in the course of the social-cultural development of the child and forming an external line in the development of symbolic activity along with the inner line, represented by the cultural development of such functions as practical intellect, perception, memory, etc. (Vygotsky and Luria, 1994, pp. 136–137)

Vygotsky's research program included studies of the transition from the natural to the cultural psychological functions of memory, perception, attention, will, counting, and speech. These studies were conducted in three directions: instrumental, developmental, and cultural-historical. The instrumental aspect included the analysis of changes occurring in psychological functions as a consequence of the introduction of new symbolic mediators or the removal of mediators that had become an integral element of individual activity (Vygotsky, 1981).

The developmental or genetical (from genesis) orientation of Vygotsky's work meant much more than a mere analysis of the unfolding of psychological functions in ontogenesis. Indeed, the very idea of development as an unfolding or a maturation was alien to him. Vygotsky perceived psychological development as a process full of upheavals, crises, and structural changes. The developmental process can be observed in both micro- and macrogenetic perspectives. Microgenetically it reveals itself in the restructuring of the child's thinking and behavior under the influence of a new psychological tool. Macrogenetically development manifests itself as the life-long process of the formation of a system of psychological functions corresponding to the entire system of symbolic means available in a given culture. Education is considered to be an integral element of this macrogenetic process. Rather than a superstructure built on the foundation of psychological functions, educational activity is seen as a process radically changing these very functions (Vygotsky, 1978).

From the general premise of Vygotsky's theory that psychological functions originate in human sociocultural activity, it naturally follows that the types of activity characteristic of different historical epochs and different cultures should be put in correspondence with various forms of memorization, reasoning, problem solving, and so on. There are two major avenues for such an analysis. The first of them relies on historical records and documents and attempts to reconstruct historically distant forms of intelligence on the basis of these records. The second avenue is

cross-cultural. By comparing different contemporary cultures and by making certain approximations from some of them and the cultures of the past, one may arrive at conclusions regarding the historical change in human cognition (Vygotsky and Luria, 1993). The most obvious contrast here is between people of preliterate, traditional societies, who rely on a relatively limited number of symbolic tools, and people of industrially developed societies, who, through the system of formal education, become exposed to a wide array of symbolic tools that not only become indispensable as cognitive tools but to a certain extent form the very "reality" of the modern individual. In order to explore this cultural-historical hypothesis Luria undertook a field study in the rural areas of Soviet Central Asia in the early 1930s. Luria's expedition collected rich empirical material about the relationships between literacy, schooling, and involvement in the more modern forms of labor, on the one hand, and the development of specific cognitive functions, on the other (Luria, 1976). This pioneering study of Luria later stimulated a whole series of cross-cultural studies conducted by Cole and his colleagues in Africa and elsewhere (for example, Cole and Scribner, 1974).

Thought and Language

Although Vygotsky's theory embraced all higher mental functions, Vygotsky himself was primarily interested in the relationship between language and thought. This special interest encompassed a number of related topics, such as the role of speech and writing as psychological tools, different forms of the child's concept formation, the development of universal word meanings and personal senses of a word, the problem of egocentric and inner speech, and others. These studies were collected in a 1934 book *Myshlenie i Rech* (1986), which remains the most popular of Vygotsky's writings. (The work has been published as *Thought and Language* (1986); a literal translation would be *Thinking and Speech*. On translation difficulties, see Kozulin 1990b.)

The development of the "tool" metaphor led Vygotsky to the hypothesis that the structural properties of language must leave their imprint on the entire activity of the child, and that the child's experience itself gradually acquires a symbolic, quasi-linguistic structure. Bringing together such seemingly disparate phenomena as gesture, symbolic play,

and children's drawings and scribbles, Vygotsky attempted to show that they represent steps toward the mastery of the symbolic function, which reaches its most revealing form in written speech.

Following Wundt's analysis of human gestures, Vygotsky drew parallels between gestures, primitive pictography, and children's drawings. According to Vygotsky the drawings of younger children serve as the fixation of gesture rather than as the reflection of visual properties of objects. Gesture provides a link connecting pictography with symbolic play.

> For children some objects can readily denote others, replacing them and becoming signs for them, and the degree of similarity between a plaything and the object it denotes is unimportant. What is most important is the utilization of the plaything and the possibility of executing a representational gesture with it. This is the key to the entire symbolic function of child's play . . .
>
> From this point of view, therefore, children's symbolic play can be understood as a very complex system of "speech" through gestures that communicate and indicate the meaning of playthings. (Vygotsky, 1978, p. 108)

In the course of play, the plaything absorbs the meaning of the signified object and then carries it without the assigning gesture. Thus the child first uses a special gesture to designate a broom as a "horse," and next the broom is used in its capacity of a horse without any special gesture. Then the children "discover" that certain properties of playthings fit their roles. For example, when a researcher put down a book with a dark cover and suggested to the child that this would be a forest, the child spontaneously added, "Yes, it's a forest because it's black and dark" (Vygotsky, 1978, p. 109). In this way the child came to the intuitive use of metonymy. Through symbolic play the child mastered symbolic relationships and the conventional character of the relations between signifier and signified. This conventionality is one of the fundamental prerequisites of writing.

Reading and writing appear in Vygotsky's system as special cases of symbolization. Such an understanding guides his educational approach, which puts major emphasis on the child's acquisition of the function of arbitrary symbolization in its various forms. Vygotsky recommended beginning writing instruction by asking children to desig-

nate certain objects by pictograms or signs. Once this core symbolic function is acquired, the shift should be made from first-order symbolism, using signs to depict the content of a sentence, to second-order symbolism, using letters to depict words. Some of Vygotsky's insights are incorporated in contemporary reading programs that emphasize the need to teach the function of symbolization prior to engaging children in the specific techniques of writing and spelling (McLane, 1990). The concept of activity thus appears as the actualization of cultural forms of behavior embodied in the use of assigning gestures, symbolic play, and a writing system.

Another aspect of Vygotsky's inquiry into the problem of thought and language concerns concept formation in children. The starting point here was Vygotsky's dissatisfaction with the then existent methods of study, which focused either on verbal definition of some concept or on nonverbal identification of a common feature in a number of objects. The first method, in Vygotsky's opinion, merely elicited ready-made definitions that characterized the child's verbal knowledge rather than concept formation. The second method, based on the function of simple abstraction, disregarded symbolic function, which in Vygotsky's opinion constituted the core of concept formation. To overcome this methodological difficulty Vygotsky suggested the method of so-called double stimulation.

The method of "double stimulation" was developed by Vygotsky's collaborator, Leonid Sakharov (1994), on the basis of the earlier work of the German psychologist Narciss Ach. In this test the child receives a number of objects differing in size, shape, and color and is asked to sort them. Unlike other sorting tests, each object in this test is also coded by a triplet of letters. The child thus can use both the objective characteristics of objects and their coded "names" as bases for classification. In Vygotsky's opinion this constitutes an experimental approximation of the concept formation processes occurring in real life, where children form concepts by combining an analysis of objects' characteristics with verbal definitions provided by adults. Using the method of double stimulation Vygotsky and his colleagues were able to identify a number of stages in the child's concept formation from unorganized congeries to logical concepts (Vygotsky, 1986). Vygotsky's study of concept formation was among the first noticed in the West. Hanfmann and Kasanin (1942) used the method of double stimulation in their study of thinking in schizophrenic patients, while Werner and E. Kaplan (1950) further

elaborated some of Vygotsky's ideas in their study of how children assign meanings to meaningless words.

Another colleague of Vygotsky, Jozephina Shif (1935), extended the study of concept formation into an educational setting. Vygotsky (1986) distinguished two types of active experience, which in his opinion led to two different, albeit interrelated, types of concept formation. The first one is a systematically organized experience of formal schooling. This activity, at least in its ideal form, leads to the formation of academic, "scientific" concepts. Scientific concepts are systemically and hierarchically organized, reflect the cultural models of thinking embodied in the natural and social sciences, and are consciously appropriated and used by students. The second type of experience leading to concept formation is the everyday experience of children. This experience is empirically very rich, but it is unsystematic and often unconscious. Everyday experience leads to spontaneous, everyday concepts that can be quite adequate in specific everyday contexts, but are misleading when applied to tasks that require logical, scientific conceptualization.

Vygotsky argued that scientific concepts are not assimilated by the child in a ready-made form, but undergo a process of substantial development. This process depends on the interaction between scientific concepts offered to the child and the child's own everyday concepts related to the same phenomena. Scientific concepts develop "from the top down," that is, from verbal or mathematical formulae to their empirical correlates. Everyday concepts develop in the opposite direction "from the bottom up," from spontaneous impressions to more structured experiences: "In working its slow way upward, an everyday concept clears the path for a scientific concept in its downward development. It creates a series of structures necessary for the evolution of a concept's more primitive, elementary aspects, which gives it body and vitality. Scientific concepts, in turn, supply structures for the upward development of the child's spontaneous concepts toward consciousness and deliberate use" (Vygotsky, 1986, p. 194).

Vygotsky's followers in the Soviet Union further elaborated the distinction between scientific and everyday concepts into the notion of theoretical versus empirical learning (see Chapter 2). In the West the distinction between scientific and everyday concepts has attracted researchers' attention in connection with the widely discussed problem of the misconceptions held by students learning science and the more

general problem of conceptual differences between novices and experts (Carey, 1985; Vosniadou, 1994).

The last of the problems discussed by Vygotsky (1986) in *Thought and Language* is the phenomenon of inner speech. He addressed this issue twice: the first time in the context of his critique of Piaget's notion of childhood egocentrism, and the second time in his discussion of the social meaning versus personal sense of the world. According to Piaget, the initial state of a child's thought can be characterized as autistic, that is, completely self-centered and oblivious to contradictions (Piaget, 1959, 1969). Later, under the influence of adults, the child starts changing his or her mental habits in the direction of greater rationality and decentration. Egocentric thought of the child represents a transitory stage, a certain compromise between original autism and logic. Egocentric speech is a speech-for-oneself that is mostly incomprehensible to others. It reflects the egocentric nature of the child's thought and the pleasure principle that guides it. In the course of the child's development egocentric speech dies out, giving way to socialized speech, which is related to the reality principle and is comprehensible to interlocutors.

Vygotsky, who replicated some of Piaget's experiments, insisted that the earliest speech of the child is already social. At a certain age this primitive social speech becomes divided into egocentric speech-for-oneself and communicative speech-for-others. Inner speech is a product of the transformation and internalization of this egocentric speech-for-oneself. Far from being a useless, disappearing phenomenon, egocentric speech is a necessary stage in the development of inner forms of verbal reasoning and self-regulation. Vygotsky's and Piaget's position are complementary in this respect. Piaget started with the premise that child's speech is individual and idiosyncratic, and attempted to show how it becomes socialized. Vygotsky started with the premise that inner psychological functions first appear as external relationships. For him the major problem was not in how the child acquires socialized speech, but rather in how communicative speech-for-others becomes the child's individualized speech-for-oneself. In this context the transition from egocentric to inner speech reveals the process of internalization of speech forms that had their roots in primitive communicative activity. Vygotsky explored the peculiar grammar and syntax of egocentric speech and linked them to the change in the addressee. While egocentric speech is still unconsciously oriented toward some external listener, inner speech

is oriented toward the internal listener, that is, oneself, who does not need all the grammatical and syntactic forms that are indispensable in the overt dialogue.

As an illustration Vygotsky (1986, p. 237) presents a fragment from Leo Tolstoy's *Anna Karenina* (part IV, chap. 13). Communication between Kitty and Levin, who are in love and understand each other instantly, acquires the quality of inner speech, as if they were one person. Levin writes only the initial letters of words while declaring his love, but Kitty easily understands the sentence because she fully "participates" in Levin's train of thought.

The sociocultural approach to language development presupposed that different social settings must have a differential effect on the child's acquisition of speech. Unfortunately, Vygotsky was unable to develop this aspect of his research program. He only outlined it as a necessary complement to the "morphological" analysis of egocentric, communicative, and inner speech, mentioning that the coefficients of egocentric speech differ depending on the social contexts of the child's upbringing. Piaget's children in Geneva, children in German kindergartens, and Vygotsky's subjects in Moscow all had different social milieus and consequently different prevalent types of communication that shaped their verbal development.

Vygotsky's belief in the functional value of egocentric speech and the importance of sociocultural factors in its development has found additional support in more recent studies (Zivin, 1979; Diaz and Berk, 1992). Berk and Garvin (1984) demonstrate that the egocentric speech of children in poor Appalachian communities moves through the same sequence of changes as the egocentric speech of middle-class children, but more slowly. The authors suggest that this delay may reflect the more taciturn character of interpersonal interactions in Appalachian families, where parents rely more on gestures than words when communicating with their children. It was also shown that children who progressed more rapidly from self-guiding audible remarks to inner speech were more advanced in their task-related behavior.

Vygotsky returned to the issue of inner speech in the context of his discussion of sociocultural and individual aspects of word meaning. He made a distinction between the sociocultural meaning (*znachenie*) of a word, which reflects a generalized concept, and word sense (*smysl*), which depends on the context in which the word is used by an individual.

[Sense] is a dynamic, fluid, complex whole, which has several zones of unequal stability. Meaning is only one of the zones of sense, the most stable and precise zone. A word acquires its sense from the contexts in which it appears; in different contexts it changes its sense. The dictionary meaning of a word is no more than a stone in the edifice of sense, no more than a potentiality which finds diversified realization in speech. (Vygotsky, 1986, p. 245)

In inner speech the predominance of sense over meaning, sentence over word, and context over sentence is a rule. Whereas meaning stands for socialized speech, sense represents a borderline between one's individual and thus incommunicable thinking and verbal thought, which is dependent on culturally sanctioned word meanings. In inner speech two important processes become interwoven: the internalization and individuation of speech forms originating in external dialogues, and the translation of intimate thoughts into a form of speech comprehensible for others. Inner speech thus serves as an interface between culturally sanctioned symbolic systems and the idiosyncratic images and figures of individual thought. The interaction of sense and meaning constitutes the inner dialogue between two "coauthors" of one thought, that is, two sides of the self. One of these "coauthors" accommodates his or her thought to the preexistent system of meanings; the other "coauthor" immediately turns them into idiosyncratic senses that later will be again transformed into intelligible words. The "author" of thought therefore is simultaneously engaged in two conversations, one outbound, the other inbound. Outbound thought and speech are oriented toward real or imaginary interlocutors, while the inbound thought brings the meanings of others back to the subject. The coexistence of these inbound and outbound processes ensures the dialogical nature of human thought. In this sense inner speech provides a psychological image of the individual as a subject, as the initiator and source of thinking. The creative work of a writer becomes a model for psychological processes observed in inner speech.

In his study of inner speech Vygotsky reached the outer limits of the traditionally defined subject matter of psychology and began to redefine it. The work of a writer and the creation of literary texts appeared as a paradigm of sociocultural activity generative of human higher mental processes (Kozulin, 1993). This redefinition of psychology's subject put

Vygotsky outside the ranks of his contemporaries and created serious problems for the acceptance of his ideas in academic psychology. Some Vygotskian scholars even suggest that the novelty of Vygotsky's views was directly related to his status as an outsider to the field:

> The range of ideas introduced by Vygotsky, alien to traditional psychology, called for special means of discussion and analysis. And he drew many of these means from philology and linguistics. His position as a methodologist with regard to the whole of psychology, the historical view he held of it, close attention to the problem of the sign, a historical approach that was at the same time structural and the attempt to synthesize them—these are, in my view, the key points in the work and ideas of Vygotsky. It turned out that in the process [of this work] Vygotsky broke down the traditional object of psychology. His works were not psychological in a common meaning of the word; moreover, they practically destroyed the traditional object of psychological analysis. (Schedrovitsky, 1982, p. 62)

Vygotsky's Followers: Elaborations and Revisions of the Principle of Activity

In the early 1930s two opposite trends affecting the dissemination of Vygotsky's ideas could be observed. On the one hand, Vygotsky became a recognized leader of a whole group of young psychologists who enthusiastically implemented his theory in a variety of experimental, educational, and clinical settings. On the other hand, the political climate associated with Stalin's ascension to power was becoming quite inhospitable to any independent-minded thinker, Vygotsky included, who dared to voice original ideas in the social sciences. Vygotsky's interest in psychoanalysis, Gestalt psychology, and the cross-cultural analysis of cognition was denounced as "anti-Marxist," "eclectic," and "erroneous." Vygotsky and Luria's field study of comparative cognition was attacked for its alleged bias against ethnic minorities (Kozulin, 1984).

Vygotsky, who was already seriously ill, continued working in Moscow until 1934, when tuberculosis led to his tragically early death. Even before this, a group of Vygotsky's students that included Leontiev, Zaporozhets, and Bozhovich decided to leave Moscow for the Ukrainian

city of Kharkov, where they established a new research center. Studies conducted in Kharkov centered on the problem of the interiorization of external actions in the form of inner mental functions. The problem of the relationship between psychological activity and consciousness was resolved in the following way: "Development of the consciousness of a child occurs as a result of the development of the system of psychological operations, which in their turn, are determined by the actual relations between a child and reality" (Leontiev, 1983, p. 347).

This insistence on the "actual relations to reality" became a major source of revision of Vygotsky's theory undertaken by his followers in Kharkov. Cole observes, "As even a superficial reading of this work indicates, Leontiev and the young researchers who worked with him established a good deal of a distance between themselves and their teacher Vygotsky" (Cole, 1980, p. 5).

The Kharkovists' emphasis on practical activity as a source of psychological functions fit well into the Soviet ideological climate of the 1930s, which glorified concrete labor as a major source of the socialist transformation of the human being. Somewhat ironically, it was also closer to the Piagetian program of exploring the internalization of sensory-motor actions, rather than to the original Vygotskian emphasis on symbolic psychological tools. In their elaboration of the notion of practical activity the Kharkovites came up with the following statement:

> Thus, even in children of early preschool age, practical activity assumes a new property, intelligibility or rationality; and practical activity is transformed into practical and intellectual activity. In other words, practical-operational, or practical thinking emerges. This form of thinking is obviously not an independent, completely formed, theoretical activity at this stage of development. It exists within practical activity as an element of that activity and as one of the properties of that activity is inseparable from it. Consequently, practical intellectual activity contains in its rudimentary aspects certain theoretical elements, elements of thought. (Asnin, 1980, p. 27)

Asnin's statement is in agreement with Vygotsky's developmental thesis "from action to thought," and yet the experimental studies that stood behind Asnin's position focused more on the problem-solving generalization and transfer rather than on the effect of psychological