

instability of attitudes in the child.

22) When we use the term "child" here, we are referring primarily to preschoolers between the ages of 3 and 5 years; but the features we describe may also often be found in older children.

23) We know that this position has to be accepted with a grain of salt; it is not the characterization of the child's thinking, but the traditional characterization of adult thinking that we question. Does anyone believe that adults always draw logical conclusions from logical assumptions? Emotions and the structure of one's visual and intellectual surroundings make us think that the thought processes of adults are less planned and logical than is usually assumed.

24) [Psychology of early childhood]. St. Petersburg, 1915. P. 194.

25) Experiments were conducted by B. V. Belyaev-Bashkirov.

26) The problem of the transformation of a child's behavior under the influence of behavioral attributes acquired in the process of assimilation of cultural experience is described in great detail by L. S. Vygotsky in [The history of the cultural development of the child].

27) E. Jaensch, Zum Aufbau der Wahrnehmungswelt. (2nd ed.) 1927. P. 195.

28) See [The history of the cultural development of the child].

29) W. Stern, Psychologie der frühen Kindheit. 1928. P. 341.

30) [Dialectics of nature]. P. 59.

31) E. Claparède, La conscience de la ressemblance et de la différence chez l'enfant. Arch. Psychol., XVII.

32) J. B. Watson, The unverbilized in human behavior. Psychol. Rev., 1924.

33) See L. S. Vygotsky, [Genetic roots of thinking and speech]. Estestvoznanie i Marksizm, No. 1.

34) See Vygotsky & Luria, [Studies in the history of behavior]. Giz, 1925. Vygotsky, [Problems in the cultural development of the child]. Zh. Pedol., 1929, No. 6. Luria, The problem of the child's cultural behavior. J. Genet. Psychol., 1928, Dec.

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## THE DEVELOPMENT OF WRITING IN THE CHILD

### I

The history of writing in the child begins long before a teacher first puts a pencil in the child's hand and shows him how to form letters.

The moment a child begins to write his first school exercises in his notebook is not actually the first stage in the development of writing. The origins of this process go far back into the pre-history of the development of the higher forms of a child's behavior; we can even say that when a child enters school, he has already acquired a wealth of skills and abilities that will enable him to learn to write within a relatively short time.

If we just stop to think about the surprising rapidity with which the child learns this extremely complex technique, which has thousands of years of culture behind it, it will be evident that this could come about only because during the first years of his development, before reaching school age, a child has already learned and assimilated a number of techniques leading up to writing that have already prepared him and made it immeasurably easier for him to grasp the concept and technique of writing. Moreover, we may reasonably assume that even be-

From Voprosy marksistkoi pedagogiki [Problems of Marxist education]. Moscow: Academy of Communist Education, 1929. Vol. 1, pp. 143-76.

fore reaching school age, during this individual "prehistory," as it were, the child has already developed a number of primitive techniques of his own that are similar to what we call writing and perhaps even fulfill similar functions, but that are lost as soon as the school provides the child with the culturally elaborated, standard and economical system of signs, but that these earlier techniques served as necessary stages along the way. The psychologist is faced with the following important and intriguing problem: to delve deeply into this early period of child development, to ferret out the pathways along which writing developed in its prehistory, to spell out the circumstances that made writing possible for the child and the factors that provided the motive forces of this development, and, finally, to describe the stages through which the development of the child's primitive writing techniques pass.

The developmental psychologist therefore concentrates his attention on the preschool period in the child's life. We begin where we think we shall find the beginnings of writing, and leave off where educational psychologists usually begin: the moment when the child begins to learn to write.

If we are able to unearth this "prehistory" of writing, we shall have acquired a valuable tool for teachers, namely, knowledge of what the child was able to do before entering school, knowledge on which they can draw in teaching their pupils to write.

## II

The best way to study this prehistory of writing and the various tendencies and factors involved in it is to describe the stages we observe as a child develops his ability to write and the factors that enable him to pass from one stage to another, higher stage.

In contrast to a number of other psychological functions, writing may be described as a culturally mediated function. The first, most fundamental condition required for a child to be able to "write down" some notion, concept, or phrase is that some particular stimulus or cue, which in itself has nothing to do with this idea, concept, or phrase, is employed as an auxiliary sign

whose perception causes the child to recall the idea, etc., to which it referred. Writing therefore presupposes the ability to use some cue (e.g., a line, a spot, a point) as a functional auxiliary sign with no sense or meaning in itself but only as an auxiliary operation. For a child to be able to write or note something, two conditions must be fulfilled. First, the child's relations with the things around him must be differentiated, so that everything he encounters will fall into two main groups: either things that represent some interest of the child's, things he would like to have, or with which he plays, or instrumental objects, things that play only a utilitarian, or instrumental, role and have sense only as aids for acquiring some object or achieving some goal and therefore have only functional significance for him. Second, the child must be able to control his own behavior by means of these aids, in which case they already function as cues he himself invokes. Only when the child's relationships with the world around him have become differentiated in this way, when he has developed this functional relationship with things, can we say that the complex intellectual forms of human behavior have begun to develop.

The use of material tools, the rudiments of this complex, mediated adaptation to the external world, is observable in apes. In his classic experiments Köhler (1) demonstrated that under certain conditions things may acquire a functional significance for apes and begin to play an instrumental role. When an ape takes a long stick to get at a banana, it is quite obvious that the banana and the stick are psychologically of different orders for the animal: whereas the banana is a goal, an object toward which the animal's behavior is directed, the stick has meaning only in relation to the banana, i.e., throughout the entire operation it plays only a functional role. The animal begins to adapt to the given situation not directly, but with the aid of certain tools. The number of such instrumental objects is still few, and in the ape their complexity is minimal; but as behavior becomes more complex, this instrumental inventory also becomes richer and more complex, so that by the time we reach man, the number of such objects playing an auxiliary functional role in the life of a human

being, who is a cultural animal, is enormous.

At a certain stage in evolution, external acts, handling objects of the external world, and internal acts as well, i.e., the utilization of psychological functions in the strict sense, begin to take shape indirectly. A number of techniques for organizing internal psychological operations are developed to make their performance more efficient and productive. The direct, natural use of such techniques is replaced by a cultural mode, which relies on certain instrumental, auxiliary devices. Instead of trying to size up quantity visually, man learns to use an auxiliary system of counting; and instead of mechanically committing things to, and retaining them in, memory, he writes them down. In each case these acts presuppose that some object or device will be used as an aid in these behavioral processes, that is, that this object or device will play a functional auxiliary role. Such an auxiliary technique used for psychological purposes is writing, which is the functional use of lines, dots, and other signs to remember and transmit ideas and concepts. Samples of florid, embellished, pictographic writing show how varied the items enlisted as aids to retaining and transmitting ideas, concepts, and relations may be.

Experiments have shown that the development of such functional devices serving psychological ends takes place much later than the acquisition and use of external tools to perform external tasks. Köhler (2) attempted to set up some special experiments with apes to determine whether an ape could use certain signs to express certain meanings, but was unable to find any such rudiments of "record keeping" in apes. He gave the animals paint, and they learned how to paint the walls, but they never once tried to use the lines they drew as signs to express something. These lines were a game for the animals; as objects they were ends, never means. Thus, devices of this sort develop at a much later stage of evolution.

In what follows we shall describe our efforts to trace the development of the first signs of the emergence of a functional relation to lines and scribbles in the child and his first use of such lines, etc., to express meanings; in doing so we shall hopefully

be able to shed some light on the prehistory of human writing.

### III

The prehistory of writing can be studied in the child only experimentally, and to do this the skill must first be brought into being. The subject must be a child who has not yet learned to write; he must be put into a situation that will require him to use certain external manual operations similar to writing to depict or remember an object. In such a situation we should be able to determine whether he has acquired the ability to relate to some device that has been given to him as a sign or whether his relation to it still remains "absolute," i.e., unmediated, in which case he will be unable to discover and use its functional, auxiliary aspect.

In the ideal case the psychologist might hope to force a child to "invent" signs by placing him in some difficult situation. If his efforts are more modest, he can give the child some task that is easier for the child to cope with and watch the successive stages the child goes through in assimilating the technique of writing.

In our preliminary experiments we followed this second course. Our method was actually very simple: we took a child who did not know how to write and gave him the task of remembering a certain number of sentences presented to him. Usually this number exceeded the child's mechanical capacity to remember. Once the child realized that he was unable to remember the number of words given him in the task, we gave him a sheet of paper and told him to jot down or "write" the words we presented. Of course, in most cases the child was bewildered by our suggestion. He would tell us that he did not know how to write, that he could not do it. We would point out to him that adults wrote things down when they had to remember something and then, exploiting the child's natural tendency toward purely external imitation, we suggested that he try to contrive something himself and write down what we would tell him. Our experiment usually began after this, and we would present the child with several (four or five) series of six or eight sentences that were quite

simple, short, and unrelated to one another.

Thus, we ourselves gave the child a device whose intrinsic technique was unfamiliar to him and observed to what extent he was able to handle it and to what extent the piece of paper, the pencil, and the scribbles the child made on the paper ceased being simple objects that appealed to him, playthings, as it were, and became a tool, a means for achieving some end, which in this case was remembering a number of ideas presented to him. We think our approach here was correct and productive. Drawing on the child's penchant for imitation, we gave him a device to use that was familiar to him in its outward aspects but whose internal structure was unknown and strange. This allowed us to observe, in its purest form, how a child adapts spontaneously to some device, how he learns how it works and to use it to master a new goal.

We assumed that we would be able to observe all the stages in a child's relationship to this device, which was still alien to him, from the mechanical, purely external, imitative copying of an adult's hand movements in writing to the intelligent mastery of this technique.

By giving the child merely the external aspects of the technique to work with, we were able to observe a whole series of little inventions and discoveries he made, within the technique itself, that enabled him gradually to learn to use this new cultural tool.

It was our intention to provide a psychological analysis of the development of writing from its origins and, within a short period, to follow the child's transition from the primitive, external forms of behavior to complex, cultural forms. Let us now examine our results. We shall try to describe how children of different ages responded to this complex task and to trace the stages of development of writing in the child from its beginnings.

#### IV

Not surprisingly, at the outset we encountered a problem that could have presented a considerable obstacle. It turned out that

4-5-year-olds were totally unable to understand our instructions. On closer analysis, however, we found that this "negative" finding actually reflected a very essential and fundamental characteristic of this age group: 3-, 4-, and 5-year-old children (it was impossible to fix a definite dividing line: these age demarcations depend on a multitude of dynamic conditions having to do with the child's level of cultural development, his environment, etc.) were still unable to relate to writing as a tool, or means. They grasped the outward form of writing and saw how adults accomplished it; they were even able to imitate adults; but they themselves were completely unable to learn the specific psychological attributes any act must have if it is to be used as a tool in the service of some end.

If we asked such a child to note (or write) on paper the sentences presented to him, in many instances the child would not even refuse with any special insistence, simply referring to his inability to perform the task.

Little Yova N. (5 years old), for the first time in our laboratory, in response to the request to remember and write down the sentence "Mice have long tails," immediately took a pencil and "wrote" a number of scrawls on the paper (Figure 1). When the experimenter asked him what they were, he said, quite confidently, "That's how you write."

The act of writing is, in this case, only externally associated with the task of noting a specific word; it is purely imitative. The child is interested only in "writing like grownups"; for him the act of writing is not a means of remembering, of representing some meaning, but an act that is sufficient in its own right, an act of play. But such an act is by no means always seen as an aid to helping the child later remember

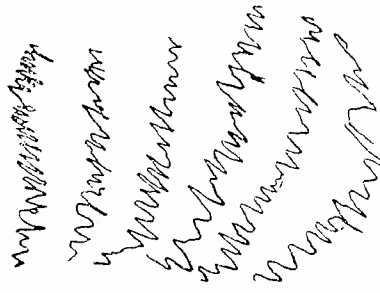


Figure 1

the sentence. The connection between the child's scrawls and the idea it is meant to represent is purely external. This is especially evident in cases in which the "writing" is sharply and noticeably divorced from the sentence to be written and begins to play a completely independent and self-sufficient role.

We frequently observed one peculiar phenomenon in small children: a child whom we had asked to write down the sentences we gave him would not limit himself to ordinary "writing down," as in the case just described; he would sometimes invert the normal order of writing and begin to write without hearing out what we had to say.

In these cases the function of "writing" had become dissociated from the material to be written; understanding neither its meaning nor its mechanism, the child used writing in a purely external and imitative way, assimilating its outer form, but not employing it in the right way. Here is a graphic example from an experiment with Lena L., 4 years old. Lena was given some sentences and told to remember them, and to do this she had to "write them down." Lena listened to the first three sentences and after each began to write down her scribbles, which were the same in each case, i.e., they were indistinguishable from one another. Before the fourth sentence I said to her: "Listen, this time write...." Lena, without waiting until I finished, began to write. The same thing happened before the fifth sentence.

The results are the undifferentiated scrawls in Figure 2, characteristic of this phase of development. There are two points that stand out especially clearly here: "writing" is dissociated from its immediate objective, and lines are used in a purely external way; the child is unaware of their functional significance as auxiliary signs. That is why the act of writing can be so completely dissociated from the dictated sentence; not understanding the principle underlying writing, the child takes its external form and thinks he is quite able to write before he even knows what he must write. But a second point is also clear from this example: the child's scrawls bear no relationship to the meaningful sentence dictated to him. We have deliberately presented an example with quite explicit features that would be re-

flected in the mere outward form of writing if only the child understood the actual purpose and mechanism of writing things down, and its necessary connection with the meaning of what is to be written. Neither the number of items (five pencils, two

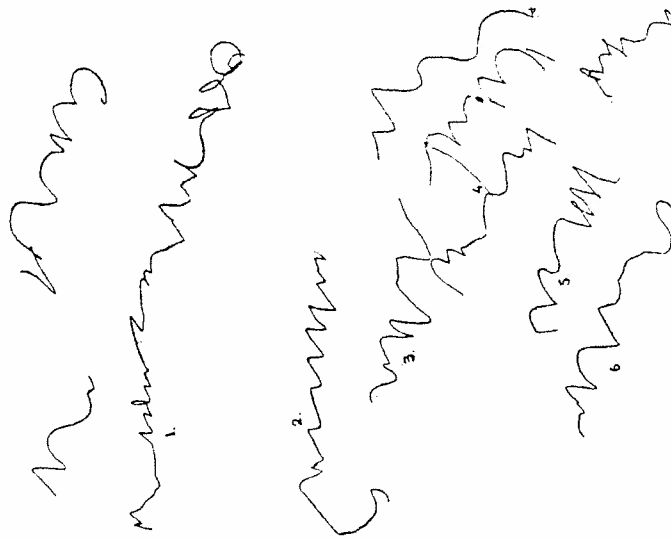


Figure 2. 1. There are five pencils on the table. 2. There are two plates. 3. There are many trees in the forest. 4. There is a column in the yard. 5. There is a large cupboard (written prematurely). 6. The little doll (written prematurely). tablets), the size factor (large table, small table), nor the shape of the object itself had any influence on the jottings; in each case there were the same zigzag lines. The "writing" had no connec-

tion with the idea evoked by the sentence to be written; it was not yet instrumental or functionally related to the content of what was to be written. Actually, this was not writing at all, but simple scribbling.

This self-contained nature of the scrawls is evident in a number of cases: we observed scribbling in children from 3 to 5 years old, and sometimes even as old as 6 (although in these older children it was not as invariant, as we shall show further on). In most children in kindergartens, scribbling on paper is already an accustomed activity, although its functional, auxiliary significance has not yet been learned. Hence, in most children of this age, we observed a similar, undifferentiated scrawling, which had no functional significance and surprisingly easily became simple scribbling on paper merely for fun. We cannot refrain from the pleasure of relating a typical example of this total dissociation between writing and its primary purpose and its transformation into the mere fun of scribbling on paper.

Experiment 9/III, series III, Yura, age 6 (middle kindergarten group).

After Yura discovered in the first series that he was unable to remember by mechanical means all the sentences dictated to him, we suggested he note them down on paper; and in the second series we obtained results like those shown in Figure 2. Despite the undifferentiated nature of what he wrote down, Yura remembered more words in the second series than in the first, and was given a piece of candy as a reward. When we went on to the third series and again asked him to write down each word, he agreed, took the pencil, and began (without listening to the end of one sentence) to scribble. We did not stop him, and he continued to scribble until he had covered the whole page with scrawls that bore no relation to his initial purpose, which was to remember the sentences. These scrawls are shown in Figure 3. Everything on the right side (A) was done before the sentences were presented; not until later, after we stopped him, did he begin to "write down" the sentences

shown on the left side (Nos. 1-7).

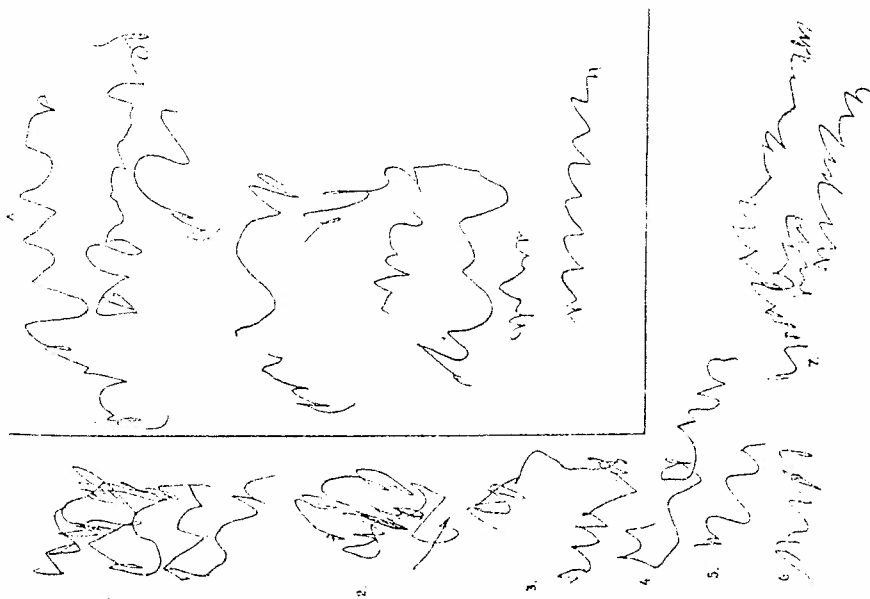


Figure 3. 1. There are many stars in the sky. 2. There is one moon. 3. I have thirty teeth. 4. Two hands and two legs. 5. A large tree. 6. The car runs.

Complete lack of comprehension of the mechanism of writing, a purely external relation to it, and a rapid shift from "writing" to self-contained fun bearing no functional relation to writing are characteristic of the first stage in the prehistory of writing in the child. We can call this phase the prewriting phase or, more broadly, the pre-instrumental phase.

One question remains that has a direct bearing on this first phase in the development of writing and has to do with its formal aspects: Why did most of the children we studied choose to write zigzags in more or less straight lines?

There is considerable literature on the first forms of graphic activity in the child. The scrawling stage is explained in terms of physiological factors, the development of coordination, etc. Our approach to the phenomenon was more straightforward. The drawings that interested us were the scribbles. Hence, the most crucial factor here was unquestionably the one that brought these scribbles most closely, albeit only outwardly, to adult writing, namely, the factor of outward imitation.

Although the child at this stage does not yet grasp the sense and function of writing, he does know that adults write; and when given the task of writing down a sentence, he tries to reproduce, if only its outward form, adult writing, with which he is familiar. This is why our samples actually look like writing, arranged in lines, etc., and why Vova immediately said, "This is how you write."

We can persuade ourselves of the crucial role of pure, external imitation in the development of this process by a very simple experiment: if we reproduce the experiment in the presence of a child with another subject (a different one) who is asked to write signs, not words, we shall see how this immediately alters the way the child's "writing" looks.

Lena, 4 years old, who gave us the typical scribbles (see Figure 2), in the break after the session noticed that her friend Lina, age 7, "wrote down" the dictated sentences with a system of "marks" (one mark for each sentence). This was enough to induce her, in the next session, after the break, to produce scrawls that looked completely dif-

ferent. Adopting the manner of her friend, she stopped writing lines of scribbles and began to note each dictated sentence with a circle.

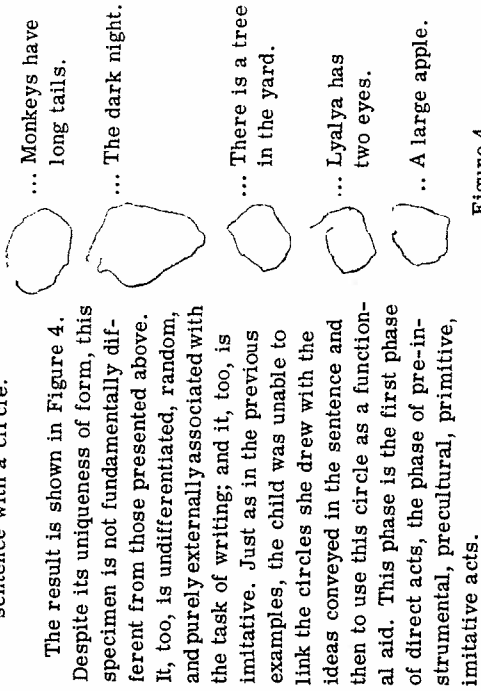


Figure 4

The result is shown in Figure 4. Despite its uniqueness of form, this specimen is not fundamentally different from those presented above. It, too, is undifferentiated, random, and purely externally associated with the task of writing; and it, too, is imitative. Just as in the previous examples, the child was unable to link the circles she drew with the ideas conveyed in the sentence and then to use this circle as a functional aid. This phase is the first phase of direct acts, the phase of pre-instrumental, precultural, primitive, imitative acts.

## V

Does "writing" help a child, at this stage, to remember the meaningful message of a dictated sentence? We can answer "no" in almost all cases, and that is the characteristic feature of this prewriting stage. The child's writing does not yet serve a mnemonic function, as will become obvious if we examine the "sentences" written by the child after dictation. In most cases the child remembered fewer sentences after "writing" them down in this way than he did without writing; so writing did not help, but actually hindered, memory. Indeed, the child made no effort to remember at all; for in relying on his "writing," he was quite convinced that it would do his remembering for him. (3)...

Let us, however, take a case in which the child remembered several sentences even in a writing experiment. If we observe how these sentences were recalled, we shall see clearly that

"writing" had nothing at all to do with this remembering, that it took place independently of the child's graphic efforts.

The first thing a psychologist studying memory notices is that a child mobilizes all the devices of direct mechanical memory, none of which are found in reading. The child fixes and recalls; he does not record and read: some of his jottings are quite beside the point, and without effect. In our experiments we frequently observed that a child would repeat the sentence after writing it down, to nail it down, as it were; when we asked him to recall what he had written, he did not "read" his jottings from the beginning, but would go right to the last sentences, to catch them while they were fresh in his memory — a procedure very typical of the phenomenon of making a mental note.

Finally, the most instructive observation was how a child would behave in recalling. His behavior was that of someone remembering, not of someone reading. Most of the children we studied reproduced the sentences dictated to them (or rather, some of them) without looking at what they had written, with their gaze directed toward the ceiling questioningly; quite simply, the entire process of recall took place completely apart from the scribbles, which the child did not use at all. We recorded some cases of this sort on film; the child's total disregard of his writing and his purely direct form of remembering are clearly evident from his facial expressions recorded on film.

Thus, the way children in our experiments recalled the dictated sentences (if they did at all) clearly demonstrates that their graphic efforts at this stage of development are actually not yet writing, or even a graphic aid, but merely drawings on paper, quite independent of, and unrelated to, the task of remembering. The child does not yet relate to writing as a tool of memory at this stage of development. This is why in our experiments the children almost always cut a poor figure: of a total of six to eight sentences, most of which they were able to remember by mechanical means, they could remember only two or three at most if asked to write them down, which indicates that if a child has to rely on writing without the ability to use it, the efficiency of memory is considerably reduced.

Nevertheless, our findings also include some cases that at first glance are rather surprising in that they are completely at variance with all we have just described. A child would produce the same undifferentiated nonsense writing as we have described, the same meaningless scribbles and lines, yet he would still be able to recall perfectly all the sentences he had written down. Moreover, as we observed him, we had the impression that he was actually making use of his writing. We checked this and indeed discovered that these scribbles actually were more than just simple scrawls, that they were in some sense real writing. The child would read a sentence, pointing to quite specific scrawls, and was able to show without error and many times in succession which scribble signified which of the dictated sentences. Writing was still undifferentiated in its outward appearance, but the child's relation to it had completely changed: from a self-contained motor activity, it had been transformed into a memory-helping sign. The child had begun to associate the dictated sentence with his undifferentiated scribble, which had begun to serve the auxiliary function of a sign. How did this come about?

In some sessions we noted that the children would arrange their scribbles in some pattern other than straight lines. For instance, they would put one scribble in one corner of the paper and another in another, and in so doing begin to associate the dictated sentences with their notations; this association was further reinforced by the pattern in which the notations were arranged, and the children would declare quite emphatically that the scribble in one corner meant "cow," or that another at the top of the paper meant "chimney sweeps are black." Thus, these children were in the process of creating a system of technical memory aids, similar to the writing of primitive peoples. In itself no scribble meant anything; but its position, situation, and relation to the other scribbles, i.e., all these factors together, imparted to it its function as a technical memory aid. Here is an example:

Brina, age 5 (first time in our laboratory), was asked



to write down a number of sentences dictated to her. She quickly learned how to proceed and after each word (or sentence) had been dictated, she would make her scribble. The results are shown in Figure 5. One might think that our little subject had made

these marks without any connection with the task of remembering the dictated sentences, just as most of the children discussed above. But to our surprise, she not only recalled all the dictated

sentences (true, there were not many, only five) but also correctly located each sentence, pointing to a scribble and saying: "This is a cow" or "A cow has four legs and a tail," or "It rained yesterday evening," etc. In other words, she recalled the dictated sentences by "reading" them. It is clear that Brina understood the task and employed a primitive form of writing, writing by means of topographical markings. These markings were quite stable; when she was questioned directly, she did not mix them up, but rigorously distinguished one from the other, knowing exactly what each one meant.

This is the first form of "writing," in the proper sense. The actual inscriptions are still undifferentiated, but the functional relation to writing is unmistakable. Because the writing is undifferentiated, it is variable. After using it once, a child may a few days later have forgotten it, and revert back to mechanical scribbling unrelated to the task. But this is the first rudiment of what is later to become writing in the child; in it we see for the first time the psychological elements from which writing will take shape. The child now recalls the material by associating it with a specific mark rather than just mechanically, and this mark will remind him of the particular sentence and

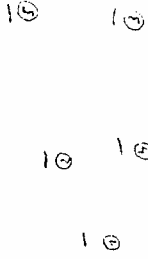


Figure 5. 1. Cow. 2. A cow has legs and a tail. 3. Yesterday evening it rained. 4. Chimney sweeps are black. 5. Give me three candles.

help him to recall it. All this and the presence of certain techniques of undifferentiated topographical writing in primitive peoples spurred our interest in this undifferentiated technical aid to memory, the precursor of real writing.

What role actually is played by the little mark the child makes on a piece of paper? We saw that it had two main features: it organized the child's behavior, but did not yet have a content of its own; it indicated the presence of some meaning, but did not yet tell us what this meaning was. We could say that this first sign plays the role of an ostensive sign or, in other words, the primary sign to "take note." (4) The mark jotted down by the child creates a certain set and serves as an additional cue that some sentences have been dictated, but provides no hints as to how to discover the content of those sentences.

An experiment demonstrated that this interpretation of a primary sign was unquestionably the right one. We can describe a number of cases to prove this. A child at this stage of development in his relationship to a sign tries to use the marks he has made to guide him in recalling. Frequently, these "sentences" have nothing in common with those dictated, but the child will formally fulfill his assignment and for each cue find the "matching word."

Here is an example of this relation of the child's to a primitive sign (we omit the actual drawing as it is very similar in structure to the preceding illustrations). We gave a child 4 years, 8 months old a series of words: "picture — book — girl — locomotive."

The child noted each of these words with a mark. When she had finished her writing, we asked her to read it.

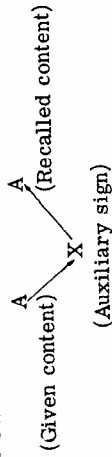
Pointing to each mark in succession, the girl "read": "girl — doll — bed — trunk."

We see that the words recalled by the child have nothing in common with the words given; only the number of words recalled was correct; their content was determined completely by the emotional sets and interests of the child (R. E. Levin's experiment).

This illustration enables us to get to the psychological structure of such a primary graphic sign. It is clear that a primary, undifferentiated, graphic sign is not a symbolic sign, which discloses the meaning of what has been written down; nor can it yet be called an instrumental sign in the full sense of the word, as it does not lead the child back to the content of what was written down. We should rather say that it is only a simple cue (although one artificially created by the child) that conditionally evokes certain speech impulses. These impulses, however, do not necessarily direct the child back to the situation he has "recorded"; they can only trigger certain processes of association whose content, as we have seen, may be determined by completely different conditions having nothing at all to do with the given cue.

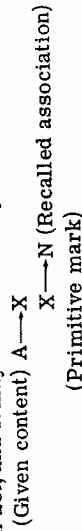
We might best describe the functional role of such a cue as follows:

Let us imagine the process of writing (alphabetic, pictographic, or conventionally agreed on) in an adult. A certain content A is written with the symbol X. When a reader looks at this symbol, he immediately thinks of the content A. The symbol X is an instrumental device to direct the reader's attention to the initial written content. The formula:



is the best expression of the structure of such a process.

The situation with respect to a primitive mark such as we have just been discussing is completely different. It only signals that some content written down by means of it exists, but does not lead us to it; it is only a cue evoking some (associative) reaction in the subject. We actually do not have in it the complex instrumental structure of an act, and it may be described by the following formula:



where N may not have any relation to the given content A, or, of course, to the mark X.

Instead of an instrumental act, which uses X to revert attention back to A, we have here two direct acts: (1) the mark on the paper, and (2) the response to the mark as a cue. Of course, in psychological terms this is not yet writing, but only the forerunner of it, in which the most rudimentary and necessary conditions for its development are forged. (5)

## VI

We have already discussed the insufficient stability of this phase of undifferentiated, memory-helping writing. Having taken the first step along the path of culture with it, and having linked, for the first time, the recalled object with some sign, the child must now go on to the second step: he must differentiate this sign and make it really express a specific content; he must create the rudiments of literacy, in the truest sense of the word. Only then will the child's writing become stable and independent of the number of elements written down; and memory will have gained a powerful tool, capable of broadening its scope enormously. Finally, only under these conditions will any steps forward be taken along the way toward objectivization of writing, i.e., toward transforming it from subjectively coordinated markings into signs having an objective significance that is the same for everyone.

Our experiments warrant the assertion that the development of writing in the child proceeds along a path we can describe as the transformation of an undifferentiated scrawl into a differentiated sign. Lines and scribbles are replaced by figures and pictures, and these give way to signs. In this sequence of events lies the entire path of development of writing in both the history of nations and the development of the child.

We are psychologists, however, and our task is not confined to simple observation and confirmation of the sequence of individual phases: we should like also to describe the conditions

that produce this sequence of events and to determine empirically the factors that facilitate for the child the transition from a stage of undifferentiated writing to the level of meaningful signs expressing a content.

Actually, one can say there are two pathways by which differentiation of the primary sign may take place in a child. On the one hand, the child may try to depict the content given him without going beyond the limits of arbitrary, imitative scrawling; on the other hand, he may make the transition to a form of writing that depicts content, to the recording of an idea, i.e., to pictograms. Both paths presuppose some jump that must be made by the child as he replaces the primary, undifferentiated sign with another, differentiated one. This jump presupposes a little invention, whose psychological significance is interesting in that it alters the very psychological function of the sign by transforming the primary sign, which merely establishes ostensively the existence of a thing, into another kind of a sign that reveals a particular content. If this differentiation is accomplished successfully, it transforms a sign-stimulus into a sign-symbol, and a qualitative leap is thereby effected in the development of complex forms of cultural behavior.

We were able to follow the elementary inventions of a child along both these paths. Let us examine each of them separately.

The first signs of differentiation we were able to observe in the small child occurred after several repetitions of our experiment. By the third or fourth session, a child of 4 or 5 years would begin to link the word (or phrase) given him and the nature of the mark with which he distinguished the word. This meant that he did not mark all the words in the same way: the first differentiation, as far as we could judge, involved reflection of the rhythm of the phrase uttered in the rhythm of the graphic sign.

The child quite early begins to show a tendency to write down short words or phrases with short lines and long words or phrases with a large number of scribbles. It is difficult to say whether this is a conscious act, the child's own invention, as it were. We are inclined to see other, more primitive mechanisms

at work in this. Indeed, this rhythmic differentiation is by no means always stable. A child who has written a series of sentences given him in a "differentiated" manner in the next session (or for that matter even in the same session) will revert to primitive, undifferentiated writing. This suggests that in this rhythmically reproductive writing some more primitive mechanisms, not an organized and conscious device, are at work.

But what are these mechanisms? Are we not dealing here with simple coincidence, which leads us to see a pattern where there is only the play of chance?

An example drawn from one of our experiments may serve as material for a concrete analysis of this problem.

Lyuse N., age 4 years, 8 months. We gave her a number of words: mama, cat, dog, doll. She wrote them all down with the same scrawls, which in no way differed from one another. The situation changed considerably, however, when we also gave her long sentences along with individual words: (1) girl; (2) cat; (3) Zhorzhik is skating; (4) Two dogs are chasing the cat; (5) There are many books in the room, and the lamp is burning; (6) bottle; (7) ball; (8) The cat is sleeping; (9) We play all day, then we eat dinner, and then we go out to play again.

In the writing the child now produced, the individual words were represented by little lines, but the long sentences were written as complicated squiggles; and the longer the sentence, the longer was the squiggle written to express it.

Thus, the process of writing, which began with an undifferentiated, purely imitative, graphic accompaniment to the presented words, after a period of time was transformed into a process that on the surface indicated that a connection had been made between the graphic production and the cue presented. The child's graphic production ceased being a simple accompaniment to a cue and became its reflection — albeit in very primitive form. It began to reflect merely the rhythm of the presented phrase:

single words began to be written as single lines, and sentences as long, complicated scribbles, sometimes reflecting the rhythm of the presented sentence.

The variable nature of this writing suggests, however, that perhaps this is no more than a simple rhythmic reflection of the cue presented to the subject. Psychologically, it is quite comprehensible that every stimulus perceived by a subject has its own rhythm and through it exerts a certain effect on the activity of the subject, especially if the aim of that activity is linked to the presented stimulus and must reflect and record it. The primary effect of this rhythm also produces that first rhythmic differentiation in the child's writing that we were able to note in our experiments.

Below we shall discuss the very intimate relationship that we believe exists between graphic production and mimicry. Functionally, graphic activity is a rather complex system of cultural behavior, and in terms of its genesis may be regarded as expressiveness materialized in fixed form. It is just this sort of reflection of mimicry we see in the example given above. The rhythm of a sentence is reflected in the child's graphic activity, and we quite frequently encounter further rudiments of such rhythmically depictive writing of complex speech clusters. It was not invention, but the primary effect of the rhythm of the cue or stimulus that was at the source of the first meaningful use of a graphic sign.

## VII

This first step along the way of differentiation of primitive, imitative, graphic activity is still very weak and impoverished, however. Although a child may be able to reflect the rhythm of a sentence, he is still unable to mark the content of a term presented to him graphically. We must await the next step, when his graphic activity begins to reflect not only the external rhythm of the words presented to him but also their content; we await the moment when a sign acquires meaning. It is then that we shall doubtless be dealing with inventiveness.

Actually, when undifferentiated, imitative, graphic activity first acquires expressive content, is this not a tremendous step forward in the child's cultural behavior? But even here, again, it is not enough merely to show invention. Our task must be to ascertain what factors are responsible for the shift to a meaningful, depictive sign; and to show what they are means to discover the internal factors determining the process of invention of expressive signs in the child.

The task of the experimenter in this case is consequently to test certain inputs into an experiment and determine which of them produces the primary transition from the diffuse phase to the meaningful use of signs.

In our experiments there was one serious factor that could influence the development of writing in the child: this was the content of what was presented to him; and in varying this, we might ask, What changes in the content we presented were conditions for inducing a primary transition to differentiated, depictive writing?

Two primary factors can take the child from an undifferentiated phase of graphic activity to a stage of differentiated graphic activity. These factors are number and form.

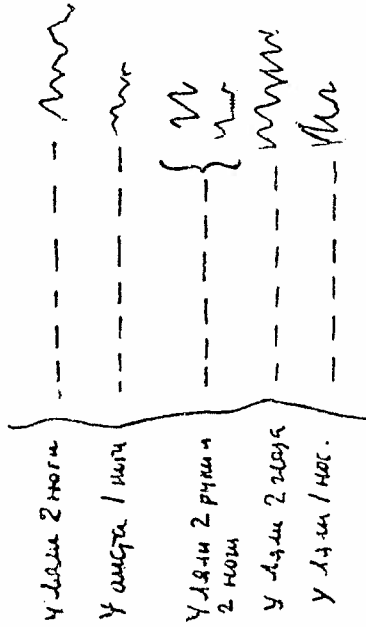
We observed that number, or quantity, was perhaps the first factor to break up that purely imitative, unexpressive character of graphic activity in which different ideas and notions were expressed by exactly the same sort of lines and scribbles. By introducing the factor of number into the material, we could readily produce differentiated graphic activity in 4-5-year-old children by causing them to use signs to reflect this number. It is possible that the actual origins of writing are to be found in the need to record number, or quantity.

Perhaps the best thing to do is to reproduce a protocol showing the process of differentiation of writing as it took place under the influence of the factor of quantity.

Lena L., 4 years old, in her first attempt to write sentences produced an undifferentiated scrawl for each sentence, with completely identical scribbles (see Figure 2). Of course, since these scribbles were totally unrelated to

the ideas, they did not even give the effect of writing, and we concluded that this kind of mechanical graphic production hindered rather than helped memory.

We then introduced the factor of quantity into a number of experiments to determine how the altered conditions would affect the development of graphic activity. We were immediately able to note the beginnings of differentiation.



Indeed, graphic production changed sharply under the influence of this factor (especially if one compares it with the sample in Figure 2). We now see a clear differentiation, linked to the particular task. For the first time each scrawl reflects a particular content. Of course, the differentiation is still primitive: what differentiates "one nose" from "two eyes" is that the scribbles representing the former are much smaller. Quantity is still not clearly expressed, but relations are. The sentence "Lilya has two hands and two legs" was perceived and recorded in a differentiated fashion: "two hands" and "two legs" each had their own scribble. But most important, this differentiation appeared in a child who had just produced some totally undifferentiated scribbles, not betraying even the

least indication that they might have anything at all to do with the sentences dictated.

This example brings us to the following observation: quantity was the factor that broke up the elementary, mechanical, undifferentiated, graphic production and for the first time opened the way toward its use as an auxiliary device, hence raising it from the level of merely mechanical imitation to the status of a functionally employed tool.

Of course, the graphic production itself is still muddled; and the technique has not yet assumed precise, constant contours: if we again dictated material having no reference to quantity, we would again obtain an undifferentiated scribbling by the same child, with no attempt on her part to represent a particular content with a particular mark. But now that the first step had been taken, the child was, for the first time, able really to "write" and, what is most important, to "read" what she had written. With the transition to this primitive but differentiated graphic activity, her entire behavior changed: the same child who had been unable to recall two or three sentences was now able to recall all of them confidently and, what is more, for the first time was able to read her own writing.

Thanks to the quantity factor, this differentiation was achieved in children 4-5 years old. The influence of the factor of quantity was especially strong in cases in which the factor of contrast was added — when, for example, the sentence "There are two trees in the yard" was followed by the sentence "There are many trees in the forest," the child tried to reproduce the same contrast, and hence could not write both sentences with the same markings and instead was forced to produce differentiated writing.

Having noted this, let us go on immediately to the second factor defining and accelerating the transition from undifferentiated play writing to real, differentiated, expressive, graphic activity.

In our experiments we observed that differentiation of writing could be considerably accelerated if one of the sentences dictated concerned an object that was quite conspicuous because of its color, clear-cut shape, or size. We combined these three fac-

tors into a second group of conditions that would promote the child's learning to put a specific content into his writing and make it expressive and differentiated. In such cases we saw how graphic production suddenly began to acquire definite contours as the child attempted to express color, shape, and size; indeed, it began to have a rough resemblance to primitive pictography. Quantity and conspicuous shape lead the child to pictography. Through these factors the child initially gets the idea of using drawing (which he is already quite good at in play) as a means of remembering, and for the first time drawing begins to converge with a complex intellectual activity. Drawing changes from simple representation to a means, and the intellect acquires a new and powerful tool in the form of the first differentiated writing.

Here is a protocol illustrating the guiding role played by the factor of form in the child's discovery of the mechanism of writing; this protocol also shows clearly the process of differentiation as it progresses.

Vova N., 5 years old, first time in our laboratory. The subject was asked to write sentences dictated to him in order to remember them. He began immediately to produce scribbles, saying, "This is how you write" (see Figure 1). Obviously, for him the act of writing was purely an external imitation of the writing of an adult without any connection with the content of the particular idea, since the scribbles differed from one another in no essential way. Here is the record:

1. The mouse with a long tall. Subject (writes:) This is how you write.
2. There is a high column. Subject (writes:) Column... This is how you write.
3. There are chimneys on the roof... This is how you write....

Now we give the subject a picture in bright colors, and the reaction immediately changes.

4. Very black smoke is coming out of the chimney. Subject: Black. Like this! (Points to the pencil and then begins to draw very black scribbles, pressing hard.) Subject: (Makes his usual scribbles, but separates them into two parts, apparently unrelated to the idea of "white snow.") Subject: (Again draws heavy lines.)
5. In the winter there is white snow.
6. Very black coal -

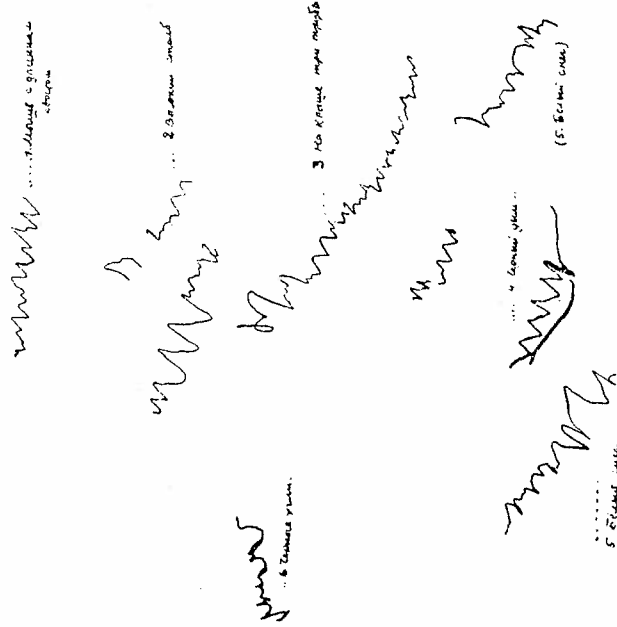


Figure 6

Both the protocol and the writing itself in Figure 6 show that the generally undifferentiated writing acquires an expressive character in only two cases (4 and 6), in which "black smoke" and "black coal" are depicted with heavy black lines. For the first time the scrawls on paper assume some of the features of true writing.

The effect becomes clear when we see how the subject recalls what he has written. When asked to recall what he has written, he refuses to recall anything at all. It seems that he has forgotten everything, and his scribbles tell him nothing. But after examining the scrawls, he suddenly stops at one of them and says, spontaneously: "This is coal." This is the first time such spontaneous reading occurs in this child, and the fact that he had not only produced something differentiated in his graphic activity but also was able to recall what it represented fully confirms that he had taken the first step toward using writing as a means of remembering.

This sort of differentiation was achieved in 4- and 5-year olds, and it is quite possible that in some cases it can occur even much earlier. The most important thing about all this is that the emergence of the conditions necessary for writing, the discovery of pictographic writing, the first use of writing as a means of expression, occurred before our eyes. We can say with assurance that after observing with our own eyes, in our laboratory, how a child gropingly repeated the first primitive steps of culture, many elements and factors in the emergence of writing became incomparably clearer for us. Sometimes, in the same experiment, we were able to observe the sequence of a whole series of inventions carrying the child forward to one new stage after another in the cultural use of signs.

The best thing to do, perhaps, is to present a protocol from one of our experiments in its entirety. We have therefore selected a record for a 5-year-old girl in which we may follow step by step her discovery of cultural signs. We have purposely chosen a subject whose undifferentiated, mnemotechnical writing we have presented earlier (Figure 5).

Brina Z., age 5. The experiment was done in a number of consecutive sessions in each of which five or six sen-

tences were dictated with the instruction to write them down in order to remember them.

1st session. The experimenter dictated five sentences:

- (1) The bird is flying. (2) The elephant has a long trunk.
- (3) An automobile goes fast. (4) There are high waves on the sea. (5) The dog barks.

The subject made a line for each sentence and arranged the lines in columns (see Figure 7A, I). The lines were identical. In the recall test, she remembered only three sentences, i.e., the same number she remembered without writing anything down. She recalled spontaneously, i.e., without looking at her scribbles.

2nd session. The experimenter dictated five sentences, which included quantitative elements: (1) A man has two arms and two legs. (2) There are many stars in the sky. (3) Nose. (4) Brina has 20 teeth. (5) The big dog has four little pups. The subject drew lines arranged in a column. Two hands and two legs were represented by two discrete lines; the other sentences were represented by one line each (Figure 7A, II). In the recall test the subject declared that she had forgotten everything and refused to try to remember. 3rd session. The experimenter repeated the second series "to help her write down and remember what was dictated a little better." He then dictated the second series again with a few changes: (the subject's scribbles are given in Figure 7A, III):

1. Here is a man, and he has two legs. Subject: Then I'll draw two lines.
2. In the sky there are many stars. Subject: Then I'll draw many lines.
3. The crane has one leg. (Makes a mark)... The crane is on one leg... There you are... (Points) The crane is on one leg.
4. Brina has 20 teeth. (Draws several lines.)
5. The big hen and four little chicks. (Makes one big line and two small ones; thinks a little, and adds another two.)



In the recall test, she remembered everything correctly except for sentence No. 2. When the experimenter dictated this sentence to her and asked, "How can you write this so as to remember it?" she answered, "Best with circles." 4th session. The experimenter again dictates sentences and the subject writes them down.

1. The monkey has a long Subject: The monkey (draws a line) has a long (draws another line) tail (draws another line). Okay, so I'll draw a line. The column came broken.
2. The column is high. Now I can draw the table and then the bottle. But I can't do it right.
3. The bottle is on the table. (Draws two lines.) Now I'll draw the branches.
4. There are two trees. Okay. In the winter (draws line) it's cold (draws line).
5. It's cold in winter. (Draws a mark.) [Experiment-er:] Why did you draw it like that? [Subject:] Because I wanted to.

In the recall test she remembered correctly Nos. 2, 3, 5, and 6. (see Figure 7B). About No. 4 she said: "This is the monkey with the long tail." When the experimenter pointed out that this sentence was No. 1, she objected: "No, these two long lines are the monkey with the long tail. If I hadn't drawn the long lines, I wouldn't have known."

This experiment began with completely undifferentiated writing. The subject would jot down lines without relating to them in any way as differentiated signs referring to something. In the recall test she did not use these lines and recalled directly, as it were. It is understandable that the failure in the first two experiments depressed her somewhat, and she tried to refuse to go on, declaring that she couldn't remember anything and that she "didn't want to play anymore." At this point, however, a

sudden change occurred, and she began to behave completely differently. She had discovered the instrumental use of writing; she had invented the sign. The lines she had drawn mechanically became a differentiated, expressive tool, and the entire process of recall for the first time began to be mediated. This invention was the result of a confluence of two factors: the imperfection of the factor of quantity into the task, and the experimenter's insistent requirement that she "write so that it could be understood." Perhaps even without this last condition the subject would have discovered the sign, maybe a little later; but we wanted to accelerate the process and restore her interest.

This we were able to do; and the subject, after switching to a new technique and finding it successful, continued to cooperate for another hour and a half.

In the third session, which we shall now discuss, she discovered for the first time that a sign, by means of numerical

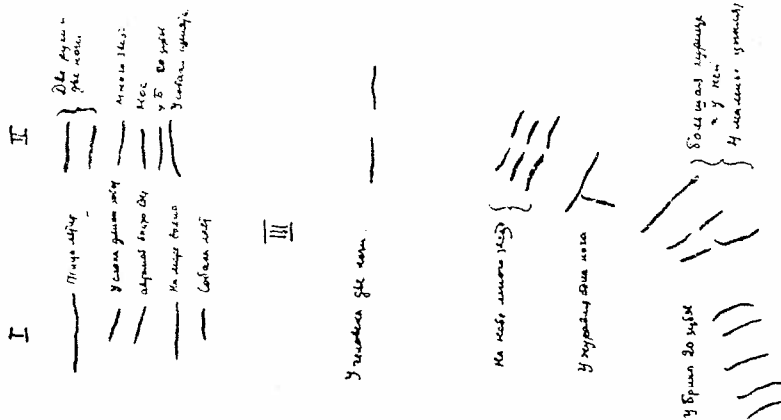


Figure 7A



differentiation, had an expressive function: when asked to write "The man has two legs" Brina immediately declared, "Then I'll draw two lines"; and once having discovered this technique, she continued to use it. She then combined this device with a rough schematic representation of the object: the crane with one leg she depicted with a line with another meeting it at right angles;

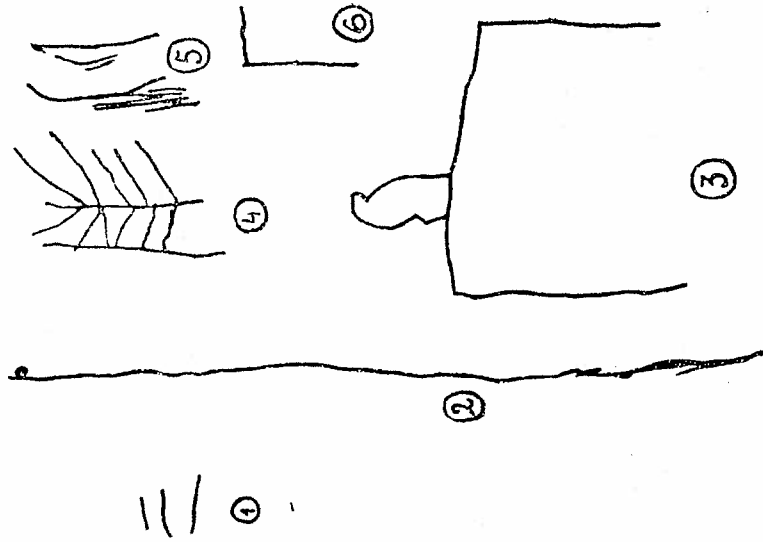


Figure 7B

the large dog with four pups became a large line with four smaller ones. Thus, in the recall test she no longer proceeded completely from memory, but read what she had written, each time pointing to her drawing. The only case of failure was "There are many stars in the sky." In the test session this was replaced with a new drawing in which the stars were represented by circles, not lines.

Differentiation continued in the fourth session, in which the length of the column was represented by a long line and the tree and bottle were drawn directly. Of particular interest is her attempt to differentiate her writing in another direction, mentioned above: when Brina had difficulty expressing a complex formula- tion, she wrote down the dictated sentence semimechanically, rhythmically breaking it down into words, each of which was represented by a line (monkey — long — tail, winter — cold). She continued to use this technique for some time; we have observed the same technique in 7-8-year-old children. This technique was less successful than the technique of real, differentiated writing, however, and hence is a special case. After writing "It is cold in winter" with two long lines, the subject began to recall them as the "monkey with the long tail," declaring that she had purposely drawn the long line and that without it she would have been unable to remember the monkey's long tail. We see here how a technique that has been used ineffectively is reworked and acquires an attribute corresponding to one of the ideas; the line is then interpreted differently and is transformed into a sign.

After having started with undifferentiated play writing, before our very eyes the subject discovered the instrumental nature of such writing and worked out her own system of expressive marks, by means of which she was able to transform the entire remembering process. Play was transformed into elementary writing, and writing was now able to assimilate the child's representational experience. We have reached the threshold of pictographic writing.

## VIII

The period of picture writing is fully developed by the time a

child reaches the age of 5 or 6 years; if it is not fully and clearly developed by that time, it is only because it already begins to give way to symbolic alphabetic writing, which the child learns in school — and sometimes long before.

If it were not for this factor, we should have every reason to expect that pictography would achieve a flourishing development; and this is what we actually see everywhere that symbolic writing is not developed or does not exist; pictography flourishes among primitive peoples (there have been many interesting studies of pictography). The richest development of pictography is found in retarded children, who are still preliterate; and we should, without reserve, recognize that their fine and colorful

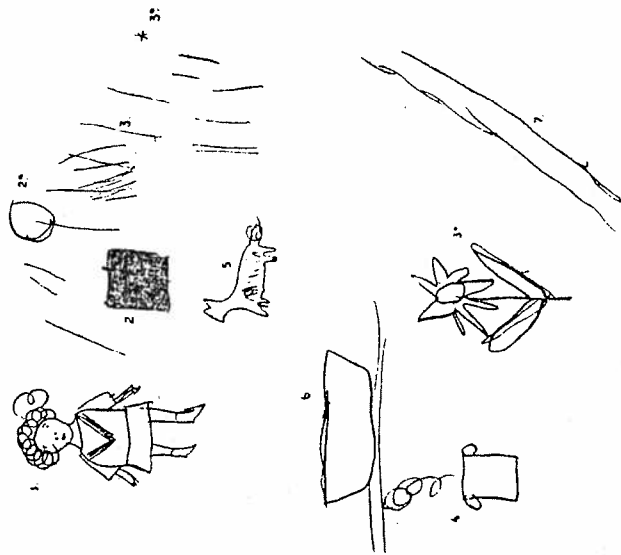


Figure 8

pictographic writing is one of the positive accomplishments of retarded children. (In Figure 8 we show some drawings by a retarded child that are quite impressive in their vividness and grace.)

The pictographic phase in the development of writing is based on the rich experience of the child's drawings, which need not in themselves serve the function of mediating signs, in any intellectual process. Initially drawing is play, a self-contained process of representation; then the perfected act can be used as a device, a means, for recording. But because the direct experience of drawing is so rich, we often do not obtain the pictographic phase of writing in its pure form in the child. Drawing as a means is very frequently blended with drawing as a self-contained, unmediated process. Nowhere in such material can one discern any sign of the difficulties the child experiences in going through the differentiation of all these processes into means and ends, objects and functionally related techniques, which, as we saw above, are the necessary condition for the emergence of writing.

We shall not dwell in detail on all the characteristic features of this pictographic phase in the development of writing in the child, since this phase has been studied much more than all the others. We shall merely underscore the distinction between pictographic writing and drawing, and once again draw on an actual experimental record to illustrate our point.

Marusya G., 8 years old, is a mentally retarded child. She cannot write, and has poor command of speech. Her Binet-Bert IQ is 60. Despite this handicap, however, she has remarkable representational gifts. Her drawings are an excellent example of how drawing may not be an indicator of intellectual aptitude, but may in compensation develop in people whose intellectual (especially verbal) aptitudes are impaired.

We performed our usual experiment with Marusya. In the first natural series, she remembered only one of the six words. After noting this, we went directly on to the writing experiment. Here is the record:

Experimenter: Now I shall tell you a number of things,

and you should write them down on the paper so you can remember them better. Here is a pencil.

Subject: How should I write it? House and girl, right? (Begins to write "girl"; see Figure 8, 1.)

Experimenter: (1) Listen. Subject: A little cow, a real little cow. I think I'd better draw the girl instead.

I don't know how (draws the girl).

Black. A little box. I don't know how to draw a chimney (draws a box, then begins to draw a flower).

(Figure 8, 2 and 3a [ "This is a flower." ])

(3) Yesterday evening it rained.

It was wet. I put on my galoshes. There was a little drizzle. Here it is (makes a few light lines on the paper [ Figure 8, 3 ] ). I can draw snow, too. Here it is (draws a star, Figure 8, 3a).

(4) We had a tasty soup for lunch. Soup, tasty (Figure 8, 4); they go together.

(5) The dog is running about the yard. Dog, little (draws a dog).

(6) The boat is sailing the sea. Here's the boat (draws).

At this point a bright light was turned on so that we could film the process, and the experimenter called the subject's attention to it: "Look at our little sun." The subject then proceeded to draw a circle and declared: "Here is the sun" (Figure 8, 2a).

In the recall test, the subject named all the figures she had drawn, regardless of whether they depicted what had been dictated or were spontaneous drawings: (1) Girl, (2) Soup, (3) The

boat is sailing, (4) The black box, (5) Here is a flower, (6) The dog... She then took the pencil and drew a road and said, "Here is a road" (Figure 8, 7).

Our record gives a good, detailed description of the development of pictographic writing in the child. What is especially noteworthy is the extraordinary ease with which the child took up this kind of writing yet dissociated the depicted figures from the writing task and turned it into spontaneous, self-contained drawing. It was with this tendency to draw pictures, not to write with the aid of pictures, that our experiment began, when Marusya at our request to pay attention to everything said to her immediately answered: "How should I write? A house, a little girl, right?" The process of the functional use of writing was incomprehensible to her; and if she learned it later, it would remain a shaky acquisition. Several times during the course of the experiment, Marusya reverted to spontaneous drawing, with no function related to remembering the dictated material.

This dual relationship to drawing remained with our subject throughout all the following experiments, and the agility with which she would switch from pictographic writing back to spontaneous drawing was something observed in many preschoolers and, especially, in older retarded children. The more outstanding the pictography, the easier it was for these two principles of picture writing to be mixed.

A child may draw well but not relate to his drawing as an auxiliary device. This distinguishes writing from drawing and sets a limit to the full development of pictographic literacy in the narrow meaning of the term. The more retarded the child, the more marked is his inability to relate to drawing other than as a kind of play and to develop and understand the instrumental use of a picture as a device or symbol, though his drawing skills may be well developed.

But now we have come to the problem of the development of the symbolic phase of writing; and in order not to lose the connection with what has been said, we should pause for a moment on a very important factor at the borderline between pictography and symbolic writing in the child.

## IX

Let us imagine a case in which a child who can write pictographically must put down something that is difficult (or even impossible) to express in a picture. What does the child then do?

This situation, of course, forces the child to find ways around the problem, if he does not simply refuse to perform the task. Two such detours, very similar to each other, are possible. On the one hand, the child instructed to record something difficult to depict may instead of object A put down object B, which is related in some way to A. Or, he may simply put down some arbitrary mark instead of the object he finds difficult to depict.

Either way leads from pictographic writing to symbolic writing, except that the first still operates with the same means of pictographic representation whereas the second makes use of other qualitatively new devices.

In experiments with mentally retarded children we often observe the development of indirect means of the first type; school and school instruction provide ample opportunities for the second type.

Let us imagine that a small child or a retarded child is able to draw well, and we suggest to him some picture that, for some reason, he finds difficult to draw. How does he proceed in this case? We can analyze the indirect means a child devises in such a case in their purest form on the basis of one of our experiments.

Let us first take a subject whom we have already discussed earlier — Marusya G.

In a fourth session we again gave her a series of sentences that were not all equally easy to write down. Here is an extract from the record (see Figure 9).

1. Two dogs on the street.  
Subject: Two dogs (draws) ... and a cat (draws a cat).  
Two big dogs.  
What stars ... here is the sky (draws a line). Here is some grass below (draws) ... I see them from the window (draws a window).
2. There are many stars in the sky.

What does this extract tell us? The subject has difficulty in representing pictographically the sentence "There are many stars in the sky," and she creates her own unique way to get around the problem: she does not draw the image given her, but instead portrays an entire situation in which she saw stars. She depicts the sky, the window through which she saw the stars, etc. Instead of the part, she reproduces the entire situation, and in this way solves the problem.

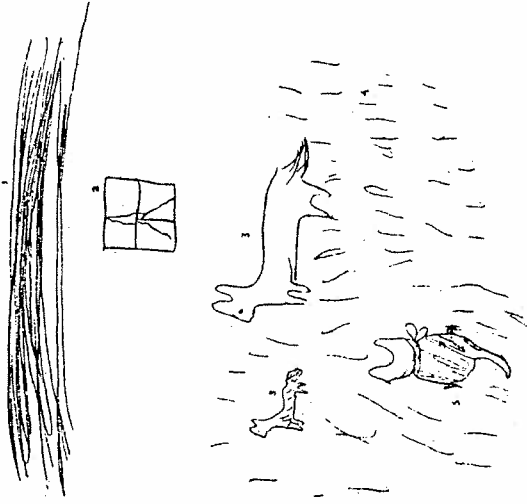


Figure 9

A similar situation was encountered with another subject, Petya U., 6½ years old. Here is an extract from the record.

- Session III, (2) There are 1,000 stars in the sky. If you want, I'll draw an airplane. This is the sky (draws a horizontal line) ... Oh, I can't....
- Subject: I can't draw 1,000 stars. If you want, I'll draw an airplane. This is the sky (draws a horizontal line) ... Oh, I can't....

We see here the difficulty of an image that does not lend itself well to graphic representation, so that the subject tries to get around the problem by depicting other, related objects.

These children had insufficient ability to use drawing as a sign or a means, and this was complicated by their attitude toward drawing as a self-contained game. Hence, the representation is extended from a single image to a whole situation in which this image was perceived; it is given new roots. In this situation, however, the indirect path is purely of the most primitive sort. The whole instead of the part is the first indirect device used in early childhood; we shall be able to understand it if we take into account the diffuse, holistic, poorly differentiated nature of a child's perceptions. (6) At the very last stages, these indirect means acquire another, more differentiated and more highly developed nature.

It is hardly necessary to present all the instances in which a child chooses an indirect means and, instead of a whole that he finds difficult to depict, draws some part of it, which is easier. These features of all infantile drawing that is already at a more differentiated stage have been described many times, and are well known to all. Two tendencies are characteristic of the pictographic writing of a child at a relatively advanced stage: the object to be depicted may be replaced either by some part of it or by its general contours or outline. In either case the child has already gone beyond the aforementioned tendency to depict an object in its entirety, in all its details, and is in the process of acquiring the psychological skills on whose basis the last form, symbolic writing, will develop. Let us give just one more example of the first appearance of this kind of representational drawing in a child. This is the "part instead of the whole" device we observed in the experiments involving writing a number.

Shura N., 7½ years old. The child is instructed to write the sentence we presented above: "There are 1,000 stars in the sky." The subject first draws a horizontal line ("the sky"), then carefully draws two stars, and stops. Experimenter: "How many do you still have to draw?" Subject:

"Only two. I'll remember there are 1,000."

Clearly, the two stars here were a sign for a large quantity. It would be wrong, however, to assume that such a small child was capable of using the "part for the whole" device. We had occasion to observe a number of children who wrote the sentence about 1,000 stars with so many "stars," i.e., marks, that after demurring several minutes, we finally had simply to stop this procedure, which looked as though it were going to end with a thousand stars. A considerable degree of intellectual development and abstraction are necessary to be able to depict a whole group by one or two representatives; a child who is capable of this is already at the verge of symbolic writing.

Let us consider briefly some experiments we ran in this regard on adults. An adult audience was asked to represent concrete or abstract concepts graphically; these adults invariably depicted one attribute of the whole (e.g., "stupidity" was represented as donkey ears, "intelligence" by a high forehead, "fear" by raised hair or big eyes, etc.). Graphic representation by means of a particular attribute, however, is not at all easy for a child, whose discriminating and abstracting powers are not very well developed.

We have arrived at the question of a child's symbolic writing, and with this will have reached the end of our essay on the prehistory of a child's writing. Strictly speaking, this primitive period of infantile literacy, which is so interesting to the psychologist, comes to an end when the teacher gives a child a pencil. But we should not be completely correct in saying such a thing. From the time a child first begins to learn to write until he has finally mastered this skill is a very long period, which is of particular interest for psychological research. It is right at the borderline between the primitive forms of inscription we have seen above, which have a prehistoric, spontaneous character, and the new cultural forms introduced in an organized fashion from outside the individual. It is during this transitional

period, when the child has not completely mastered the new skills but also has not completely outgrown the old, that a number of psychological patterns of particular interest emerge.

How does a child write who, although he is still unable to write, knows some of the elements of the alphabet? How does he relate to these letters, and how does he (psychologically) try to use them in his primitive practice? These are the questions that interest us.

Let us first describe some extremely interesting patterns we observed in our material. Writing by no means develops along a straight line, with continuous growth and improvement. Like any other cultural psychological function, the development of writing depends to a considerable extent on the writing techniques used and amounts essentially to the replacement of one such technique by another. Development in this case may be described as a gradual improvement in the process of writing, within the means of each technique, and sharp turning points marking a transition from one such technique to another. But the profoundly dialectical uniqueness of this process means that the transition to a new technique initially sets the process of writing back considerably, after which it then develops further at the new and higher level. Let us try to see what this interesting pattern means, since without it, in our opinion, it would be impossible for such cultural psychological functions to develop.

We saw that the prehistory of infantile writing traces a path of gradual differentiation of the symbols used. At first the child relates to writing things without understanding the significance of writing; in the first stage, writing is for him not a means of recording some specific content, but a self-contained process involving imitation of an adult activity but having no functional significance in itself. This phase is characterized by undifferentiated scribbles; the child records any idea with exactly the same scrawls. Later — and we saw how this develops — differentiation begins: the symbols acquire a functional significance and begin graphically to reflect the content the child is to write down.

At this stage the child begins to learn how to read: he knows individual letters, and he knows that these letters record some

content; finally, he learns their outward forms and how to make particular marks. But does this mean that he now understands the full mechanics of their use? Not at all. Moreover, we are convinced that an understanding of the mechanisms of writing, and takes place much later than the outward mastery of writing, and that in the first stages of acquiring this mastery the child's relation to writing is purely external. He understands that he can use signs to write everything, but he does not yet understand how to do this; he thus becomes fully confident in this writing yet is still totally unable to use it. Believing completely in this new technique, in the first stage of development of symbolic alphabetic writing the child begins with a stage of undifferentiated writing he had already passed through long before.

Here are some examples from our records for different subjects obtained under different conditions.

Little Vasya G., a village boy 6 years old, could not yet write, but knew the individual letters A and I. When we asked him to remember and write down some sentences we dictated, he easily did so. In his movements he showed total confidence that he would be able to write down and remember the dictated sentences. The results are shown in the following record.

1. A cow has four legs and a tail. Subject: I know he has four legs, and this (writes) is "I."
2. Chimney sweeps are black. (Writes) and this is "A."
3. Yesterday evening it rained. Here's rain. Here's "I" (writes).
4. There are many trees in the woods. Subject: (writes) Here is "u."
5. The steamer is sailing down the river. The steamer goes like this (makes a mark). Here's "I."

The result was a column of alternate I's and A's having nothing to do with the dictated sentences. Obviously, the subject had not yet learned how to make such a connection, so that in the

task in which he was to read what he wrote, he read the letters (I and A) without relating them at all to the text.

In this case the letters were completely non-functional; the child was at a stage fully analogous with the stage studied earlier.

But one may object: the child had obviously not yet learned the function of writing, and psychologically the letters were totally analogous to the earlier scribbles. He had not yet gone beyond the stage of primary, undifferentiated, graphic activity. This observation is quite true, but it does not vitiate the law we wished to demonstrate. We can present data showing that this inability to use letters, this lack of understanding of the actual mechanism of alphabetic writing, persists for a long time. To study the psychological underpinnings of automatized writing skills rather than these skills themselves we selected a somewhat different approach; the children were instructed not to write each word in a sentence completely. The results of this test gave us a deeper insight into a child's attitude toward writing. Here is an example:

A H H A H A

Figure 10

Vanya Z., 9 years old, a village boy, wrote the letters well, and willingly participated in our experiment. The results, however, showed a very unique attitude toward his writing. Here is the record:

1. Monkeys have long tails.  
Subject writes first "n" and then crosses it out and writes "i" (saying to himself: u obezvan-i).
2. There is a tall tree.  
"v"
3. It's dark in the cellar.  
"v"
4. The balloon soars.  
"y"
5. The big dog gave birth to four pups.  
"u"

6. The boy is hungry. "m"  
[Translator's note: Each of the Russian sentences begins with the letter the boy wrote down.]

Of course, the subject was able to recall very little of the written words on the basis of what was written here. The way he wrote three different sentences (2, 3, and 4) induced us to do the following test.

In a second session we gave the boy six sentences beginning with the preposition "u." All six sentences were written down as six completely identical letters "u" (see Figure 11).

These data show that the ability to write does not necessarily mean that the child understands the process of writing and that a child who can write may, under certain conditions, display a totally undifferentiated attitude toward writing and a lack of comprehension of the basic premises of it, namely, the need for specific distinctions to record different contents.

Figure 11

We obtained even clearer results when we asked a schoolchild who had recently learned how to write some idea with any marks (or graphic designs); he was forbidden only to use letters. The most conspicuous result of these experiments was the surprising difficulty the child had in reverting to the phase of pictorial, representational writing through which he had already passed. Our expectation, which seemed quite reasonable, that given the conditions of our experiment, the child would immediately revert to simple drawings proved wrong. The child whom we had forbidden to use letters did not revert to the picture stage, but remained at the level of symbolic writing. He worked out his own signs and, using them, tried to do the assignment. Finally, what was most interesting of all was that in using these signs he started with the same undifferentiated phase with which he began the development of writing in general, only now he gradually developed

y y y y y y

differentiated techniques for this higher level of development.

Here is a record of an experiment done with Shura I., a city schoolboy  $8\frac{1}{2}$  years old. We asked him to note each sentence we dictated with marks to remember it. The subject quickly consented to the experiment, and in the first session used a very simple system. He marked each sentence with crosses, each element of the sentence being noted by one cross. Here is what he produced:

Session I:

1. A cow has four legs and a tail.      XXX  
(Cow - four legs - tail.)
2. Negroes are black.                    XXXX
3. It rained yesterday evening.        XXX  
(It rained - yesterday - evening.)
4. There are many wolves in the forest. XXXX  
(There are - many wolves - in the forest.)
5. House.                                    X
6. Two dogs, a large one and a small one. XXXX  
(Two dogs - large one and - small one.)

The completely undifferentiated nature of this writing shows with graphic clarity that the subject had not yet grasped the mechanism of symbolic writing and used it only externally, thinking that these marks in themselves would be of assistance to him.

The effect of such writing was quite expected; the subject remembered only three of the six sentences, and moreover was completely unable to indicate which of his markings represented which sentence.

To follow the process in its purest form, we forbade our subject to make crosses. The result was a transition to a new form, marks that were not as undifferentiated but that he continued to use in a purely mechanical fashion. In this second trial, however, we were already able to achieve some differentiation; the subject discovered pictographic writing and resorted to it after a number of failures with his marks. Here is the record (see Figure 12).

Session II:

1. Monkeys have long tails. (Makes two marks.)
2. There is a high column on the street. (Two marks.)
3. The night is dark. (I'll write down a bottle and two glasses.)
4. There is one bottle and two glasses. (Makes two marks.)
5. One big dog and one small dog. (I'll write down wood.)
6. Wood is thick.

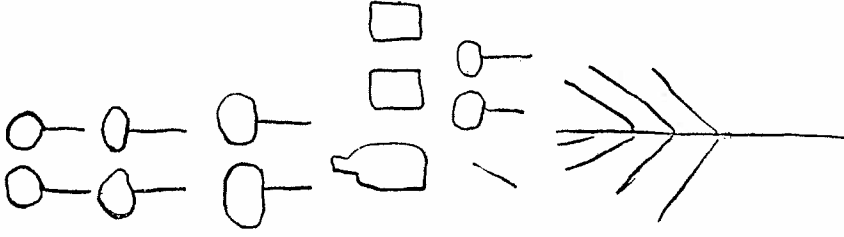


Figure 12

We see that at first this writing was undifferentiated; but then, in cases that were especially conducive to pictography, the subject went over to a graphic depiction of the objects. He was not content in this, however, and at even the slightest difficulty in depicting something would again revert to undifferentiated use of signs.

But in this case, we were able to advance one step in our inquiry into the most difficult problem of our study, namely, the mechanisms by which this arbitrary conventional sign is created. Session III shows this mechanism.

We gave the subject a number of concrete images with a word between them identifying the situation. Figure 13 shows the inter-



esting process of generation of a sign to identify an abstract term.

Session III:

1. There is a column. (The subject draws something.)
2. The night is dark. (I'll put a circle for the night (draws a filled-in circle).)
3. The bird is flying. (The subject draws something.)
4. Smoke is coming from I'll draw a house with smoke the chimney. (draws).
5. The fish is swimming. Fish...fish.... I'll draw a fish.
6. The girl wants to eat. I'll draw a girl.... She wants to eat (makes a mark) — there it is — she wants to eat (Figure 13, 6, 7).

The last is very characteristic. The subject, unable to draw "hunger," reverted to his system of signs and, next to the figure of the little girl, placed a mark meant to signify that the girl wanted to eat. Pictography here is combined with arbitrary symbolic writing, and a sign is used where pictographic means are not sufficient.

Our example clearly shows that a child initially assimilates school experience purely externally, without yet understanding the sense and mechanism of using symbolic marks. In the course of our experiment, however, a positive aspect of this assimilated experience emerged; when conditions were restricted, the child reverted to a new, more complicated form of pictographic writing, in which the pictographic elements were combined with sym-

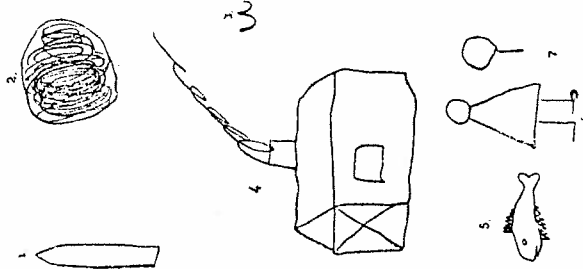


Figure 13

bolic marks used as technical means for remembering.

The further development of literacy involves the assimilation of the mechanisms of culturally elaborated symbolic writing and the use of symbolic devices to simplify and expedite the act of recording. This takes us beyond our topic, and we shall explore the psychological fate of writing further in another study of adults who are already cultural beings. We have come to the end of our essay, and may sum up our conclusions as follows.

One thing seems clear from our analysis of the use of signs and its origins in the child: it is not understanding that generates the act, but far more the act that gives birth to understanding — indeed, the act often far precedes understanding. Before a child has understood the sense and mechanism of writing, he has already made many attempts to elaborate primitive methods; and these, for him, are the prehistory of his writing. But even these methods are not developed all at once: they pass through a number of trials and inventions, constituting a series of stages with which it is very useful for an educator working with school-age children and preschoolers to be acquainted.

The 3- or 4-year-old first discovers that his scribbles on paper can be used as a functional aid to remembering. At this point (sometimes much later) writing assumes an auxiliary instrumental function, and drawing becomes sign writing.

At the same time as this transformation takes place, a fundamental reorganization occurs in the most basic mechanisms of the child's behavior; on top of the primitive forms of direct adaptation to the problems imposed by his environment, the child now builds up new, complex, cultural forms; the major psychological functions no longer operate through primitive natural forms and begin to employ complex cultural devices. These devices are tried in succession, and perfected, and in the process transform the child as well. We have observed the engrossing process of the dialectical development of complex, essentially social forms of behavior that after traversing a long path, have brought us finally to the mastery of what is perhaps the most priceless tool of culture.

Notes

- 1) W. Köhler, Intelligenzprüfungen an Menschenaffen. 1917.
- 2) W. Köhler, *ibid.*
- 3) This is yet another example of a purely external relation to writing that does not take into account its sense. We could say that the child's relation to writing assumes a primitive, magical character. We shall take up this point in more detail elsewhere.
- 4) See L. S. Vygotsky, "Development of higher forms of attention," in this book.
- 5) It is difficult to enumerate on the spur of the moment all the factors that allow the child to enter this phase of primary utilization of some undifferentiated sign. The topography and integral perception of the entire surface of the paper and the relationships among the signs on it probably play an essential role here. Werner (Einführung in die Entwicklungspsychologie) gives the example of the graphic production of primitive peoples, some of which signifies nothing whatever and acquires meaning only through its topographical position.
- 6) See H. Werner for details on this point in Einführung in die Entwicklungspsychologie, 1926.

A. R. Luria

THE DEVELOPMENT OF CONSTRUCTIVE  
ACTIVITY IN THE PRESCHOOL CHILD

Psychological analysis of the development of play, so important for the preschool child, still suffers from relative neglect in modern educational science.

Montessori's theory of educative games was based on concepts of associationistic psychology that have long since been discarded. With its premise that educational play should develop each of the child's senses in isolation and form in him the necessary associations, this theory attempted to defend the pedagogical significance of nonmeaningful activities in the development of the elementary sensations of play. Instead of meaningful play activity, this theory proposed exercises to train the senses of hearing, vision, and touch and regarded such exercises as particularly essential in pedagogy, in contrast to the development of the complex thinking activity of the child, with which the theory was not directly concerned.

This theory was long ago demonstrated to be false by our increasing knowledge of the structure of psychological processes and by pedagogical practice.

The development of a child's mental processes cannot be reduced to mere progressive improvement in the functioning of

From Voprosy psikhologii rebenka dos chkol'novo vozrastia  
[ Problems in the psychology of the preschool child ]. Moscow-Leningrad: APN RSFSR, 1948. Pp. 34-64.