IT IS No exaggeration to say that Vygotsky was a genius. Through more than five
decades in science I never again met a person who even approached his clearness of
mind, his ability to lay bare the essential structure of complex problems, his breadth of
knowledge in many fields, and his ability to foresee the future development of his
science.

We met early in 1924 at the Second Psychoneurological Congress in Leningrad.
This gathering was the most important forum at that time for Soviet scientists who
worked in the general area of psychology. Kornilov brought along from the Institute of
Psychology several of his younger colleagues, among whom I was included.

When Vygotsky got up to deliver his speech, he had no printed text from which to
read, not even notes. Yet he spoke fluently, never seeming to stop and search his memory
for the next idea. Even had the content of his speech been pedestrian, his performance
would have been notable for the persuasiveness of his style. But his speech was by no
means pedestrian. Instead of choosing a minor theme, as might befit a young man of
twenty-eight speaking for the first time to a gathering of the graybeards of his profession,
Vygotsky chose the difficult theme of the relation between conditioned reflexes and
man's conscious behavior.

Only the previous year Kornilov had used this same podium to deliver an attack
on introspective theories in psychology. His point of view had prevailed, and his
objective, reactological approach was the dominant viewpoint in our institute. Both
Bekhterev and Pavlov were well known for their opposition to subjective psychology, in
which consciousness was a key concept. Yet Vygotsky defended the position that
consciousness as a concept had to remain in psychology, arguing rather that it must be
studied by objective means. Although he failed to convince everyone of the correctness
of his view, it was clear that this man from a small provincial town in western Russia was
an intellectual force who would have to be listened to. It was decided that Vygotsky
should be invited to join the young staff of the new, reorganized Institute of Psychology
in Moscow. In the fall of that year Vygotsky arrived at the institute, and we began a collaboration that continued until his death a decade later.

Prior to his appearance in Leningrad, Vygotsky had taught at a teachers college in Gomel, a provincial town not far from Minsk. By training he was a literary critic, whose dissertation on Shakespeare's Hamlet is still considered a classic. In this work, as well as in his studies of fables and other works of fiction, he revealed a striking ability to carry out psychological analysis. He was influenced by scholars who were interested in the effect of language on thought processes. He referred to the works of the Russian A. A. Potebriya and of Alexander von Humboldt, who first formulated the Sapir-Whorf hypothesis of linguistic relativity. Vygotsky's work at the teachers college brought him in contact with the problems of children who suffered from congenital defects-blindness, deafness, mental retardation-and with the need to discover ways to help such children fulfill their individual potentials. It was while searching for answers to these problems that he became interested in the work of academic psychologists.

When Vygotsky arrived in Moscow, I was still conducting studies by the combined motor method with Leontiev, a former student of Chelpanov's with whom I have been associated ever since. Recognizing Vygotsky's uncommon abilities, Leontiev and I were delighted when it became possible to include Vygotsky in our working group, which we called the "troika." With Vygotsky as our acknowledged leader, we undertook a critical review of the history and current status of psychology in Russia and the rest of the world. Our aim, overambitious in the manner characteristic of the times, was to create a new, comprehensive approach to human psychological processes.

Our shared assumption at the outset was that neither the subjective psychology propounded by Chelpanov nor the oversimplified attempts to reduce the whole of conscious activity to simple reflex schemes would provide a satisfactory model of human psychology. A new synthesis of the partial truths of previous approaches had to be found. It was Vygotsky who foresaw the outlines of this new synthesis.

Drawing heavily on German, French, English, and American writings, Vygotsky developed his analysis of what he called the crisis in psychology. He discussed these ideas at various conferences and actually wrote them down in 1926 when he was...
hospitalized for the treatment of tuberculosis. Unfortunately, this work was never published; the manuscript was lost during World War II, and a copy was not discovered until 1960, when it was placed in his archives.

According to Vygotsky's analysis, the situation in world psychology at the beginning of the twentieth century was extremely paradoxical. During the second half of the nineteenth century, Wundt, Ebbinghaus, and others had succeeded in turning psychology into a natural science. The basic strategy in their approach was to reduce complex psychological events to elementary mechanisms that could be studied in the laboratory by exact, experimental techniques. The "sense" or "meaning" of complex stimuli was pared away in order to neutralize the influence of experiences outside the laboratory which the experimenter could not control or properly evaluate. Isolated tones and lights, or nonsense syllables, were the favorite stimuli that served as the occasion for behavior. The goal of researchers became the discovery of laws of the elementary mechanisms that gave rise to this laboratory behavior.

Acknowledging the success of this enterprise, Vygotsky pointed out that an essential consequence of this strategy was the exclusion of all higher psychological processes, including consciously controlled action, voluntary attention, active memorizing, and abstract thought. Such phenomena were either ignored, as in theories derived from reflex principles, or left to mentalistic description, as in Wundt's notion of apperception.

The failure of the natural science psychologists to incorporate complex human functions in their work provoked Dilthey, Spranger, and others to offer an alternative approach. They took as their subject matter exactly those processes that the natural scientists could not cope with: values, will, attitudes, abstract reasoning. But all of these phenomena were treated in a purely phenomenological, descriptive manner. They claimed that explanation was impossible in principle. To stress the difficulty, they would pose the question,---Can one ask why the sum of the angles of a triangle is 180?"

Surveying this situation, Vygotsky pointed out that the division of labor between the natural science psychologists and the phenomenological psychologists had produced an implicit agreement that complex psychological functions, the very functions that
distinguish human beings from animals, could not be studied scientifically. The naturalists and mentalists had artificially dismembered psychology. It was his goal, and our task, to create a new system that would synthesize these conflicting approaches.

It is probably impossible to assess all of the influences on us as we undertook a grand revision of psychology back in early 1925. But I know some of the resources on which we drew. For the natural science base we turned to Pavlov's study of higher nervous activity. The basic structural units that produced adaptive adjustments to the environment were then being studied by Pavlov and his co-workers at their experimental station near Leningrad. Pavlovian psychophysiology provided a materialistic underpinning to our study of the mind.

Vygotsky was particularly impressed by the work of V. A. Wagner, an eminent Russian specialist in the comparative study of animal behavior. Wagner was a scientist who applied a broad biological approach to animal behavior. His ideas on evolution greatly impressed Vygotsky, and the two men carried on a lengthy correspondence.

Within psychology proper we read widely. Though we disagreed with many of their theoretical ideas, we found a good deal of merit in the work of our German contemporaries, especially Kurt Lewin, Heinz Werner, William Stern, Karl and Charlotte Buhler, and Wolfgang Kohler, many of whom are too poorly known by my American colleagues. We accepted their insistence on the emergent nature of the complexities of many psychological phenomena. Pavlovian reflexes might serve as the material foundation of mind, but they did not reflect the structural realities of complex behavior or the properties of higher psychological processes. Just as the properties of water could not be discovered directly from knowing that water consists of two hydrogen and one oxygen atom, the properties of a psychological process such as voluntary attention could not be recovered directly from knowing the way in which individual cells respond to novel stimuli. In both cases, the properties of the system - water in one case, voluntary attention in the other must be understood as qualitatively different from the units that compose them.

We also took to heart the point that similar looking behaviors do not necessarily reflect similar psychological mechanisms. When studying children of different ages or
people from different cultures, we needed to examine carefully the nature and developmental history of the surface similarity in order to preclude the very likely existence of different underlying systems.

When Piaget's Language and Thought of the Child became known to us, we studied it carefully. A fundamental disagreement with the interpretation of the relation between language and thought distinguished our work from that of this great Swiss psychologist. But we found the style of his research, especially his use of the clinical method in the study of individual cognitive processes, highly compatible with our goal of discovering the qualitative differences that distinguish children of different ages.

Vygotsky was also the leading Marxist theoretician among us. In 1925, when he published the lecture that brought him to Moscow, he included a citation from Marx: which was one of the key concepts in the theoretical framework he proposed to us:

The spider carries out operations reminiscent of a weaver, and the boxes which bees build in the sky could disgrace the work of many architects. But even the worst architect differs from the most able bee from the very outset in that before he builds a box out of boards, he has already constructed it in his head. At the end of the work process he obtains a result which already existed in his mind before he began to build. The architect not only changes the form given to him by nature, within the constraints imposed by nature, but he also carries out a purpose of his own which defines the means and the character of the activity to which he must subordinate his will. (Capital, Pt. 3, ch. 7, sec. 1)

This kind of general statement was not enough, of course, to provide a detailed set of procedures for creating an experimental psychology of higher psychological functions. But in Vygotsky's hands, Marx's methods of analysis did serve a vital role in shaping our course.

Influenced by Marx, Vygotsky concluded that the origins of higher forms of conscious behavior were to be found in the individual's social relations with the external world. But man is not only a product of his environment, he is also an active agent in creating that environment. The chasm between natural scientific explanations of elementary processes and mentalist descriptions of complex processes could not be
bridged until we could discover the way natural processes such as physical maturation and sensory mechanisms become intertwined with culturally determined processes to produce the psychological functions of adults. We needed, as it were, to step outside the organism to discover the sources of specifically human forms of psychological activity.

Vygotsky liked to call his approach "cultural," "historical, or -instrumental" psychology. Each term reflected a different feature of the new approach to psychology that he proposed. Each emphasized different sources of the general mechanism by which society and social history mold the structure of those forms of activity that distinguish man from his animal neighbors.

"Instrumental" referred to the basically mediated nature of all complex psychological functions. Unlike basic reflexes, which can be characterized by a stimulus-response process, higher functions incorporate auxiliary stimuli, which are typically produced by the person himself. The adult not only responds to the stimuli presented by an experimenter or by his natural environment, but also actively modifies those stimuli and uses his modifications as an instrument of his behavior. We know some of these modifications through folk customs such as tying a string around one's finger in order to remember more effectively. Many less prosaic examples of this principle were uncovered in studies of changes in the structure of children's thinking as they grow from the age of three to ten years.

The "cultural" aspect of Vygotsky's theory involved the socially structured ways in which society organizes the kinds of tasks that the growing child faces and the kinds of tools, both mental and physical, that the young child is provided to master those tasks. One of the key tools invented by mankind is language, and Vygotsky placed special emphasis on the role of language in the organization and development of thought processes.

The "historical" element merged into the cultural one. The tools that man uses to master his environment and his own behavior did not spring fully developed from the head of god. They were invented and perfected in the long course of man's social history. Language carries within it the generalized concepts that are the storehouse of human knowledge. Special cultural instruments like writing and arithmetic enormously expanded
man's powers, making the wisdom of the past analyzable in the present and perfectible in the future. This line of reasoning implied that if we could study the way the various thought operations are structured among people whose cultural history has not supplied them with a tool such as writing, we would find a different organization of higher cognitive processes but a similar structuring of elementary processes. I had the opportunity to evaluate these very ideas early in the 1930s.

All three aspects of the theory are applicable to the development of children. From the moment of birth, children are in constant interaction with adults who actively seek to incorporate them into their culture and its historically accumulated store of meanings and ways of doing things. In the beginning, children's responses to the world are dominated by natural processes, namely those provided by their biological heritage. But through the constant intercession of adults, more complex, instrumental psychological processes begin to take shape. At first, these processes can operate only in the course of the children's interaction with adults. As Vygotsky phrased it, the processes are interpsychic; that is, they are shared between people. Adults at this stage are external agents mediating the children's contact with the world. But as children grow older, the processes that were initially shared with adults come to be performed within the children themselves. That is, the mediated responding to the world becomes an intrapsychic process. It is through this interiorization of historically determined and culturally organized ways of operating on information that the social nature of people comes to be their psychological nature as well.

When we first began this work, the three of us-Vygotsky, Leontiev, and I-used to meet at Vygotsky's apartment once or twice a week to plan the research that would be required to develop his ideas. We reviewed each of the major concepts in cognitive psychology-perception, memory, attention, speech, problem solving, and motor activity. Within each of these areas we had to come up with new experimental arrangements which would incorporate the notion that, as higher processes take shape, the entire structure of behavior is changed.

At this time I held a position as director of the Laboratory of Psychology in the Krupskaya Institute of Communist Education, which was named for Lenin's wife, a
woman who, following the Revolution, was extraordinarily supportive of educational work in the USSR. The institute was across the street from what was then called the Second Moscow University (now the Pedagogical Institute). Drawing on students from the university, I formed a student psychology circle where we discussed Vygotsky's ideas. Each of Vygotsky's students and colleagues undertook the task of inventing experimental models for the development of instrumental behavior.

The development of memory became the special province of Alexel Leontlev. Working with normal and retarded children of various ages, Leontiev devised a task in which auxiliary stimuli could be used by the subject to help him remember a series of stimuli presented by the experimenter. Further, Leontlev demonstrated that the process of mastering mediated remembering is long and difficult. At first the very young child, presented with clear reminders of a dozen or so common words, such as a picture of a sleigh to help him remember the word "horse," pays no attention at all to the reminders. Such a child might remember two, three, or four of the words, but not systematically and giving no evidence of engaging in any special activity to ensure the remembering. We called this kind of behavior "natural remembering," since the stimulus seems to be remembered through a process of direct, unmediated impression.

A little later the child might begin to take note of the reminders, or "auxiliary stimuli" as we called them. Although auxiliary stimuli sometimes helped the child, as often as not the reminder failed to remind him of the stimuli it was intended to evoke. Instead, the child would simply incorporate it into a chain of associations. Thus, if "sleigh" were the reminder, a child might end up recalling "snow" instead of "horse." Still later the child could use such ready-made reminders quite efficiently, but the process of using auxiliary stimuli was still external to the child in the sense that the connections between stimuli to be remembered and reminders were given by the conventional meanings of the words, that is, by the culture. Only somewhat later, at the age of nine or ten, did we begin to observe internalized mediation, when children began, creating their own reminders that virtually any auxiliary stimulus would be effective in aiding memory. The idea of using two sets of stimuli, one the primary set that has to be mastered and the other an auxiliary set that can serve as an instrument for mastering the primary set, became the central, methodological tool in all our studies.
Prior experiments on how complex choices are made employed trained adults who were required to press one or more telegraph keys when a stimulus was presented. By comparing the speed of a single response to a single stimulus with the time required to choose between two or more stimuli, many investigators hoped to be able to study the psychology of a single choice, and to distinguish the process of choosing from other processes, such as differentiating between stimuli and organizing a motor response. Vygotsky criticized this work severely, pointing out contradictions in typical results that suggested the need for a new way to treat the process of making choices.

Instead of relying on data from trained adults, Natalia Morozova studied the development of complex choices in small children. In her experiments a three or four-year-old child would be presented with a simple task: "Press the button when you see a red card." Then two or perhaps three cards were shown to the child simultaneously and three keys were made available for pressing. When these complications were introduced, the systematic flow of the child's responding disintegrated. The child often forgot which color went with which key. Even if the child remembered which keys to press in response to which stimuli, the entire method of responding was quite different from that typical of adults. As soon as a stimulus was shown, the child would begin to respond, but the response had no special direction. No choice had been made among the response alternatives. Rather, the child moved hesitantly, as if choosing among his own movements instead of among the stimuli.

Morozova's studies of choice soon shaded into research on memory of the sort that Leontiev was undertaking at the time. Since remembering which stimuli went with which responses was shown to be difficult for the young child, Morozova began to introduce auxiliary stimuli into the choice reaction experiment. Thus, a picture of a horse would be shown the child, with a picture of a sleigh pasted on the appropriate key. When Morozova traced the way in which children began to use the auxiliary stimuli to guide their choice responses, she found that the rules governing the acquisition of mediated remembering applied to the remembering that was required in the choice experiment as well.
R. E. Levina carried out studies on the planning role of speech. On the surface this work seemed quite different from the work of Leontiev and Morozova, but the underlying idea was exactly the same. Although Piaget had impressed us with his studies of the relation between language and thought in the young child, we disagreed fundamentally with his idea that early speech in the child plays no important role in thought. The phases in the development of speech-thought relations, according to Vygotsky, were roughly as follows. Initially, motor and speech aspects of the child's behavior are fused. Speech involves referential elements, object-oriented conversation, emotional expressions, and other kinds of social speech. Because the child is surrounded by his elders, speech begins to take on more and more demonstrative features, which permits the child to indicate what he is doing and what his needs are. After a while, the child, making distinctions for others with the aid of speech, begins to make distinctions for himself, internally. In this way, speech ceases to be solely a means for guiding the behavior of others and starts to serve the function of self-guidance.

Levina asked three-to four-year-old children to solve analogous problems to those that Wolfgang Kohler had posed for his chimpanzees: to obtain desired objects that were out of reach. For example, a piece of candy was placed in a cupboard out of reach of the children and a stick placed nearby on the floor. One child was observed to behave as follows, talking to herself the while:

"That candy is up so high. [Here the child climbs up on the divan and jumps up and down.] I have to call Mommy so she will get it for me [jumps some more]. There's no way to get it, it's so high. [Here the child picks up the stick, looking at the candy.] Papa also has a big cupboard and sometimes he can't reach things. No, I can't get it with my hand, I'm too small still. Better to stand on a stool [climbs on a stool, waves the stick around, which bangs the cupboard]. Knock, knock. [Here the child laughs. Glancing at the candy, she takes the stick and knocks it off the cupboard.] There! The stick got it. I'll have to take this stick home with me."

Vygotsky paid special attention to the way in which seemingly egocentric speech in tasks like this begins to play a role in carrying out the action and then in planning the action. At some point in the course of solving these problems, speech ceases merely to
accompany action and begins to organize behavior. In short, it attains the instrumental function that he believed characteristic of all older children and adults.

This same fundamental idea was applied by Alexander Zaporozhets to the restructuring of motor behavior that occurs as the child grows older. In place of natural movements, controlled from outside, the child begins to gain voluntary control over his own movements. The change from natural, involuntary movements to instrumental, voluntary movement could be seen very clearly by placing the child in a situation where, in order to complete a task successfully, he was required to guide himself by an external rule.

For example, suppose we wanted to study the acquisition of jumping movements. In very young children, jumping occurs only when the immediate context, including the child's own desires, requires it. Jumping "just happens." We can not evoke it. Then, gradually, the child begins to use auxiliary stimuli to master his own movements. At first these auxiliary stimuli are of an external nature; a board is placed in front of the child to guide lumping or an adult gives a verbal command, "Jump." Later the child can attain the same level of proficiency by giving the command to himself, saying the word "lump" in a whisper. Finally, the child can simply think "lump," and the movements unfold in a voluntary way.

In a quite different example, L. S. Sakharov, a gifted collaborator of Vygotsky's who died at a young age, applied this same method to studies of classifying. He discovered that the naming function of words, which seems to be constant at different age levels because the surface features of the words remain the same, in fact undergoes deep changes in the course of development. At the very earliest stages, words designate whole complexes of referents, including not only the object named but also the child's feelings toward the object. Next, words refer to objects and their concrete contexts, and only later do they begin to refer to abstract categories. The block sorting technique upon which these observations rest was called the Vygotsky-Salcharov method when it was first invented, but over the years, as it began to take hold abroad, it came to be known as the Harifman-Kasanin method, in honor of two investigators who translated Vygotsky's work and applied the method.
In 1929 our group devoted ourselves to a study of early "significative" activity, by which we meant the way in which children come to engage in activities that give significance to the stimuli that they are asked to master, thereby creating their own instrumental, mediated activities. We developed the idea of asking children to invent pictograms, pictures of their own choosing to help them memorize a series of abstract words.

At a very early stage, children are really incapable of producing a pictorial stimulus that can guide later remembering. For example, a four-year-old, asked to draw something that would help her remember the phrase "The teacher is angry," responded by laughing and making a simple mark on the paper. She talked about her activity, but her talk and her movements were not guided by the task of remembering and bore no instrumental relation to each other. She forgot not only the phrase but the purpose of the entire task.

We saw the beginnings, of useful productions in slightly older children. Not only did the children make pictures that captured an essential element of the phrase (a deaf boy was pictured by a head with no ears), but the children's descriptions had interesting character. As Vygotsky pointed out, these children, having, made a picture, would turn to the experimenter (although not required to do so) and formulate, as if the adultI a feature of the stimulus. For example, for the phrase "sly old lady," one child drew an old lady with big eyes. Turning to the experimenter, he said, "Look at what big eyes they are." When we worked with older children, we found that this "attention gathering" speech ceased to be addressed to the adult. Instead, it "went inside" and was used by the child to guide its own productions.

The individual studies that we carried out at this time, of which I have mentioned a few, must be considered banal in and of themselves. Today we would consider them nothing more than student projects. And this is exactly what they were. Nevertheless, the general conception that organized these pilot studies laid the methodological foundation for Vygotsky's general theory and provided a set of experimental techniques which I was to use throughout the remainder of my career. The students who carried out this work
have gone on to play important roles in the development of Soviet psychology, generalizing these early efforts in a variety of sophisticated ways.

My own work was permanently changed by my association with Vygotsky and by the ingenious studies of our students. At the same time that we were carrying out this new line of work I was still conducting studies using the combined motor method, but as exemplified in The Nature of Human Conflicts, the focus in my work began to change. Although I had begun with an interest in studying the dynamic course of emotions, Vygotsky saw in my research a model for studying the relation between complex voluntary movements and speech. In particular, he emphasized the way in which speech served as an instrument for organizing behavior. As a result, in the later chapters of The Nature of Human Conflicts I included some of my earliest studies on the development of the regulatory role of speech. This topic became a central focus of my work only many years later.

It is extremely difficult, after the passage of so much time, to recapture the enormous enthusiasm with which we carried out this work. The entire group gave almost all of its waking hours to our grand plan for the reconstruction of psychology. When Vygotsky went on a trip, the students wrote poems in honor of his journey. When he gave a lecture in Moscow, everyone came to hear him.

His lectures were always a great occasion. It was in no way unusual for him to lecture for three, four, and even five hours at a stretch. Moreover, he did so with not so much as a scrap of notes. A good deal of the surviving material describing Vygotsky's work comes from stenographic notes of these lectures.

In the early years of our collaborative work, our theoretical stance met with little understanding or enthusiasm. People would ask: "Why cultural psychology? Every process is a mixture of natural and cultural influence. Why historical psychology? One can deal with psychological facts without being interested in the history of the behavior of primitive peoples. Why instrumental psychology? We all use instruments in our experiments."

In the course of time, as the result of many heated discussions and exchanges in scientific and social journals, the isolation of our small group came to an end. Our
methods became more sophisticated, our theories more thorough and robust. In a few years, the concepts formulated by Vygotsky became widely accepted, and eventually they formed the basis for the main school of Soviet psychology.

One of the many characteristics of Vygotsky's work that was important in shaping my later career was his insistence that psychological research should never be limited to sophisticated speculation and laboratory models divorced from the real world. The central problems of human existence as it is experienced in school, at work, or in the clinic all served as the contexts within which Vygotsky struggled to formulate a new kind of psychology. It is significant that, when Vygotsky got his first job as an instructor in the teachers college in Gomel, he devoted his attention to the special problems of educating retarded children. He did not forget this interest. During the 1920s he founded the Experimental Defectological Institute (EDI) which is now called the Institute of Defectology in the Academy of Pedagogical Sciences.

Unlike many previous investigators of handicapped children, Vygotsky concentrated his attention on the abilities that such children had, abilities that could form the basis for developing their full potential. It was their strengths, not their defects, that interested him most. Consistent with his overall approach, he rejected simple quantitative descriptions of such children in terms of unidimensional psychological traits reflected in test scores. Instead, he relied on qualitative descriptions of the special organization of their behavior. His diagnostic protocols analyzing children with various forms of deficiency were preserved by his collaborator, L. Geshelina, but many were destroyed during the war, and others were lost after Geshelina's death. Nonetheless, this work has been carried on by many able people, including his early students, Morozova and Levina.

A second and equally important area of applied work for Vygotsky was psychiatry. At this time, psychiatry shared in the crisis that characterized psychology. Its theories, such as they were, were largely descriptive and highly speculative. With a few notable exceptions, its methods were subjective and unsystematic. Vygotsky was strongly opposed to Freud's "depth psychology" with its overemphasis on man's biological nature. Instead he proposed a psychology from the "heights" of man's socially organized experiences, which, he maintained, determines the structure of human conscious activity.
From a theoretical perspective, the psychiatric clinic provided an additional setting in which to study the higher psychological functions. He applied a series of experimental tasks-some of them borrowed from developmental research, some invented for the special population-in order to be able to evoke pathological behavior under experimentally controlled circumstances. He was joined in this work by Bluma Zeigarruk, who had returned to the USSR in the late 1920s after studying for a number of years with Kurt Lewin in Germany.

Perhaps one of the most fruitful applied areas studied by Vygotsky, and certainly the one that had the greatest influence on my own career, was his work in neurology. This interest led us both to take courses in medical school. For me, it was the return to a medical career that my father had wished for me a decade earlier. For Vygotsky, it was the beginning of a road that time did not allow him to travel.

The neurology that we knew in the 1920s derived primarily from the achievements of German neurology in the latter half of the nineteenth century. Certain major "centers" controlling psychological functioning had been identified, such as the speech center discovered by Paul Broca, and neurologists were busy constructing maps of the cerebral cortex. This work proved important in formulating the cortical basis of psychological functions. But Vygotsky did not consider it sufficient because the neurological evidence was not closely linked to an adequate psychological theory. What the enterprise called for was the creation of a neuropsychology.

Vygotsky had two early models of such a compound discipline in the work of two Russian scientists. Bekhterev had applied experimental psychological methods in the neurological clinic, although Vygotsky could not accept reflexology as a theory of higher, specifically human psychological functions. At the Moscow Neurological Institute, Rossolimo had constructed a battery of tests for clinical diagnosis, rather similar to the battery developed some years later by David Wechsler. But the tasks that made up this battery failed to give a clear picture of the psychological mechanisms that were disrupted by neurological disorders.

Having surveyed previous versions of neuropsychology, Vygotsky proposed an approach based on his own analysis of the structure of psychological functioning. He
sought first to specify the relation between elementary and higher psychological functions and their brain organization in the normal adult. He then proposed general principles to explain the changes in the structure of psychological functioning that characterized various pathological states and early ontogeny.

Vygotsky's observations in the neurological clinic began with aphasia, a language disorder. This choice reflected his conviction that the acquisition of language plays a decisive role in the development of higher psychological processes. Aphasia promised to be a condition that could be shown to affect specific aspects of mediated forms of cognitive activity in association with specific neurological damage. While the specific hypotheses related to aphasia proved simplistic, the general proposition that neurological explanations of human behavior required a sophisticated psychological theory of that behavior proved central to the later development of neuropsychology in the USSR.

Vygotsky's approach to the study of aphasia served as a model for all our later investigations in neuropsychology. Beginning with prior evidence concerning both the neurology and the psychology of the disturbance, he used clinical examinations of individual patients to gain a clearer picture of the qualitative differences between normal and aphasic functioning. The qualitative picture of the syndrome then led in two directions, toward a deeper understanding of both the brain structures intimately involved in the disorder and the psychological features of the disorder. Because in this case the psychological disorder was both organized by and reflected in language, we undertook a study of linguistics to supplement our psychological research.

In the brief decade between the time Vygotsky arrived in Moscow and his death from tuberculosis in 1934, his intelligence and energy created a psychological system that has by no means been fully explored. Virtually every branch of Soviet psychology, both its theory and its practical applications, have been influenced by his ideas. These same ten years altered forever the course of my own work. Without destroying the basic impulses that had attracted me to psychology in the first place, Vygotsky provided me with an incomparably broader and deeper understanding of the enterprise into which my early research fit. By the end of the 1920s the future course of my career was set. I was to
spend my remaining years developing various aspects of Vygotsky's psychological system.

From 1928 to 1934 my energy was concentrated on demonstrating the social origin and mediated structure of higher psychological processes. The studies evolved from Vygotsky's belief that human beings' higher psychological functions come about through the intricate interaction of biological factors that are part of our physical makeup as Homo sapiens and cultural factors that have evolved over the tens of thousands of years of human history. At the time of his death, my colleagues and I had developed two complementary strategies for discovering the interplay of biological and social factors in the structure of higher psychological functions. The first strategy was to trace the development of such functions out of the natural, biologically determined functions which preceded them. The second strategy was to study the dissolution of higher psychological functions as the result of some kind of insult to the organism.

During the period 1928-1934 and again in the late 1940s I concentrated my work on the first class of strategies, those that emphasize developmental change. From 1936 to 1945 and again from the mid 1950s to the present day I emphasized the study of dissolution and restoration of higher psychological functions in terms of the brain mechanisms that control them.

The developmental research was further divided into three lines of work, each of which addressed the relation of biological and cultural factors in human cognition in a different way. First, in an attempt to demonstrate the social origins of the particular forms that higher psychological functions assume in differently organized cultural circumstances, we undertook a study of adults who had been raised in different cultural circumstances from those that prevailed in the industrial centers of European Russia. Next, we carried out a longitudinal study of identical and fraternal twins. Here we, like others who have been concerned with the relative roles of "nature" and "nurture" in human development, made use of the differences between identical and fraternal twins, in that identical or monozygotic, twins have identical genetic material, whereas fraternal twins do not. By calculating the difference in performance of twins of the two kinds, we hoped to separate "natural" and "cultural" factors in development. Working from
Vygotsky's theory, we added our own refinements to the techniques then available to us. Finally, we undertook a study of the comparative development of normal and mentally retarded children of various kinds. Here we used biological distortion in the course of development to aid us both in understanding the structure of normal functioning and in developing means of compensating biologically disabled children to the greatest extent possible using carefully designed educational curricula.

The work that emphasized the dissolution of higher functions was always seen as a natural complement to the developmental work. In fact, in the late 1920s we drew no really clearcut distinction between the two approaches; our work went on simultaneously on all fronts. The kindergarten and the clinic were equally attractive avenues of approach to the difficult analytic problems. But when war broke out in 1941, there was no room for choice. All of our efforts were concentrated on the study of the cortical foundations of higher functions, and in the trying years that followed, we put our limited theory into practice, developing both the theory and its applications.

SOURCE:
http://www.marxists.org/archive/luria/works/1979/mind/ch03.htm