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NINETEENTH-CENTURY BEGINNINGS

Until the latter half of the nineteenth century the study of man‘s nature was the province of philosophy. The intellectual descendants of John Locke in England had developed his empiricist explanation of mind, which emphasized the origin of ideas from environmentally produced sensations. The major problem of psychological analysis for these British empiricists was to describe the laws of association by which simple sensations combine to produce complex ideas. On the continent the followers of Immanuel Kant argued that ideas of space and time and concepts of quantity, quality, and relation originate in the human mind and cannot be decomposed into simpler elements. Neither side budged from its armchair. Both of these philosophical traditions were operating under the assumption, dating from the work of Rene Descartes, that the scientific study of man could apply only to his physical body. To philosophy was assigned the study of his soul.

These books by Darwin, Fechner, and Sechenov can be viewed as essential constituents of psychological thought at the end of the nineteenth century. Darwin linked animals and humans in a single conceptual system regulated by natural laws: Fechner provided an example of what a natural law describing the relationship between physical events and human mental functioning might look like; Sechenov, extrapolating from muscle twitches in frogs, proposed da physiological theory of how such mental processes worked within the normally functioning individual. None of these authors considered themselves (or were considered by their contemporaries) to be psychologists. But they provided the central questions with which the young science of psychology became concerned in the second half of the century: What are the relationships between animal and human behavior? Environmental and mental events? Physiological and psychological processes? Various schools of psychology attacked one or another of these questions, providing partial answers within theoretically limited perspectives.

The second line of attact on descriptions of the contents of consciousness came from a group of psychologists who objected to the one point upon which Wundt and the behaviorists agreed: the appropriateness of analyzing psychological processes into their basic constituents. This movement, which came to be known as Gestalt psychology, demonstrated that many intellectual phenomena (Köhler‘s studies with anthropoid apes were an example) and perceptual phenomena (Wertheimer‘s studies of apparent movement of flickering lights, for example) could not be accounted for in terms of either the basic elements of consciousness postulated by Wundt or simple stimulus-response theories of behavior. The Gestalt psychologists rejected, in principle, the possibility of accounting for complex processes in terms of simple ones.

… he [Vygotsky] made it clear that in his view none of the existing schools of psychology provided a firm foundation for establishing a unified theory of human psychological processes. Borrowing a phrase from his German contemporaries, he often referred to the „crisis in psychology“ and set himself the task of achieving a synthesis of contending views on a completely new theoretical basis. Established theories (primarily Wundts and Watsonian behaviorism) could not, in their view, explain complex perceptual and problemsolving behaviors. For Vygotsky, the crisis went much deeper. He shared the Gestalt psychologists‘ dissatisfaction with psychological analysis that began by reducing all phenomena to a set of psychological „atoms.“ But he felt that the Gestalt psychologists failed to move beyond the description of complex phenomena to the explanation of them. Even if one were to accept the Gestalt criticisms of previous approaches, a crisis would still exist because psychology would remain split into two irreconcilable halves: a „natural science“ branch that could explain elementary sensory and reflex processes, and a „mental science“ half that could describe emergent properties of higher psychological processes. What Vygotsky sought was a comprehensive approach that would make possible description and explanation of higher psychological functions in terms acceptable to natural science.

A major reason for the continued relevance of Vygotsky‘s work is that in 1924 and the following decade he constructed a penetrating critique of the notion that an understanding of the higher psychological functions in humans can be found by a multiplication and complication of principles derived from animal psychology, in particular those principles that represent the mechanical combination of stimulus-response laws. At the same time he provided a devastating critique of theories which claim that the properties of adult intellectual functions arise from maturation alone, or are in any way preformed in the child and simply waiting for an opportunity to manifest themselves.

MARXIST THEORETICAL FRAMEWORK

… Vygotsky saw in the methods and principles of dialectical materialism a solution to key scientific paradoxes facing his contemporaries. A central tenet of this method is that all phenomena be studied as processes in motion and in change. In terms of the subject matter of psychology, the scientist‘s task is to reconstruct the origin and course of development of behavior and consciousness. Not only does every phenomenon have its history, but this history is characterized by changes both qualitative (changes in form and structure and basic characteristics) and quantitative. Vygotsky applied this line of reasoning to explain the transformation of elementary psychological processes into complex ones. The schism between natural scientific studies of elementary processes and speculative reflection on cultural forms of behavior might be bridged by tracing the qualitative changes in behavior occuring in the course of deyelopment. Thus, when Vygotsky speaks of his approach as „developmental,“ this is not to be confused with a theory of child development. The developmental method, in Vygotsky‘s view, is the central method of psychological science.

Vygotsky brilliantly extended this concept of mediation in human-environment interaction to the use of signs as well as tools. Like tool systems, sign systems (language, writing, number systems) are created by societies over the course of human history and change with the form of society and the level of its cultural development. Vygotsky believed that the internalization of culturally produced sign systems brings about behavioral transformations and forms the bridge between early and later forms of individual development. Thus for Vygotsky, in the tradition of Marx and Engels, the mechanism of individual developmental change is rooted in society and culture.

THE INTELLECTUAL AND SOCIAL SETTING

Within psychology, an older colleague, P. P. Blonsky, had already adopted the position that an understanding of complex mental functions requires developmental analysis. From Blonsky Vygotsky adopted the notion that „behavior can be understood only as the history of behavior.“ Blonsky was also an early advocate of the view that the technological activities of people were a key to understanding their psychological makeup, a view that Vygotsky exploited in great detail.

VYGOTSKY‘S USE OF THE EXPERIMENTAL METHOD

Vygotsky's references in the text to experiments conducted in his laboratory sometimes leave readers with a sense of unease. He presents almost no raw data and summaries are quite general. Where are the statistical tests that record whether or not observations reflect „real“ effects? What do these studies prove? Do they in fact lend any support to Vygotsky's general theories, or is he, in spite of his disclaimers, conducting psychology in a speculative manner without subjecting his central propositions to empirical test? Those steeped in the methodology of experimental psychology as practiced in most American laboratories may be inclined to withhold the term „experiment“ from Vygotsky's studies and consider them to be little more than interesting demonstrations or pilot studies. And so, in many respects, they were.

Vygotsky's concept of the experiment differed from that of American psychology, and understanding this difference is important for an appreciation of Vygotsky's contribution to contemporary cognitive psychology.
As every student of an introductory experimental course knows, the purpose of an experiment as conventionally presented is to determine the conditions controlling behavior. Methodology follows from this objective: the experimental hypothesis predicts aspects of the stimulus materials or task that will determine particular aspects of the response; the experimenter seeks maximum control over materials, task, and response in order to test the prediction. Quantification of responses provides the basis for comparison across experiments and for drawing inferencnces about cause-and-effect relationships. The experiment, in short, is designed to produce a certain performance under conditions that maximize its interpretability.

To serve as an effective means of studying „the course of development of process," the experiment must provide maximum opportunity for the subject to engage in a variety of activities that can be observed, not just rigidly controlled. One technique Vygotsky effectively used for this purpose was to introduce obstacles or difficulties into the task that disrupted routine methods of problem solving. For example, in studying children‘s communication and the function of egocentric speech Vygotsky set up a task situation that required children to engage in cooperative activity with others who did not share their language (foreignspeaking or deaf children). Another method was to provide alternative routes to problem solving, including a variety of materials (Vygotsky called them „external aids") that could be used in different ways to satisfy the demands of the task. By careful observation of the uses made of these external aids by children at different ages under different conditions of task difficulty, Vygotsky sought to reconstruct the series of changes in intellectual operations that normally unfold during the course of the child‘s biographical development.

Several implications follow from Vygotsky's theoretical approach and method of experimentation. One is that experimental results will be qualitative as well as quantitative in nature. Detailed descriptions, based on careful observation, will constitute an important part of experimental findings. To some, such findings may seem merely anecdotal; Vygotsky maintained that if carried out objectively and with scientific rigor, such observations have the status of validated fact.
Another consequence of this new approach to experimentation is to break down some of the barriers that are traditionally erected between „laboratory" and „field." Experimental interventions and observations may often be as well or better executed in play, school, and clinical settings than in the psychologist's laboratory. The sensitive observations and imaginative interventions reported in this book attest to this possibility.

TOOL AND SYMBOL IN CHILD DEVELOPMENT

Karl Stumpf, a prominent German psychologist in the early years of the twentieth century, based his studies on a set of premises completely different from those I will employ here. He compared the study of children to the study of botany, and stressed the botanical character of development, which he associated with maturation of the whole organism.
The fact is that maturation per se is a secondary factor in the development of the most complex, unique forms of human behavior. The development of these behaviors is characterized by complicated, qualitative transformations of one form of behavior into another (or, as Hegel would phrase it, a transformation of quantity into quality). The conception of maturation as a passive process cannot adequately describe these complex phenomena. Nevertheless, as A. Gesell has aptly pointed out, in our approaches to development we continue to use the botanical analogy in our description of child development (for example, we say that the early education of children takes place in a „kindergarten"). Recently several psychologists have suggested that this botanical model must be abandoned.

RELATION BETWEEN SPEECH AND TOOL USE

… Psychologists preferred to study the development of sign use as an example of pure intellect and not as the product of the child‘s develoo mental history. They often attributed sign use to the child*s spontaneous discoyery of the relation between signs and their meanings. As W. Stern stated, recognition of the fact that verbal signs have meaning constitutes „the greatest discovery in the child‘s life.“ A number of authors fix this happy „moment“ at the juncture of the child‘s first and second year, regarding it as the product of the child‘s mental activity. Detailed examination of the development of speech and other forms of sign use was assumed to be unnecessary. Instead, it has routinely been assumed that the child*s mind contains all stages of future intellectual development; they exist in complete form, awaiting the proper moment to emerge.

Not only were speech and practical intelligence assumed to have different origins, but their joint participation in common operations was considered to be of no basic psychological importance (as in the work of Shapiro and Gerke). Even when speech and the use of tools were closely linked in one operation, they were still studied as separate processes belonging to two completely different classes of phenomena. At best, their simultaneous occurrence was considered a consequence of accidental, external factors.

The students of practical intelligence as well as those who study speech development often fail to recognize the interweaving of these two functions. Consequently, the children's adaptive behavior and signusing activity are treated as parallel phenomena—a view that leads to Piaget's concept of „egocentric“ speech. He did not attribute an important role to speech in the organization of the child's activities, nor did he stress its communicative functions, although he was obliged to admit its practical importance.

Although practical intelligence and sign use can operate independently of each other in young children, the dialectical unity of these systems in the human adult is the very essence of complex human behavior. Our analysis accords symbolic activity a specific organizing function that penetrates the process of tool use and produces fundamentally new forms of behavior.

SOCIAL INTERACTION AND THE TRANSFORMATION OF PRACTICAL ACTIVITY

… the most significant moment in the course of intellectual development, which gives birth to the purely human forms of practical and abstract intelligence, occurs when speech and practical activity, two previously completely independent lines of development, converge.

Prior to mastering his own behavior, the child begins to master his surroundings with the help of speech. This produces new relations with the environment in addition to the new organization of behavior itself. The creation of these uniquely human forms of behavior later produce the intellect and become the basis of productive work: the specifically human form of the use of tools.

Observations of children in an experimental situation similar to that of Köhler‘s apes show that the children not only *act* in attempting to achieve a goal but also *speak*. As a rule this speech arises spontaneously and continues almost without interruption throughout the experiment. It increases and is more persistent every time the situation becomes more complicated and the goal more difficult to attain. Attempts to block it (as the experiments of my collaborator R. E. Levina have shown) are either futile or lead the child to „freeze up.“

These observations lead me to the conclusion that children solve practical tasks with the help of their speech, as well as their eyes and hands. This unity of perception, speech, and action, which ultimately produces internalization of the visual field, constitutes the central subject matter for any analysis of the origin of uniquely human forms of behavior.

Sometimes speech becomes of such vital importance that, if not permitted to use it, young children cannot accomplish the given task.

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To develop the first of these two points, we must ask: What is it that really distinguishes the actions of the speaking child from the actions of an ape when solving practical problems?
The first thing that strikes the experimenter is the incomparably greater *freedom* of children*s operations, their greater independence from the structure of the concrete, visual situation. Children with the aid of speech, create greater possibilities than apes can accomplish through action. One important manifestation of this greater flexibility is that the child is able to ignore the direct line between actor and goal. Instead, he engages in a number of preliminary acts using what we speak of as instrumental, or mediated (indirect), methods. In the process of solving a task the child is able to include stimuli that do not lie within the immediate visual field. Using words (one class of such stimuli) to create a specific plan, the child achieves a much broader range of activity, applying as *tools* not only those objects that lie near at hand, *but searching for and preparing such stimuli as can be useful in the solution of the task, and planning future actions*.

Second, the practical operations of a child who can speak become much less impulsive and spontaneous than those of the ape. The ape typically makes a series of uncontrolled attempts to solve the given problem. In contrast, the child who uses speech divides the activity into two consecutive parts. She plans how to solve the problem through speech and then carries out the prepared solution through overt activity Direct manipulation is replaced by a complex psychological process through which inner motivation and intentions, postponed in time, stimulate their own development and realization. This new kind of psychological structure is absent in apes, even in rudimentary forms.

One way to increase the production of egocentric speech is to complicate a task in such a way that the child cannot make direct use of look for its solution. When faced with such a challenge, the children's emotionai use of language increases as well as their efforts to achieve a new plan, and their utterances reveal the close connection between egocentric and socialized speech. This is best seen when the experimenter leaves the room or fails to answer the children's appeals for help. Upon being deprived of the opportunity to engage in social speech, children immediately switch over to egocentric speech.

The greatest change in children‘s capacity to use languae as a problem-solving tool takes place somewhat later in their development, when socialized speech (which has previouslv been used to address an adult) is *turned inward*. Instead of appealing to the adult, children appeal to themselves; language thus takes on an *intrapersonal function* in addition to its *interpersonal use.* When children develop a method of behavior for guiding themselves that had previously been used in relation to another person, when they organize their own activities according to a social form of behavior, they succeed in applying a social attitude to themselves. The history of the process of the *internalization of social speech* is also the history of the socialization of children‘s practical intellect.

Young children name their drawings only after they have completed them; they need to see them before they can decide what they are. As children get older they can decide in advance what they are going to draw. This displacement of the naming process signifies a change in the function of speech. Initially speech follows actions, is provoked by and dominated by activity. At a later stage, however, when speech is moved to the starting point of an activity, a new relation between word and action emerges. Now speech guides, determines, and dominates the course of action; *the planning function of speech* comes into being in addition to the already existing function of language to reflect the external worid.

Unlike the ape, which Köhler tells us is „the slave of its own visual field,“ children acquire an independence with respect to their concrete surroundings; they cease to act in the immediately given and evident *space*. Once children learn how to use the planning function of their language effectively, their psychological field changes radically. A view of the future is now an integral part of their approaches to their surroundings.

The changes I have described do not occur in a one-dimensional, even fashion. Our research has shown that very small children solve problems using unique mixtures of processes. In contrast with adults, who act differently to objects and to people, young children are likely to fuse action and speech when responding to both objects and social beings. This fusion of activity is analagous to syncretism in perception, which has been described by many developmental psychologists.

The unevenness I am speaking of is seen quite clearly in a situation where small children, when unable to solve the task before them easily, combine direct attempts to obtain the desired end with a reliance upon emotional speech. At times speech expresses the childrens desires, while at other times it serves as a substitute for actually achieving the goal. The child may attempt to solve the task through verbal formulations *and* by appeals to the experimenter for help. This mixture of diverse forms of activity was at first bewildering; but further observations drew our attention to a sequence of actions that clarify the meaning of the children‘s behavior in such circumstances. For example, after completing a number of intelligent and interrelated actions that should help him solve a particular problem successfully, the child suddenly, upon meeting a difficulty, ceases all attempts and turns for help to the experimenter. Any obstacle to the child‘s efforts at solving the problem may interrupt his activity. The child‘s verbal appeal to another person is an effort to to fill the hiatus his activity has revealed. By asking a question, the child indicates that he has, in fact, formnulated a plan to solve the task before him, but is unable to perform all the necessary operations.

Through repeated experiences of this type, children learn covertly (mentally) to plan their activities. At the same time they enlist the assistance of another person in accordance with the requirements of the problem posed for them. The child‘s ability to control another person‘s behavior becomes a necessary part of the child‘s practical activity.

THE DEVELOPMENT OF PERCEPTION AND ATTENTION

Köhler‘s work emphasized the importance of the structure of the visual field in organizing the ape‘s practical behavior. The entire process of problem solving is essentially determined by perception. In this respect Köhler had ample grounds for believing that these animals are bound by their sensory field to a much greater extent than adult humans. They are incapable of modifying their sensory field by means of voluntary effort. Indeed it would probably be useful to view as a general law the dependence of all natural forms of perception on the structure of the sensory field.

By means of words children single out separate elements, thereby overcoming the natural structure of the sensory field and forming new (artifically introduced and dynamic) structural centers. The child begins to perceive the world not only through his eyes but also through his speech. As a result, the immediacy of „natural“ perception is supplanted by a complex mediated process; as such, speech becomes an essential part of the child‘s cognitive development.

The role of language in perception is striking because of the opposing tendencies implicit in the nature of visual perception and language. The independent elements in a visual field are simultaneously perceived; in this sense, visual perception is integral. Speech, on the other hand, requires sequential processing. Each element is separately labeled and then connected in a sentence structure, making speech essentially analytical.
Our research has shown that even at very eariy stages of development, language and perception are linked.

Attention should be given first place among the major functions in the psychological structure underlying the use of tools. Beginning with Köhler, scholars have noted that the ability or inability to direct one‘s attention is an essential determinant of the success or failure of any practical operation. However, the difference between the practical intelligence of children and animals is that children are capable of reconstructing their perception and thus freeing themselves from the given structure of the field. With the help of the indicative function of words, the child begins to master his attention, creating new structural centers in the perceived situation.

In addition to reorganizing the visual-spatial field, the child, with the help of speech, creates a time field that is just as perceptible and real to him as the visual one. The speaking child has the ability to direct his attention in a dynamic way. He can view changes in his immediate situation from the point of view of past activities, and he can act in the present from the viewpoint of the future.
For the ape, the task is unsolvable unless the goal and the object needed to reach it are both simultaneously in view. For the child, this gap is easily overcome by verbally controlling her attention and thereby reorganizing her perceptual field. The ape will perceive a stick one moment, but cease to pay attention to it after its visual field has changed and the goal comes into view. The ape must see his stick in order to pay attention to it; the child may pay attention in order to see.

The possibility of combining elements of the past and present visual fields (for instance, tool and goal) in one field of attention leads in turn to a basic reconstruction of another vital function, *memory*. (…) Through verbal formulations of past situations and activities, the child frees himself from the limitations of direct recall; he succeeds in synthesizing the past and present to suit his purposes.

Created with the help of speech, the time field for action extends both forward and backward. Future activity that can be included ongoing activity is represented by signs. As in the case of memory and attention, the inclusion of signs in temporal perception does not lead to a simple lengthening of the operation in time; rather, it creates the conditions for the development of a single system that includes effective elements of the past, present, and future. This emerging psychological system in the child now encompasses two new functions: intentions and symbolic representations of purposeful action.

Mastery of Memory and Thinking

SOCIAL ORIGINS OF INDIRECT (MEDIATED) MEMORY

A comparative investigation of human memory reveals that, even at the earliest stages of social development, there are two, principally different, types of memory. One, dominating in the behavior of nonliterate peoples, is characterized by the nonmediated impression of materials, by the retention of actual experiences as the basis of mnemonic (memory) traces. We call this *natural memory*, and it is clearly illustrated in E. R. Jaensch‘s studies of **eidetic imagery**. This kind of memory is very close to perception, because it arises out of the direct influence of external stimuli upon human beings. From the point of view of structure, the entire process is characterised by a quality of immediacy.
Natural memory is not the only kind, however, even in the case of nonliterate men and women. On the contrary, other types of memory belonging to a completely different developmental line coexist with natural memory. The use of notched sticks and knots, the beginnings of writing and simple memory aids all demonstrate that even at early stages of historical development humans went beyond the limits of the psychological functions given to them by nature and proceeded to a new culturally-elaborated organization of their behavior. Comparative analysis shows that such activity is absent in even the highest species of animals; we believe that these sign operations are the product of specific conditions of *social* development.

STRUCTURE OF SIGN OPERATIONS

Every elementary form of behavior presupposes a direct reaction to the task set before the organism (which can be expressed by the simple S → R formula). But the structure of sign operations requires an intermediate link between the stimulus and the response. This intermediate link is a second order stimulus (sign) that is drawn into the operation where it fulfills a special function; it creates a new relation between S and R. The term „drawn into“ indicates that an individual must be actively engaged in establishing such a link. This sign also possesses the important characteristic of reverse action (that is, it operates on the individual, not the environment).

Careful studies demonstrate that this type of organization is basic to all higher psychological processes, although in much more sophisticated forms than that shown above. The intermediate link in this formula is not simply a method of improving the previously existing operation. Nor is it a mere additional link in an S-R chain. Because this auxiliary stimulus possesses the specific function of reverse action, it transfers the psychological operation to higher and qualitatively new forms and permits humans, by the aid of extrinsic stimuli, *to control their behavior from the outside*. The use of signs leads humans to a specific structure of behavior that breaks away from biogical development and creates new forms of a culturally-based psychological process.

THE NATURAL HISTORY OF SIGN OPERATIONS

Although the indirect (or mediated) aspect of psychological operations is an essential feature of higher mental processes, it would be a great mistake, as I pointed out with respect to the beginnings of speech, to believe that indirect operations appear as the result of a pure logic. They are not invented or discovered by the child in the form of a sudden insight or lightning-quick guess (the so-called „aha“ reaction). The child does not suddenly and irrevocably deduce the relation between the sign and the method for using it. Nor does she intuitively develop an abstract attitude derived, so to speak, from „the depths of the child‘s own mind.“ This metaphysical view, according to which inherent psychological schemata exist prior to any experience, leads inevitably to an a priori conception of higher psychological functions.
Our research has led us to quite different conclusions. We have found that sign operations appear as a result of a complex and prolonged process subject to all the basic laws of psychological evolution. *This means that sign-using activity in children is neither simply invented nor passed down by adults;* rather it arises from something that is originally not a sign operation and becomes one only after a series of qualitative transformations. Each of these transformations provides the conditions tor the next stage and is itself conditioned by the preceding one; thus, transformations are linked like stages of a single process, and are historical in nature.

Within a general process of development, two qualitatively different lines of development, differing in origin, can be distinguished: the elementary processes, which are of biological on the one hand, and the higher psychological functions, of sociocultural origin, on the other. *The history of child behavior is born from the interweaving of these two lines*. The history of the development of the higher psychological functions is impossible without a study of their prehistory. Their biological roots, and their organic disposition. The developmental roots of two fundamental, cultural forms of behavior arise during infancy: the use of *tools* and human *speech*. This alone places infancy at the center of the prehistory of cultural development.

MEMORY AND THINKING

In other words, with a change in developmental level there occurs a change not so much in the structure of a single function (which, for example, we may call memory) as in the character of those functions with the aid of which remembering takes place; what changes is the *interfunctional* relations that connect memory with other functions.
The memory of older children is not only different from the memory of younger children; it also plays a different role in the older child‘s cognitive activity. Memory in early childhood is one of the central psychological functions upon which all the other functions are built. Our analyses suggest that thinking in the very young child is in many respects determined by his memory, and is certainly not the same thing as the thinking of the more mature child. For the very young child, to think means to remember; at no time after very early childhood do we see such a close connection between these two psychological functions.

However, in the course of development a transfonnation occures, especially in adolescence. Investigations of memory at this age have shown that toward the end of childhood the interfunctional relations involving memory reverse their direction. *For the young child, to think means to recall; but for the adolescent, to recall means to think.* Her memory is so „logicalized“ that remembering is reduced to establishing and finding logical relations; recognizing consists in discovering that element which the task indicates has to be found.

This logicalization is indicative of how relations among cognitive functions change in the course of development. At the transitional age all ideas and concepts, all mental structures, cease to be organized according to family types and become organized as abstract concepts.
There can be no doubt that to remember an item when thinking in concepts is a completely different task from thinking in complexes, although the processes are compatible with each other. Therefore the development of children‘s memory must be studied not only with respect to changes happening within memory itself, but also with respect to the relation between memory and other functions.

The very essence of human memory consists in the fact that human beings actively remember with the help of signs. It may be said that the basic characteristic of human behavior in general is that humans personally influence their relations with the environment and through that environment personally change their behavior, subjugating it to their control. It has been remarked that the very essence of civilization consists of purposely building monuments so as not to forget. In both the knot and the monument we have manifestations of the most tundamental and characteristic feature distinguishing human from animal memory.

One thing is already certain. Just as the first use of tools refutes the notion that development represents the mere unfolding of the child‘s organically predetermined system of activity, so the first use of signs demonstrates that there cannot be a single organically predetermined internal system of activity that exists for each psychological function. The use of artificial means, the transition to mediated activity, fundamentally changes all psychological operations just as the use of tools limitlessly broadens the range of activities within which the psychological functions may operate. In this context, we can use the term *higher* psychological function, or *higher behavior* as referring to the combination of tool and sign in psychological activity.

In the initial phase reliance upon external signs is crucial to the child‘s effort. But through development these operations undergo radical changes: the entire operation of mediated activity (for example, memorizing) begins to take place as a purely internal process. Paradoxically, late stages of the child‘s behavior appear to be the same as early stages of memorizing, which were characterized by a direct process. The very young child does not rely upon external means; rather he uses a „natural,“ „eidetic“ approach. Judging only from external appearances, it seems that the older child has simply begun to memorize more and better; that she has somehow perfected and developed her old methods of memorizing. At the highest levels she appears to have abandoned any reliance upon signs. However, this appearance is only illusory. Development, as often happens, proceeds here not in a circle but in a spiral, passing through the same point at each new revolution while advancing to a higher level.

We call the internal reconstruction of an external operation *internalization*. A good example of this process may be found in the development of pointing. Initially, this gesture is nothing more than an unsuccessful attempt to grasp something, a movement aimed at a certain object which designates forthcoming activity. The child attempts to grasp an object placed beyond his reach; his hands, stretched toward that object, remain poised in the air. His fingers make grasping movements. At this initial stage pointing is represented by the child‘s movement, which seems to be pointing to an object —that and nothing more.
When the mother comes to the child‘s aid and realizes his movement indicates something, the situation changes fundamentally. Pointing becomes a gesture for others. The child‘s unsuccessful attempt engenders a reach on not from the object he seeks but *from another person.* Consequently the primary meaning of that unsuccessful grasping movement is established by others. Only later, when the child can link his unsuccessful grasping movement to the objective situation as a whole, does he begin to understand this movement as pointing. At this juncture there occurs a change in that movement‘s function: from an object-oriented movement it becomes a movement aimed at another person, a means of establishing relations. *The grasping movement changes to the act of pointing.*

As the above description of pointing illustrates, the process of internalization consists of a series of transformations:

(a) An operation that initially represents an external activity is reconstructed and begins to occur internally. Of particular importance to the development of higher mental processes is the transformation of sign-using activity, the history and characteristics of which are illustrated by the development of practical intelligence, voluntary attention, and memory.

(b) An interpersonal process is transformed into an intrapersonal one. Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological), and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relations between human individuals.

(c) The transformation of an interpersonal process into an intrapersonal one is the result of a long series of developmental events. The process being transformed continues to exist and to change as an external form of activity for a long time before definitively turning inward. For many functions, the stage of external signs lasts forever, that is, it is their final stage of development. Other functions develop further and gradually become inner functions. However, they take on the character of inner processes only as a result of a prolonged development. Their transfer inward is linked with changes in the laws governing their activity; they are incorporated into a new system with its own laws.

The internalization of cultural forms of behavior involves the reconstruction of psychological activity on the basis of sign operations.

Problems of Method

Therefore, our criticism of current views concerning the essential nature and development of psychological processes must inevitably result in a reexamination of methods of research.

Despite great diversity in procedural details, virtually all psychological experiments rely on what we shall term a stimulus-response *framework*. By this we mean that no matter what psychological process is under discussion, the psychologist seeks to confront the subject with some kind of stimulus situation designed to influence him in a particular way, and then the psychologist examines and analyzes the response(s) elicited by that stimulating situation. After all, the very essence of experimentation is to evoke the phenomenon under study in an artificial (and thereby controllable) way and to study the variations in response that occur in conjunction with various changes in the stimulus.

On the surface it may appear that various schools of psychology could not possibly agree on this methodology. The objective psychology of Watson, Bekhterev, and others, for example, was constructed in Opposition to the subjective theories of Wundt and the Würzburg school. But closer examination of the differences between schools of psychology reveals that those differences arise out of the *theoretical interpretation* psychologists want to assign to the consequences of various stimulating environments and not out of variations in the general methodological approach within which observations are made.

Kehance on a stmmlus-response framework is an obvious feature of those schools of psychology whose theories as well as experiments are based on stimulus-response interpretations of behavior. Pavlovian theory, for example, has utilized the notion of cortical excitation incited by various stimuli to explain how connections are formed in the brain that enable the organism to learn to respond to hitherto neutral stimuli. It may be less obvious that exactly the same framework applies to introspective psychology as well, since the framework and the theory do not seem to coincide. However, taking Wundt as an example, we find that the stimulus-response framework provided the context within which the experimenter-theorist could obtain descriptions of the processes presumed to have been elicited by the stimulus.

From the foregoing it should be clear that a stimulus-response framework for constructing experimental observations cannot serve as the basis for the adequate study of the higher, specifically human forms of behavior. At best it can only help us to record the existence of the lower, subordinated forms, which do not capture the essence of the higher forms. Using current methods, we can only determine quantitative variation in the complexity of stimuli and in the responses o different animals and humans at different stages of development.
It is my belief, based upon a dialectical materialist approach to the analysis of human history, that human behavior differs qualitatively from animal behavior to the same extent that the adaptability and historical development of humans differ from the adaptability and development of animals. The psychological development of humans is part of the general historical development of our species and must be so understood. Acceptance of this proposition means that we must find a new methodology for psychological experimentation.

The keystone of our method, which I will try to describe analytically in the following sections, follows directly from the contrast Engels drew between naturalistic and dialectical approaches to the understanding of human history. Naturalism in historical analysis, according to Engels, manifests itself in the assumption that only nature affects human beings and only natural conditions determine historical development. The dialectical approach, while admitting the influence of nature on man, asserts that man, in turn, affects nature and creates through his changes in nature new natural conditions for his existence. This position is the keystone of our approach to the study and interpretation of man's higher psychological functions and serves as the basis for the new methods of experimentation and analysis that we advocate.

All stimulus-response methods share the inadequacy that Engels ascribes to naturalistic approaches to history. Both see the relation between human behavior and nature as unidirectionally reactive. My collaborators and I, however, believe that human behavior comes to have that „transforming reaction on nature“ which Engels attributed to tools. We must, then, seek methods adequate to our conception. In conjunction with new methods, we also need a new analytic framework.

Explanation versus description. In associationistic and introspective psychology, analysis is essentially description and not explanation as we understand it. Mere description does not reveal the actual causaldynamic relations that underlie phenomena.
K. Lewin contrasts phenomenological analysis, which is based on external features (phenotypes), with what he calls genotypic analysis, wherein a phenomenon is explained on the basis of its origin rather than its outer appearance. The difference between these two points of view can be elucidated by any biological example. A whale, from the point of view of its outer appearance, stands closer to the fish family than to the mammal, but in its biological nature it is closer to a cow or a deer than to a pike or a shark. Following Lewin, we can apply this distinction between the phenotypic (descriptive) and genotypic (explanatory) viewpoints to psychology. By a developmental study of a problem, I mean the disclosure of its genesis, its causal dynamic basis. By phenotypic I mean the analysis that begins directly with an object's curren features and manifestations. It is possible to furnish many examples from psychology where serious errors have been committed because these Viewpoints have been confused. In our study of the development of speech, we have emphasized the importance of the distinction between phenotypic and genotypic similarities.

Our research on young children's speech brings us to the basic principle formulated by Lewin: two phenotypically identical or similar processes may be radically different from each other in their causaldynamic aspects and vice versa; two processes that are very close in their causal-dynamic nature may be very different phenotypically.

Marx commented on the phenotypic approach in a most general form when he stated that „if the essence of objects coincided with the form of their outer manifestations, then every science would be superfluous“—an extremely reasonable observation. If every object was phenotypically and genotypically equivalent (that is, if the true principles of its construction and operation were expressed by its outer manifestation), then everyday experience would fully suffice to replace scientific analysis. Everything we saw would be the subject of our scientific knowledge.

In reality, psychology teaches us at every step that though two types of activity can have the same external manifestation, whether in origin or essence, their nature may differ most profoundly. In such cases special means of scientific analysis are necessary in order to lay bare internal differences that are hidden by external similarities. It is the task of analysis to reveal these relations. In that sense, real scientific analysis differs radically from subjective, introspective analysis, which by its verv nature cannot hope to go beyond pure description. Itie kind of objective analysis we advocate seeks to lay bare the essence rather than the perceived characteristics of psychological phenomena.

The problem of „fossilized behavior.“ The third principle underlying our analytic approach is based on the fact that in psychology often meet with processes that have already died away, that is, processes that have gone through a very long stage of historical development and have become fossilized. These fossilized forms of behavior are most easily found in the so-called automated or mechanized psychological processes which, owing to their ancient origins, are now being repeated for the millionth time and have become mechanized. They have lost their original appearance, and their outer appearance tells us nothing whatsoever about their internal nature. Their automatic character creates great difficulties for psychological analysis.

The concept of a historically based psychology is misunderstood by most researchers who study child development. For them, to study something historically means, by definition, to study some past event. Hence, they naively imagine an insurmountable barrier between historic study and study of present-day behavioral forms. To study something historically means to study it in the process of change; that is the dialectical method's basic demand. To encompass in research the process of a given thing's development in all its phases and changes—from birth to death—fundamentally means to discover its nature, its essence, for „it is only in movement that a body shows what it is.“ Thus, the historical study of behavior is not an auxiliary aspect of theoretical study, but rather forms its very base. As P. P. Blonsky has stated, „Behavior can be understood only as the history of behavior.“

The search for method becomes one of the most important problems of the entire enterprise of understanding the uniquely human forms of psychological activity. In this case, the method is simultaneously prerequisite and product, the tool and the result of the study.

In summary, then, the aim of psychological analysis and its essential factors are as follows:
(1) process analysis as opposed to object analysis;
(2) analysis that reveals real, causal or dynamic relations as opposed to enumeration of a process's outer features, that is, explanatory, not descriptive, analysis; and
(3) developmental analysis that returns to the source and reconstructs all the points in the development of a given structure. The result of development will be neither a purely psychological structure such as descriptive psychology considers the result to be, nor a simple sum of elementary processes such as associationistic psychology saw it, but a qualitatively new form that appears in the process of development.

CHARACTERISTICS OF THE NEW METHOD

I have attempted to demonstrate that the course of child development is characterized by a radical alteration in the very structure of behavior; at each new stage the child changes not only her response but carries out that response in new ways, drawing on new „instruments“ of behavior and replacing one psychological function by another. Psychological operations that were achieved through direct forms of adaptation at early stages are later accomplished through indirect means. The growing complexity of children‘s behavior is reflected in the changed means they use to fulfill new tasks and the corresponding reconstruction of their psychological processes.

Our concept of development implies a rejection of the frequently held view that cognitive development results from the gradual accumulation of separate changes. We believe that child development is a complex dialectical process characterized by periodicity, unevenness in the development of different functions, metamorphosis or qualitative transformation of one form into another, intertwining of external and internal factors, and adaptive processes which overcome impediments that the child encounters. Steeped in the notion of evolutionary change, most workers in child psychology ignore those turning points, those spasmodic and revolutionary changes that are so frequent in the history of child development. To the naive mind, revolution and evolution seem incompatible and historic development continues only so long as it follows a straight line. Where upheavals occur, where the historical fabric is ruptured, the naive mind sees only catastrophe, gaps, and discontinuity. History seems to stop dead, until it once again takes the direct, linear path of development.
Scientific thought, on the contrary, sees revolution and evolution as two forms of development that are mutually related and mutually presuppose each other. Leaps in the child's development are seen by the scientific mind as no more than a moment in the general line of development.

We study *not only the final effect of the operation, but its specific psychological structure*. In all these cases, the psychological structure of the development appears with much greater richness and variety than in the classic method of the simple stimulus-response experiment. Although stimulus-response methodology makes it extremely easy to ascertain subjects‘ responses, it proves useless when our objective is to discover the means and methods that subjects use to organize their own behavior.

Interaction between Learning and Development
… Essentially, all current conceptions of the relation between development and learning in children can be reduced to three major theoretical positions.
The first centers on the assumption that processes of child development are independent of learning. Learning is considered a purely external process that is not actively involved in development. It merely utilizes the achievements of development rather than providing an impetus for modifying its course.
In experimental investigations of the development of thinking in school children, it has been assumed that processes such as deduction and understanding, evolution of notions about the world, interpretation of physical causality, and mastery of logical forms of thought and abstract logic all occur by themselves, without any influence from school learning. An example of such a theory is Piaget‘s extremely complex and interesting theoretical principles, which also shape the experimental methodology he employs.

Similarly, the classics of psychological literature, such as the works by Binet and others, assume that development is always a prerequisite for learning and that if a child‘s mental functions (intellectual operations) have not matured to the extent that he is capable of learning a particular subject, then no instruction will prove useful. They especially feared premature instruction, the teaching of a subject before the child was ready for it. All effort was concentrated on finding the lower threshold of which a particular kind of learning first becomes possible.
…
Development or maturation is viewed as a precondition of learning but never the result of it. To summarize this position: Learning forms a superstructure over development, leaving the latter essentially unaltered.

The second major theoretical position is that learning is development. This identity is the essence of a group of theories that are quite diverse in origin.
One such theory is based on the concept of reflex, an essentially old notion that has been extensively revived recently. Whether reading, writing, or arithmetic is being considered, development is viewed as the mastery of conditioned reflexes; that is, the process of learning is completely and inseparably blended with the process of development. This notion was elaborated by James, who reduced the learning process to habit formation and identified the learning process with development.
These theories have at least one thing in common with theories such as Piaget‘s: in both, development is conceived of as the elaboration and substitution of innate responses. As James expressed it, „Education, in short, cannot be better described than by calling it the organization of acquired habits of conduct and tendencies to behavior.“

Theorists who hold the first view assert that developmental cycles precede learning cycles; maturation precedes learning and instruction must lag behind mental growth. For the second group of theorists, both processes occur simultaneously; learning and development coincide at all points in the same way that two identical geometrical figures coincide when superimposed.

The third theoretical position on the relation between learning and development attempts to overcome the extremes of the other two by simply combining them. A clear example of this approach is Koffka‘s theory, in which development is based on two inherently different but related processes, each of which influences the other. On the one hand is maturation, which depends directly on the development of the nervous system; on the other hand is learning, which itself is also a developmental process.

…

Also new is the idea that the two processes that make up development are mutually dependent and interactive. Of course, the nature of the interaction is left virtually unexplored in Koffka‘s work, which is limited solely to very general remarks regarding the relation between these two processes.

According to Thorndike, theoreticians in psychology and education believe that every particular response acquisition directly enhances overall ability in equal measure. Teachers believed and acted on the basis of the theory that the mind is a complex of abilities—powers of observation, attention, memory, thinking, and so forth—and that any improvement in any specific ability results in a general improvement in all abilities. According to this theory, if the student increased the attention he paid to to Latin grammar, he would increase his abilities to focus attention on any task. The words „accuracy,“ „quick-wittedness,“ ‘‘ability to reason,“ „memory,“ „power of observation,“ „attention,“ „concentration,“ and so forth are said to denote actual fundamental capabilities that vary in accordance with the material with which they operate; these basic abilities are substantially modified by studying particular subjects, and they retain these modifications when they turn to other areas. Therefore, if someone learns to do any single thing well, he will also be able to do other entirely unrelated things well as a result of some secret connection. It is assumed that mental capabilities function independently of the material with which they operate, and that the development of one ability entails the development of others.

ZONE OF PROXIMAL DEVELOPMENT:

Only recently, however, has attention been directed to the fact that we cannot limit ourselves merely to determining developmental levels if we wish to discover the actual relations of the developmental process to learning capabilities. We must determine at least two developmental levels.
The first level can be called the *actual developmental level*, that is, the level of development of a child‘s mental functions that has been established as a result of certain already *completed* developmental cycles. When we determine a child‘s mental age by using tests, we are almost always dealing with the actual developmental level. In studies of children‘s mental development it is generally assumed that only those things that children can do on their own are indicative of mental abilities.

We give children a battery of tests or a variety of tasks of varying degrees of difficulty, and we judge the extent of their mental development on the basis of how they solve them and at what level of difficulty. On the other hand, if we offer leading questions or show how the problem is to be solved and the child then solves it, or if the teacher initiates the solution and the child completes it or solves it in collaboration with other children—in short, if the child barely misses an independent solution of the problem—the solution is not regarded as indicative of his mental development. This „truth“ was familiar and reinforced by common sense. Over a decade even the profoundest thinkers never questioned the assumption; they never entertained the notion that what children can do with the assistance of others might be in some sense even more indicative of their mental development than what they can do alone.

… some way or another I propose that the children solve the problem with my assistance. Under these circumstances it turns out that the first child can deal with problems up to a twelve-year-old‘s level, the second up to a nine-year-old‘s. Now, are these children mentally the same?

...the zone of proximal development. It is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers.

The zone of proximal development furnishes psychologists and educators with a tool through which the internal course of development can be understood. By using this method we can take account of not only the cycles and maturation processes that have already been completed but also those processes that are currently in a state of formation, that are just beginning to mature and develop. Thus, the zone of proximal development permits us to delineate the child's immediate future and his dynamic developmental state, allowing not only for what already has been achieved developmentally but also for what is in the course of maturing.

The American researcher Dorothea McCarthy showed that among children between the ages of three and five there are two groups of functions: those the children already possess, and those they can perform under guidance, in groups, and in collaboration with one another but which they have not mastered independently. McCarthy‘s study demonstrated that this second group of functions is at the actual developmental level of five-to-seven-year-olds. What her subjects could do only under guidance, in collaboration, and in groups at the age of three-to-five years they could do independently when they reached the age of five-to-seven years. Thus, if we were to determine only mental age—that is, only functions that have matured—we would have but a summary of completed development, while if we determine the maturing functions, we can predict what will happen to these children between five and seven, provided the same developmental conditions are maintained. The zone of proximal development can become a powerful concept in developmental research, one that can markedly enhance the effectiveness and utility of the application of diagnostics of mental development to educational problems.

A full understanding of the concept of the zone of proximal development must result in reevaluation of the role of imitation in learning. An unshakable tenet of classical psychology is that only the independent activity of children, not their imitative activity, indicates their level of mental development. This view is expressed in all current testing systems. In evaluating mental development, consideration is given to only those solutions to test problems which the child reaches without the assistance of others, without demonstrations, and without leading questions. Imitation and learning are thought of as purely mechanical processes. But recently psychologists have shown that a person can imitate only that which is within her developmental level. For example, if a child is having difficulty with a problem in arithmetic and the teacher solves it on the blackboard, the child may grasp the solution in an instant. But if the teacher were to solve a problem in higher mathematics, the child would not be able to understand the solution no matter how many times she imitated it.

A primate can learn a great deal through training by using its mechanical and mental skills, but it cannot be made more intelligent, that is, it cannot be taught to solve a variety of more advanced problems independently. For this reason animals are incapable of learning in the human sense of the term; *human learning presupposes a specific social nature and a process by which children grow into the intellectual life of those around them*.
Children can imitate a variety of actions that go well beyond the limits of their own capabilities. Using imitation, children are capable of doing much more in collective activity or under the guidance o adults. This fact, which seems to be of little significance in itself, is of fundamental importance in that it demands a radical alteration of the entire doctrine concerning the relation between learning and development in children.

Formerly, it was believed that by using tests, we determine the mental development level with which education should reckon an whose limits it should not exceed. This procedure oriented learning toward yesterday's development, toward developmental stages already completed. The error of this view was discovered earlier in practice than in theory.

It is demonstrated most clearly in the teaching of mentally retarded children. Studies have established that mentally retarded children are not very capable of abstract thinking. From this the pedagogy of the special school drew the seemingly correct conclusion that all teaching of such children should be based on the use of concrete, look-and-do methods. And yet a considerable amount of experience with this method resulted in profound disillusionment.
It turned out that a teaching system based solely on concreteness—one that eliminated from teaching everything associated with abstract thinking—not only failed to help retarded children overcome their innate handicaps but also reinforced their handicaps by accustoming children exclusively to concrete thinking and thus suppressing the rudiments of any abstract thought that such children still have. Precisely because retarded children, when left to themselves, will never achieve well-elaborated forms of abstract thought, the school should make every effort to push them in that direction and to develop in them what is intrinsically lacking in their own development. In the current practices of special schools for retarded children, we can observe a beneficial shift away from this concept of concreteness, one that restores look-and-do methods to their proper role. Concreteness is now as necessary and unavoidable only as a stepping stone for developing abstract thinking—as a means, not as an end in itself.

Similarly, in normal children, learning which is oriented toward developmental levels that have already been reached is ineffective from the viewpoint of a child‘s overall development. It does not aim for a new stage of the developmental process but rather lags behind this process. Thus, the notion of a zone of proximal development enables us to propound a new formula, namely that the only „good learning“ is that which is in advance of development.

The acquisition of language can provide a paradigm for the entire problem of the relation between learning and development. Language arises initially as a means of communication between the child and the people in his environment. Only subsequently, upon conversion to internal speech, does it come to organize the child‘s thought, that is, become an internal mental function. Piaget and others have shown that reasoning occurs in a children‘s group as an argument intended to prove one‘s own point of view before it occurs as an internal activity whose distinctive feature is that the child begins to perceive and check the basis of his thoughts.

Such observations prompted Piaget to conclude that communication produces the need for checking and confirming thoughts, a process that is characteristic of adult thought. In the same way that internal speech and reflective thought arise from the interactions between the child and persons in her environment, these interactions provide the source of development of a child‘s voluntary behavior. Piaget has shown that cooperation provides the basis for the development of a child‘s moral judgment. Earlier research established that a child first becomes able to subordinate her behavior to rules in group play and only later does voluntary self-regulation of behavior arise as an internal function.

These individual examples illustrate a general developmental law for the higher mental functions that we feel can be applied in its entirety to children‘s learning processes. We propose that an essential feature of learning is that it creates the zone of proximal development; that is, learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with his peers. Once these processes are internalized, they become part of the child‘s independent developmental achievement.

From this point of view, learning is not development; however, properly organized learning results in mental development and sets in motion a variety of developmental processes that would be impossible apart from learning. Thus, learning is a necessary and universal aspect of the process of developing culturally organized, specifically human, psychological functions.

To summarize, the most essential featiire of our hypothesis is the notion that developmental processes do not coincide with learning processes. Rather, the developmental process lags behind the learning process; this sequence then results in zones of proximal development.
Our analysis alters the traditional view that at the moment a child assimilates the meaning of a word, or masters an operation such as addition or written language, her developmental processes are basically completed. In fact, they have only just begun at that moment. The major consequence of analyzing the educational process in this manner is to show that the initial mastery of, for example, the four arithmetic operations provides the basis for the subsequent development of a variety of highly complex internal processes in children‘s thinking.

THE ROLE OF PLAY IN DEVELOPMENT

To define play as an activityty that gives pleasure to the child is inaccurate for two reasons. First, many activities give the child much keener experiences of pleasure than play, for example, sucking a pacifier, even though the child is not being satiated. And second, there are games in which the activity itself is not pleasurable, for example, games, predominantly at the end of preschool and the beginning of school age, that give pleasure only if the child finds the result interesting. Sporting games (not only athletic sports, but other games that can be won or lost) are very often accompanied by displeasure when the outcome is unfavorable to the child.

We often describe a child‘s development as the development of his intellectual functions; every child stands before us as a theoretician who, characterized by a higher or lower level of intellectual development, moves from one stage to another. But if we ignore the child‘s needs, and the incentives which are effective in getting him to act, we will never be able to understand his advance from one developmental stage to the next, because every advance is connected with a marked change in motives, inclinations, and incentives. That which is of the greatest interest to the infant has almost ceased to interest the toddler. The maturing of needs is a dominant issue in this discussion because it is impossible to ignore the fact that the child satisfies certain needs in play. If we do not understand the special character of these needs, we cannot understand the uniqueness of play as a form of activity.

ACTION AND MEANING IN PLAY

The influence of play on a child‘s development is enormous. Play in an imaginary situation is essentially impossible for a child under three in that it is a novel form of behavior liberating the child from constraints. To a considerable extent the behavior of a very young child-and to an absolute extent, that of an infant-is determined by the conditions in which the activity takes place, as the experiments of Lewin and others have shown. For example, Lewin‘s demonstration of the great difficulty a small child has in realizing that he must first turn his back to a stone in order to sit on it illustrates the extent to which a very young child is bound in every action by situational constraints. It is hard to imagine a greater contrast to Lewin‘s experiments showing the situational constraints on activity than what we observe in play. It is here hat the child learns to act in a cognitive, rather than an externally visual, realm by relying on internal tendencies and motives and not on incentives supplied by external things. A study by Lewin on the motivating nature of things for a very young child concludes that things dictate to the child what he must do: a door demands to be opened and closed, a staircase to be climbed, a bell to be rung. In short, things have such an inherent motivating force with respect to a very young child‘s actions and so extensively determine the child‘s behavior that Lewin arrived at the notion of creating a psychological topology: he expressed mathematically the trajectory of the child‘s movement in a field according to the distribution of things with varying attracting or repelling forces.

The root of situational constraints upon a child lies in a central fact of consciousness characteristic of early childhood: the union of motives and perception. At this age perception is generally not an independent but rather an integrated feature of a motor reaction. Every perception is a stimulus to activity. Since a situation is communicated psychologically through perception, and since perception is not separated from motivational and motor activity, it is undemandable that with her consciousness so structured, the child is constrained by the situation in which she finds herself.

But in play, things lose their determining force. *The child sees one thing but acts differently in relation to what he sees. Thus, a condition is reached in which the childs begins to act independently of what he sees.* Certain brain-damaged patients lose the ability to act independentiy of what they see. In considering such patients one can appreciate that the freedom of action adults and more mature children enjoy is not acquired in a flash but has to go through a long process of development.

Action in an imaginary situation teaches the child to guide her behavior not only by immediate perception of objects or by the situation immediately affecting her but also by the meaning of this situation. Experiments and day-to-day observation clearly show that it is impossible for very young children to separate the field of meaning from the visual field because there is such intimate fusion between meaning and what is seen. Even a child of two years, when asked to repeat the sentence „Tanya is standing up“ when Tanya is sitting in front of her, will change it to „Tanya is sitting down.“ In certain diseases, exactly the same situation is encountered. Goldstein and Gelb described a number of patients who were unable to state something that was not true.

A divergence between the fields of meaning and vision first occurs at preschool age. In play thought is separated from objects and action arises from ideas rather than from things: a piece of wood begins to be a doll and a stick becomes a horse. Action according to rules begins to be determined by ideas and not by objects themselves. This is such a reversal of the child‘s relation to the real, immediate, concrete situation that it is hard to underestimate its full significance. The child does not do this all at once because it is terribly difficult for a child to sever thought (the meaning of a word) from object.

Play provides a transitional stage in this direction whenever an object (for example, a stick) becomes a pivot for severing the meaning of horse from a real horse. The child cannot as yet detach thought from object. The child‘s weakness is that in order to imagine a horse, he needs to define his action by means of using „the-horse-in-the-stick“ as the pivot. But all the same, the basic structure determining the child‘s relation to reality is radically changed at this crucial point, because the structure of his perceptions changes.

… a special feature of human perception (one arising at a very early age) is the so-called perception of real objects, that is, the perception of not only colors and shapes, but also meaning. This is something to which there is no analogy in animal perception. Humans do not merely see something round and black with two hands; they see a clock and can distinguish one thing from another. Thus, the structure of human perception could be figuratively expressed as a ratio in which the object is the numerator and the meaning is the denominator (object/meaning). This ratio symbolizes the idea that all human perception is made up of generalized rather than isolated perceptions. For the child the object dominates in the object/meaning ratio and meaning is subordinated to it. At the crucial moment when a stick becomes the pivot for detaching the meaning of horse from a real horse, this ratio is inverted and meaning predominates, giving meaning/ object.

This is not to say that properties of things as such have no meaning. Any stick can be a horse but, for example, a postcard cannot be a horse for a child. Goethe‘s contention that in play any thing can be anything for a child is incorrect. Of course, for adults who can make conscious use of symbols, a postcard *can* be a horse. If I want to show the location of something, I can put down a match and say, „This is a horse.“ That would be enough. For a child it cannot be a horse because one must use a stick; because of the lack of free substitution, the child‘s activity is play and not symbolism. A symbol is a sign, but the stick does not function as the sign of a horse for the child, who retains the properties of things but changes their meaning. Their meaning, in play, becomes the central point and objects are moved from a dominant to a subordinate position.
The child at play operates with meanings detached from their usual objects and actions; however, a highly interesting contradiction arises in which he fuses real actions and real objects. This characterizes the transitional nature of play; it is a stage between the purely situational constraints of early childhood and adult thought, which can be totally free of real situations.

A vital transitional stage toward operating with meanings occurs when a child first acts with meanings as with objects (as when he acts with the stick as though it were a horse). Later he carries out these acts consciously. This change is seen, too, in the fact that before a child has acquired grammatical and written language, he knows how to do things but does not know that he knows. He does not master these activities voluntarily. In play a child spontaneously makes use of his ability to separate meaning from an object without knowing he is doing it, just as he does not know he is speaking in prose but talks without paying attention to the words. Thus, through play the child achieves a functional definition of concepts or objects, and words become parts of a thing.

The creation of an imaginary situation is not a fortuitous fact in a child‘s life, but is rather the first manifestation of the child‘s emancipation from situational constraints. The primary paradox of play is that the child operates with an alienated meaning in a real situation. The second paradox is that in play she adopts the line of least resistance—she does what she most feels like doing because play is connected with pleasure—and at the same time she learns to follow the line of greatest resistance by subordinating herself to rules and thereby renouncing what she wants, since subjection to rules and renunciation of impulsive action constitute the path to maximum pleasure in play.
Play continually creates demands on the child to act against immediate impulse. At every step the child is faced with a conflict between the rules of the game and what he would do if he could suddenly act spontaneously. In the game he acts counter to the way he wants to act. A child‘s greatest self-control occurs in play. He achieves the maximum display of willpower when he renounces an immediate attraction in the game (such as candy, which by the rules of the game he is forbidden to eat because it represents something inedible). Ordinarily a child experiences subordination to rules in the renunciation of something he wants, but here subordination to a rule and renunciation of action on immediate impulse are the means to maximum pleasure.

Looking at the matter from the opposite perspective, could one suppose that a child‘s behavior is always guided by meaning, that a preschooler‘s behavior is so arid that he never behaves spontaneously simply because he thinks he should behave otherwise? This strict subordination to rules is quite impossible in life, but in play it does become possible: thus, play creates a zone of proximal development of the child. In play a child always behaves beyond his average age, above his daily behavior; in play it is as though he were a head taller than himself. As in the focus of a magnifying glass, play contains all developmental tendencies in a condensed form and is itself a major source of development.

To quote Baldwin‘s apt expression regarding the development of things, it is as much involution as evolution. This means that, together with processes of development, forward motion, and appearance of new forms, we can discern processes of curtailment, disappearance, and reverse development of old forms at each step. The developmental history of written language among chidren is full of such discontinuities. Its line of development seems to disappear altogether; then suddenly, as if from nowhere, a new line begins, and at first it seems that there is absolutely no continuity between the old and the new. But only a naive view of development as a purely evolutionary process involving nothing but the gradual accumulation of small changes and the gradual conversion of one form into another can conceal from us the true nature of these processes. This revolutionary type of development is in no way new for science in general; it is new only for child psychology. Therefore, despite a few daring attempts, child psychology does not have a cogent view of the development of written language as a historical process, as a unified process of development.

SYMBOLISM IN WRITING

In connection with our general research, Luria undertook to create this moment of discovery of the symbolics of writing so as to be able to study it systematically. In his experiments children who were as yet unable to write were confronted with the task of making some simple form of notation. The children were told to remember a certain number of phrases that greatly exceeded their natural memory capacity. When each child became convinced that he would not be able to remember them all, he was given a sheet of paper and asked to mark down or record the words presented in some fashion.

Frequently, the children were bewildered by this suggestion, saying at they could not write, but the experimenter furnished the child with a certain procedure and examined the extent to which the child was able to master it and extent to which the pencil-marks ceased to be simple playthings and became symbols for recalling the appropriate phrases. In the three-to-four-year-old stage, the childs notations are of no assistance in remembering the phrases; in recalling them, the child does not look at the paper. But we occasionally encountered some seemingly astonishing cases that were sharply at variance with this general observation. In these cases, the child also makes meaningless and undifferentiated squiggles and lines, but when he reproduces phrases it seems as though he is reading them; he refers to certain specific marks and can repeatedly indicate, without error, which marks denote which phrase. An entirely new relationship to these marks and a self-reinforcing motor activity arise: for the first time the marks become mnemotechnic symbols. For example, the children place individual marks on different parts of the page in such a way as to associate a certain phrase with each mark. A characteristic kind of topography arises—one mark in one comer means a cow, while another farther up means a chimney-sweep. Thus the marks are primitive indicatory signs for memory purposes.

We do not deny the possibility of teaching reading and writing to preschool children; we even regard it as desirable that a younger child enter school if he is able to read and write. But the teaching should be organized in such a way that reading and writing are necessary for something. If they are used only to write official greetings to the staff or whatever the teacher thinks up (and clearly suggests to them), then the exercise will be purely mechanical and may soon bore the child; his activity will not be manifest in his writing and his budding personality will not grow. Reading and writing must be something the child needs. Here we have the most vivid example of the basic contradiction that appears in the teaching of writing not only in Montessori‘s school but in most other schools as well, namely, that writing is taught as a motor skill and not as a complex cultural activity. Therefore, the issue of teaching writing in the preschool years necessarily entails a second requirement: writing must be „relevant to life“—in the same way that we require a „relevant“ arithmetic.

A second conclusion, then, is that writing should be meaningful for children, that an intrinsic need should be aroused in them, and that writing should be incorporated into a task that is necessary and relevant for life. Only then can we be certain that it will develop not as a matter of hand and finger habits but as a really new and complex form of speech.

The third point that we are trying to advance as a practical conclusion is the requirement that writing be *taught* naturally. In this respect, Montessori has done a great deal. She has shown that the motor aspect of this activity can indeed be engaged in in the course of children‘s play, and that writing should be „cultivated“ rather than‘“imposed.“ She offers a well-motivated approach to the development of writing.

Following this path, a child approaches writing as a natural moment in her development, and not as training from without. Montessori has shown that kindergarten is the appropriate setting for teaching reading and writing, and this means that the best method is one in which children do not learn to read and write but in which both these skills are found in play situations. For this it is necessary that letters become elements of children‘s life in the same way, for instance, that speech is.

CONCEPTS OF DEVELOPMENT

… Piaget shares Vygotsky‘s emphasis upon an active organism. They share, as well, the ability to observe children astutely. However, Vygotsky‘s skills of observation were enhanced by his knowledge of dialectical materialism and his view of the human organism as highly plastic and of the environment as historically and culturally shifting contexts into which children are born and which they, too, will eventually change.

While Piaget stresses biologically supported, universal stages of development, Vygotskys‘ emphasis is on the interaction between changing social conditions and the biological substrata of behavior. He wrote that „in order to study development in children, one must begin with an understanding of the dialectical unity of two principally different lines [the biological and the cultural], to adequately study this process, then an experimenter must study both components and the laws which govern their interlacement at each stage of a child‘s development.“