?) -- German psychologist specializing in child psychology.

4. *Hermann Helmholtz* (1821-1894) -- German physiologist, anatomist, and psychologist who developed theories of vision and hearing.

5. *Ewald Hering* (1834-1918) -- One of the founders of experimental physiological psychology who developed theories of vision and hearing in opposition to those of Helmholtz. Hering discovered an optical illusion known as "the Hering illusion."

6. *Herman Rorschach* (1884-1922) -- Swiss psychologist and psychiatrist who developed a widely known projective test that is commonly called the "inkspot" or "Rorschach" test.

7. *Alfred Binet* (1857-1911) -- French psychologist and one of the pioneers of experimental studies of the higher mental functions, in particular, thinking and memory. His later works had a special significance for Vygotsky (see: "The Problem of the Cultural Development of the Child," *Pedalogiia* [Pedagogy], 1928, No.1). Binet was a specialist in testing, working in the domain of measuring the level of mental development.

8. *Jean Demor* (1867-1941) -- Belgian doctor and pedagogue specializing in the education of the mentally retarded.

9. *Hugo Munsterberg* (1863-1916) -- German and American psychologist and one of the creators of the psychology of labor (i.e., psychotechnics). A methodologist of psychology, his methodological principle ("Psychology must confirm the truth of its thinking in practice.") was particularly important for Vygotsky (see: "The Historical Significance of the Psychological Crisis, *Problems of the Theory and History of Psychology*). In his philosophy, Munsterberg was an objective idealist.

10. *Bliuma Vul'fovna Zeigarnik* (born 1901) -- Soviet psychologist and pupil of Lewin and Vygotsky. In the 1920's, Zeigarnik worked under the guidance of Lewin, discovering the Zeigarnik effect (i.e., the phenomenon in which uncompleted actions are remembered better than completed actions). Subsequently, Zeigarnik has specialized in pathological psychology, applying the methodological principles of Vygotsky and Leont'ev to the study of schizophrenia.

11. *Leonid Vladimirovich Zankov* (1901-1977) -- Soviet psychologist, student of Vygotsky, and academician of the USSR Academy of Sciences. Zankov was a specialist in the psychology of memory, defectology, and the psychology of instruction.

12. *Hermann Ebbinghaus* (1850-1909) -- German psychologist and associationist who initiated the experimental study of the higher mental functions. Ebbinghaus introduced the method of using nonsense syllables to study the "pure culture" of memory. He conceptualized forgetting as a function of time ("the Ebbinghaus curve").

13. The books that Vygotsky has in mind in this connection are: K. Buhler, *Handbuch der Psychologie*, Jena, 1922; K. Koffka, *The Growth of the Mind: An Introduction to Child Psychology*, N.Y., 1925. [1924, 2nd Edition 1928. Editors]

14. *Herbert Spencer* (1920-1903) -- English philosopher and sociologist and one of the founders of positivism. Spencer specialized in the study of primitive cultures.

15. *Theodule Ribot* (1839-1916) -- French psychologist specializing in pathological and general psychology who worked in the domains of the psychology of memory and voluntary attention.

16. *Nikolai Nikolaevich Lange* (1858-1921) -- Russian psychologist concerned with psychological methodology, general psychology, and the psychology of attention. His antidualistic tendencies were compatible with Vygotsky's views (see: "The Historical Significance of the Psychological Crisis," *Problems of the Theory and History of Psychology*)[13].

17. *Walter Cannon* (1871-1945) -- American physiologist specializing in the mechanisms of emotional behavior who asserted the unity of neurohumoral regulation.

18. *Boris Mikhailovich Zavadovskii* (1895-1951) -- Soviet biologist and academician. Zavadovskii was a specialist in Darwinism, the methodology of biology, and the internal secretion of the glands.

19. *Vladimir Leonidovich Durov* (1863-1934) -- Russian circus artist, clown, wild animal trainer, and creator of the new Russian school of training. Durov was a practical specialist in zoopsychology.

20. *Alfred Adler* (1870-1937) -- German doctor and psychologist who developed a system of individual psychology. Adler's interpretation of the role of inclinations in mental life was similar to that of Freud. The concept of compensation, understood as a universal mechanism in man's mental activity, had a central place in his psychological system.

21. *Paul Broca* (1824-1880) -- French anatomist and one of the founders of modern anthropology -- [Soviet anthropology corresponds essentially with American *physical* anthropology-Eds.] -- who described speech disorders connected with disease in certain areas of the brain (Broca's area).

22. *Carl Wernicke* (1848-1936) -- German philosopher, musicologist, psychiatrist, neuropathologist, and neuroanatomist who developed the classic theory of aphasia. Wernicke also described the syndrome of alcoholic hallucinations.

23. *Karl Stumpf* (1848-1936) -- German philosopher and musicologist, Stumpf was a phenomenologist with views similar to those of Gestalt psychology. To illustrate the conception of consciousness characteristic of traditional psychology, Vygotsky turned to Stumpf's letter to James, where the former referred to consciousness as "the general host of the mental functions" (see: L.S. Vygotsky, "The Problem of Consciousness," in: *The Psychology of Grammar*, Moscow, 1968).

24. *Tamaro Dembo* (born 1907) -- German and then American psychologist. In the 1930's, under Lewin, Dembo conducted a well known series of experiments on the influence of frustration on the process of problem resolution.

NOTES TO THE ENGLISH EDITION

The following notes, which are designated in the text by Arabic numerals between brackets (e.g.[1]), were provided by the translator and editors.

[1]. The evidence on this issue which was adduced in the literature available as Vygotsky wrote in 1934 was generally argumentative and anecdotal in nature. Although some systematic experimentation may have been underway at the time, apparently nothing resembling some of the studies appearing in this volume and meeting Vygotsky's standards for experimentation had been published in a form available to Vygotsky. The extensive and diversified experimentation which has emerged since then confirms Vygotsky's perception of the need for experimental evidence.

[2]. Throughout the text, the term "verbal" in phrases such as "verbal thinking" is a translation of the Russian term *rechnoi*, the adjectival form of the word *rech'* (speech). While too awkward as an English translation, a more literal rendering would have been "speech thinking." Extending our earlier discussion of our use of the term "speech" rather than "language" in the title of *Thinking and Speech*, it should be noted here that when Vygotsky use the phrase *rechnoi myshlenie* (verbal thinking) he is generally indicating not a form of thought which merely incorporates linguistic categories but a form of thought mediated by speaking.

[3]. Vygotsky may have had in mind the experiments such as those by Jacobsson, L. E. "The Electrophysiology of Mental Activities." *American Journal of Psychology*, 1932, Vol 44, pp. 677-694. These experiments on imagining and verbal thinking were replicated and extended by Max, L. W. in, among others, "An Experimental Study of the Motor Theory of Consciousness. III. Action-current Responses in Deaf-mutes during Sleep, Sensory Stimulation and Dreams." *Journal of Comparative Psychology*, 1935, vol 19, pp. 469-486. (The editors' access to these references in through Crafts, L. W. Schneirla, T. C., Robinson, E. E., and Gilbert, R. W. (Editors) *Recent Experiments in Psychology* (1938) New York: McGraw-Hill, whence the foregoing references were obtained.

[4]. A thoroughgoing example of how such Hegelian-Marxist concepts as "the dialectial leap" can be applied to a wide range of natural phenomena is provided in Engels' *The Dialectics of Nature*. Though Vygotsky was not precisely an orthodox, doctrinaire Marxist this passage is one of many illustrating his creative use of the concepts of dialectical materialism and his unambiguously socialistic orientation in the formulation of his psychological, psycholinguistic, and educational concepts.

[5]. When Vygotsky uses the term "methodological" or "methodology" (*metodologii*) in this text, he does not have in mind only a narrow concern with experimental method but the much broader problem of the

philosophical and conceptual bases of science in general and the human sciences in particular, as well as the bases for the assessment and development of experimental methods (*metody*) more narrowly conceived.

[6]. The 1982 Russian version quoted the German as *Triebfeler*, but a check of the 1934 version revealed *Triebfeder*, which glosses as "trip spring" or "motive" and would seem to be the appropriate word here.

[7]. The Russian text had *Hindenten* here.

[8]. Followers of the American research in developmental psycholinguistics in the 1960's and 70's will recall extensive discussions of the "holophrastic sentence" and "holophrastic speech," an issue, we can surmise from this text, which had been fairly well settled by Vygotsky in the 1930's.

[9]. The term "speech" is used here in the sense discussed in our Preface. Speech for the structuralist linguist and, obviously for Vygotsky, was the primary form of language. As the passage continues it becomes quite clear that it is the special characteristics of speech as a method of thought and communication which Vygotsky has in mind and not the more circumscribed definition of which others might ascribe to; namely the motor acts of the vocal tract which accompany linguistic communication.
The use of the word speech in the sense described leads to certain surprising results. Later in the present text it yields the expression "written speech," which is a literal rendering of *pis'meny rech'*. Vygotsky seems intentionally not to have used the word "writing," possibly because to him and to the early structuralist linguists, writing was regarded only as a form of notation for speech; not a form of communication in its own right. The concept of "written speech" which is developed in Chapter 7 as a special kind of mental formulation occurring when situational and expressive supports are lacking, i.e., the kind verbal thinking which is responsive to the pragmatic constraints imposed by the writing process is, clearly, to be distinguished from "writing" in the sense of notation for speech. Further, Vygotsky's understanding of the term "speech" leads to the suggestion that the function of speech can be assumed by other forms of communication. Thus Vygotsky in the present chapter clearly anticipates a series of experiments which followed some forty years later. In those studies, after Liberman's demonstration that the vocal tract of chimpanzees was not suited to the production of complex speech sounds, Gardner, Premak, Terrace, and others then attempted to discern and demonstrate that the functions of speech could be taken up by other organs (such as the hands using American sign language) or other devices (such as "joy sticks" or abstract tokens to which significanda were assigned) for communication. The reference, later in the chapter, to the sign language of the deaf follows the same vein and is equally contemporary in its outlook.

[10]. In using the term "scientific" in this context, Vygotsky is emphasizing (1) the *systematic* nature of scientific knowledge and (2) its association with the peculiar social institutions of science and education.

[11]. The term that is translated here as "instruction" (*obuchenie*) has been translated in other texts as "learning." Neither of these English glosses is an entirely adequate translation of the Russian term. *Obuchenie* is the nominal form associated with the active verb *uchit'*, ("to teach") and the reflexive verb *uchit'cia* ("to be taught," "to learn through instruction," "to study"). Thus the term *obuchenie* seems to us to imply the teaching/learning process involved in instruction; not merely the action of the instructor or the learner. We use the term "instruction" here because, like the term *obuchenie*, it implies an intentional transmission of knowledge while the term"learning" does not seem to.

[12]. By the phrase "conscious awareness" we gloss the Russian *osoznanie*, which Vygotsky carefully and consistently uses and distinguishes from the term *soznanie* or "consciousness." Vygotsky clarifies the difference between the two at several points in the text. It is, nonetheless, important to note the distinction both because of the unavoidable awkwardness of the phrase "conscious awareness" in some of the contexts in the translation and because the earlier translation of this volume (L. S. Vygotsky, [1962] *Thought and Language* Cambridge, Mass.: MIT Press) rendered both terms as "consciousness," introducing a confusion not to be found in the original Russian text.

[13]. Western scholars seem to be at variance with our Soviet colleagues in believing that the Lange of the James-Lange theory was C. G. Lange, a Norwegian and not a Russian, as the notes to the Russian edition suggest. See Boring, E. G. A *History of Experimental Psychology* (1929) New York, D. Appleton-Century,

page 532 where a paper by Lange, "Concerning Emotion" (1885) in Norwegian which was translated into German is cited.

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