

# Tool and symbol in child development

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## 1 The problem of the practical intelligence in animal and child

From the moment when child psychology began to develop as a special branch of psychological investigation, Stumpf<sup>1</sup> attempted to outline the character of this new scientific field through a comparison with botany. 'Linnaeus,' said he,

as is well known, qualified botany as 'scientia amabilis' or 'pleasant science'. This scarcely applies to contemporary botany . . . If, indeed, any science deserves to be called pleasant, it is the psychology of childhood, the science of what we most cherish, love and take pleasure in, the thing we care most for in the world and which we therefore must study and learn to understand.

Behind this pretty comparison, however, there lies more than meets the eye, more than the mere introduction of Linnaeus' attitude toward the botany of his time into child psychology. For this comparison actually shielded an entire philosophy of child psychology, a specific concept of child development which, without saying so much in words, based all its experiments on the premise proclaimed by Stumpf. This concept stressed the botanic, vegetable character of child development, while psychological development of the child was understood, chiefly, as a growth phenomenon.

In a certain sense contemporary child psychology is not yet completely free from these botanical tendencies, which act as blinkers and hinder the light of true perception from being shed on the highly specific character of psychological development in the child as compared with growth in plants. Therefore Gesell is absolutely right when he points to the fact that our approach toward, and notions of, child development still teem with botanical comparisons. We speak of the development (growth) of the child, we qualify kindergarten as a system of early-age upbringing. It was only during the process of long investigations, lasting entire decades, that psychology overcame the first concept which saw the processes of psychological development as following and proceeding along the lines of botanic patterns.

Nowadays psychology has begun to realize that growth processes alone do not account for the whole complexity of child development; what is more, when it comes

to the most complex and specific forms of human behaviour, growth, in the literal sense of the word, while remaining an element of the process of development, is but a subordinate factor. The processes of development display such complicated qualitative transformations of one form into another, as Hegel would say, such a transition of quantity into quality, and vice versa, that the notion of growth cannot be applied.

If, however, modern psychology has as a whole indeed parted company with the botanic model of child development, now, as it were, ascending the ladder of science, it abounds with ideas that centre around the concept of child development essentially being merely a more complicated and developed type of the origins and evolution of those forms of behaviour which are observed in the animal kingdom. Once the captive of botany, child psychology is now mesmerized by zoology, and many of the leading trends in modern psychology seek to receive a direct answer concerning the psychology of child development through experiments conducted on animals. These experiments, with slight modifications, are transferred from the laboratory of animal psychology into the nursery. Thus one of the most authoritative investigators in this field was obliged to acknowledge that the most important methodological achievements in child investigations are due to animal zoopsychology.

Such convergence of child and animal psychology has contributed significantly in creating a biological basis to psychological research. It has certainly led to the establishment of many highly important points which link child and animal behaviour where lower and elementary psychological processes are concerned. But recently we have been witnessing a most paradoxical stage in the development of child psychology: the chapter even now being written and dealing with the development of the higher intellectual processes native to man as a human being, evolves<sup>2</sup> as the direct continuation of the corresponding chapter of animal psychology.

Nowhere does this paradoxical attempt to solve the mystery of the specifically human in child psychology, and its development through analogous forms of behaviour observed in higher animals, display itself with such evidence as in the teaching of practical intelligence of the child, the most important function of which is the use of tools.

#### *Experiments on the practical intelligence of the child*

The beginning of this new and fruitful series of investigations was marked by the well known works of Köhler conducted on apes. Köhler, as we know, from time to time compared child response in his experiments to those of a chimpanzee in similar conditions. This was fatal to all following investigators. The direct comparison of practical intelligence in the child with analogous actions of apes became the guiding principle of all further experimental work in this field.

Thus one is at first tempted to qualify all these experiments, originating from Köhler's work, as the direct continuation of the ideas which are evolved in his classic study. But this applies only to one's first impression. An attentive approach quickly shows that, all exterior and interior similarities notwithstanding, the new works

actually represent a tendency basically opposed to, and opposite to, those which guided Köhler.

One of Köhler's fundamental ideas, as was correctly shown by Lipmann, is the similarity of behaviour of anthropoids and man in the field of practical intelligence. Köhler's chief concern throughout his entire work was to show the human-like behaviour of anthropoids. At the same time, the point of departure of Köhler's work is based on the tacit assumption that the corresponding behaviour of man is evident to all from everyday experience. Contrary to this, new investigators<sup>3</sup> who tried to transfer to the child<sup>4</sup> the laws of practical intelligence discovered by Köhler, were guided by the opposite tendency which found an exact reflection in the interpretation of Bühler's experiments as given by the author himself.

This investigator relates his experiments concerning the earliest manifestations of practical thought in the child. 'These manifestations were absolutely similar to those of the chimpanzee, and therefore this phase of a child's life might quite justly be called. "The chimpanzee-like age" . . . In the given chimpanzee-like age the child makes its first little inventions, of course, most primitively, but from the psychological point of view of a most important nature.'<sup>5</sup>

The application of Köhler's methods to such a child naturally calls for many changes. But the principle of investigation and its fundamental psychological contents remain unchanged. The child play of grasping objects was used by the author to investigate the child's capacity to apply roundabout ways to achieve a goal and to use primitive tools. In that sense some of these experiments may be regarded as a direct transfer of Köhler's experiments (for instance, the experiment where a ring must be removed from a stick, or the series with the piece of toast attached to a string).

Bühler's experiments led him to the important discovery that the first manifestations of practical intelligence in the child, as well as the actions of the chimpanzee, are entirely independent of speech (this was later re-affirmed in the works of Ch. Bühler, with the first manifestations of practical intelligence in the child being placed at an even earlier date between the sixth and seventh months).

Bühler establishes the genetically extremely important fact that 'prior to speech exists instrumental thought' ('Werkzeugdenken'), i.e. the 'grasping of mechanical concatenations and finding of mechanical means for mechanical ends'.<sup>6</sup> Actually, active practical thinking does precede the first beginnings of intelligent speech in the child, thus evidently comprising genetically the most initial phase in the development of its intellect.

However, even in these investigations Bühler's basic idea comes out with great clarity. Where Köhler was concerned with uncovering the human-like in the actions of anthropoids, Bühler aims to show the chimpanzee-like in the actions of the child.

This tendency, with a few exceptions, remains unchanged in the work of all following investigators. It is here that the danger of what might be called the 'animalization' of child psychology, mentioned earlier, finds its clearest expression as the prevalent feature of investigation in this field (see earlier reference).

However, this danger is at its smallest in Bühler's experiments. Bühler deals with the pre-speech period of the child, which makes it possible to fulfil the basic conditions necessary to justify the psychological parallel between chimpanzee and child. It is true that Bühler underestimates the importance of the similarities of these basic conditions when he states: 'The chimpanzee's activities are totally independent of speech, and in man's later period of life technical, instrumental thinking is much less connected to speech and concepts than other forms of thought'.<sup>7</sup>

Bühler, thus, proceeds from the assumption that the relation between practical thought and speech characteristic of the ten-months-old-child – the independence of intelligent action from speech thought – remains intact throughout man's life, which in turn means that the development of speech does not cause fundamental changes in the structure of the practically reasoned activities of the child. As we shall see later, this assumption finds no factual confirmation throughout experimental investigation, conducted with the aim of discovering the connection between speech thinking in ideas [*rechevoe myslenie v ponjatiakh* – more adequately rendered as 'thinking with the use of concepts' – eds], and practical, instrumental thinking. As will be demonstrated further, our experiments show that the independence of practical activity from speech, typical of apes, has no place in the development of the child's practical intelligence – in fact, the latter proceeds chiefly in the opposite direction, i.e. close integration of speech and practical thinking.

Nevertheless, as we already said, Bühler's premise is shared by the majority of investigators, including those whose experiments deal with more mature children of speaking age. In this article it is impossible for us to give a complete and detailed review of all the important investigations which concern this problem. We shall dwell only very briefly on their fundamental conclusions which are of essential importance to our topic: the connection between practical action and symbolic forms of thinking in child development.

While carrying out a superb and highly systematic series of experiments, Lipmann and Bogen reached conclusions which differ little from Bühler's thesis.<sup>8</sup> They applied a more complex method of investigation which made it possible to include in their experiments the practical intelligence of the grade school age child, yet they saw the experiments as basically only the confirmation of the dogma concerning the chimpanzee-likeness of the child's practical activity, i.e. the fundamental identity of the psychological nature of the use of tools by animals and man, the fundamental similarity of the road leading to the development of practical intelligence in ape and child, which in both cases proceeds<sup>9</sup> due to the growing complexity of the interior factors determining the operation of our interest, but not due to any basic or radical alteration in its structure.

Bühler correctly remarked that a child is psychologically much less stable, biologically less formed, physically less powerful than a four-year-old or seven-year-old (that is, almost adult) chimpanzee. This approach is apparent in the work of other investigators who advance a wealth of distinctions between child and chimpanzee activity; however, these distinctions basically follow along the lines proposed by Bühler.

Lipmann and Bogen see the domination of the physical structure in child behaviour as the main distinction, as compared to the optic structure of ape behaviour. If ape behaviour in an experimental situation which requires the use of tools is, according to Köhler, determined chiefly by the structure of its optic field, the determining factor in the child is 'naive Physik' (naive physics) i.e. primitive experience concerning the physical nature of its environment and of its body.

'Without dwelling on details,' says Bogen,

we could briefly sum up the results of our comparison of activity in children and anthropoids as follows: as long as physical action depends chiefly on the visual structural components of the situation, the only difference between child and ape is quantitative. If, however, the situation requires in addition the realization of the physical structural properties of things, then we must acknowledge that the actions of the ape differ from those of the child. As long as we have no new explanations concerning the ape's behaviour we may define this distinction by saying, along with Köhler, that the ape's actions are determined chiefly by visual, and those of the child chiefly by physical, relations.<sup>10</sup>

Thus we see that the distinction in the development of practical intellect between child and ape boils down to physical structures taking the place of optical structures, i.e. is chiefly determined by purely biological factors rooted in the biological distinction between man and chimpanzee. It is also interesting to note that although the author does not refute the possibility of a change in this thesis as a result of new investigations of the ape's actions, he hardly expected that child activity, when attentively studied, would furnish the grounds for the revision of his views.

Therefore there is nothing surprising in the fact that, having concluded their experiments, these authors are forced to acknowledge that in Köhler's descriptions of the chimpanzee, much is highly pertinent in what concerns child behaviour. They object to some extent to Köhler's statement qualifying the description of practical activity in man as *terra incognita*. Therefore it cannot be supposed *a priori* that the comparison of child and ape activity will give us something fundamentally new. The authors see the importance of the investigation only in that it allows for great clarity in the similarities and differences traced by Köhler. Hence, one should not be surprised when the authors conclude their investigation with the confession that, had children served as the subject of their experiments, the results would [not - eds] have led to a fundamentally different picture of the teaching of intelligent activity, than the one so beautifully and convincingly drawn by Köhler on the basis of his experiments with apes. 'Therefore we must arrive at the conclusion,' they say, 'that, as far as our experiments show, no qualitative distinction between the behaviour of child and ape may be defined during the process of teaching.'<sup>11</sup>

Further investigations in the same field differ little in principle from those of Bühler and Bogen. Analogous experiments on mentally handicapped or ungifted children closely follow Köhler's methods; as, for instance, those included in Schlüter's book.<sup>12</sup> The same may be said of the application of these experiments to

psychotechnical selection, as carried out by some investigators; their application to deaf and dumb children, their use as non-verbal tests and, finally, their systematic use for the comparative study of children of different ages: none of these studies contributed toward principally new findings in our particular field of interest.

As an example, let us cite one of the latest investigations which was published in 1930, and was also conducted in careful comparison with Köhler's experiments. Undertaken by Paul Brainard,<sup>13</sup> these experiments were an exact, step by step reproduction of Köhler's experiments; they led the author to the conclusion that all the children tested were identical in general attitudes, skills and methods of solution. The older children solve problems more adroitly but by the same processes. A three-year-old child shows the same difficulties in solving the problems as did Köhler's apes. Where the child has the advantage of speech and understanding of instructions, the apes have the advantage of longer arms and greater experience in handling objects.

Thus we see that the response of a three-year-old child in principle is equated to an ape's response, while speech which, by the way, is noted by all these authors as present in the process of solution of a practical problem, is treated as a secondary factor and is equated to the arm length of the ape. What most investigators do not acknowledge is that with speech the child acquires a fundamentally different attitude toward the entire situation in which the solution of practical problems is carried out, and that the child's practical actions represent, from a psychological point of view, a completely different structure.

Summing up the results of his experiments, the author openly says: 'The results show that the response of a three-year-old child is almost identical to that of a grown-up ape'.<sup>14</sup>

The first attempt to uncover not only similarities but also the distinctions between the practical intellect of child and ape was carried out in the laboratory of M. Y. Basov.<sup>15</sup> In the introduction to their series of experiments, Shapiro and Guerke<sup>16</sup> note that social experience plays a dominant role in man. 'Drawing a parallel between chimpanzee and child, we shall do so always keeping the aforementioned fact in view,' they wrote. The authors see the effect of social experience in the fact that the child through imitation and the application of tools or objects, following a given pattern, develops not only ready-made stereotype modes of action, but learns to master the very principle involved in the given activity. As the authors say,

All these repeated actions pile up, one upon the other, as in a multi-exposure photograph, with common traits acquiring clarity and differences becoming blurred. The final result is a crystallized scheme, a defined principle of activity. As it becomes more experienced, the child acquires a greater number of models of what it understands. These models represent, as it were, a refined cumulative design of all similar-type previous actions; at the same time, they are also a rough blueprint for possible types of action in the future.<sup>17</sup>

We shall not speak in detail of the fact that the appearance of such blueprints, somewhat remindful of Galton's collective photography, revives in the theory of

practical intellect the theory of the formation of ideas or generic ideas corresponding to word meaning – a theory long abandoned in psychology. We shall also not touch on the problem as to what extent the factor understood as a function of adaptation to new circumstances (and thus differing in principle from the intellect) is introduced along with the blueprints for solution of problems, formed in a purely mechanical way as the result of repetition. We shall only point to the fact that the significance of social experience in this case is understood exclusively from the point of view of the presence of suitable patterns which the child finds in its environment. Thus social experience without changing anything in the interior structure of the child's intellectual operations simply gives these operations another content, forming a series of clichés, a series of stereotyped motor-forms, a series of motor-schemes which the child applies for the solution of a problem.

True, the authors, just as almost all other investigators, while describing their experiments are forced to point to the 'specific role fulfilled by speech' in the practical effective adaptation of the child. However, its role is indeed of a strange nature for, as the authors would have it, 'speech replaces and compensates for real adaptation, it does not serve as a bridge leading to past experience and to a purely social type of adaptation which is achieved via the experimenter'.<sup>18</sup> Thus speech does not create a principally new structure of the practical activity of the child, and the old statement concerning the prevalence of ready-made schemes in the child's behaviour, and of resorting to clichés extracted from the archives of old experience holds true. The new element here is that speech is regarded as a substitute which replaces an unsuccessful action by a word or the action of another.

At this point we could discontinue our brief review of the most important experimental research pertaining to our particular subject of interest. But before making a general conclusion, we would like to call the reader's interest to a very recently published work (1930), for it puts into bold relief the general defect common to all the above-mentioned works and helps define the starting point for an independent solution of our particular problem. We have in mind Guillaume and Meyerson's study, to which we shall have occasion to revert in the course of our article.<sup>19</sup> These authors devoted their research to the use of tools by apes. Children were not involved in their experiments. But when comparing the general results of their work with the corresponding activity of man, the authors conclude that ape behaviour finds its analogy in the behaviour of a man suffering from aphasia, i.e. in the behaviour of a person deprived of speech.

We see this indication as extremely telling and pertaining directly to the heart of our problem. In essence we come around full circle to the opening words of our review. If, as Bühler's experiments confirm, the practical activity of the child, prior to speech development, is identical to that of the ape, then, as Guillaume and Meyerson's investigations confirm, the activity of a man struck by aphasia, through a pathological process, begins again to resemble in principle something analogous to the activity of the ape. But can it be said that the varied forms of man's practical activity situated between these two extreme cases, can it be said that all the practical

activity of the speaking child is also analogous in structure and in psychological nature to the activity of speechless animals? This is the cardinal question to be answered. Here we must turn to our own experimental investigations carried out by ourselves and our staff and based on principally different premises from those which served for almost all the above-mentioned works.

Our research had as its first aim to bring to light the specifically human traits in child behaviour and how these traits are historically established. In the problem of practical intellect our primary interest was the history of origin of those forms of practical activity which could be qualified as specifically human.

We felt that many previous investigations, the fundamental methodological premise of which was animal psychology, lacked this most important aspect. Those works are, of course, extremely important, for they show the ties between the development of human forms of activity and their biological beginnings in the animal world. Yet they record nothing in child behaviour than what it has already inherited from former animal forms of thought. The new type of attitude toward environment, typical of man, the new forms of activity which led to development of labour as the determining form of man's relation with nature, the connection between use of tools and speech – all that remains beyond the range of previous investigators, due to the fundamentally different starting points. We mean to analyse this problem in the light of new experimental investigations aimed at uncovering the specifically human forms of practical intellect in the child and their main lines of development.<sup>20</sup>

*The function of speech in tool use: the problem of practical and verbal intelligence*

This article deals with two processes of vital psychological importance: the use of tools and of symbols; until now they were treated in psychology as isolated and independent of each other.

For many long years scientific opinion held that practical intelligent action connected to the use of tools had no basic relation to the development of sign or symbolic operations, such as, for instance, speech. Psychological literature almost ignored the question of the structural and genetic relations of these two functions.

All the information that could be obtained by modern science led rather to the treatment of these two psychological processes as two quite independent lines of development which, although they might come into contact, basically had nothing in common.

In the classic work on the use of tools by apes, Köhler obtained what one might call the pure culture of practical intellect, developed to a fairly high degree, but having no ties with the application of symbols. Having described brilliantly examples of the use of tools by anthropoids, he went on to demonstrate how futile it was to attempt to develop even the most elementary sign and symbolic operations in animals. The practical intellectual behaviour of the ape proved to be absolutely independent from symbolic activity. Further attempts to cultivate speech in the ape

(see works by Yerkes and Learned)<sup>21</sup> also gave negative results, thus showing once more that the practical 'ideational' behaviour of the animal is completely autonomous and isolated from speech-symbol activity, and that, notwithstanding the similarity of both man's and the ape's vocal apparatus, speech remains beyond the ape's grasp.

The acceptance of the fact that the beginning of practical intellect may be observed to almost its full extent in the pre-human and pre-speech period, led psychologists to the assumption that the use of tools, which originates as a natural operation, remained the same in the child. A number of authors, engaged in the study of practical operations of children of different ages, attempted to define as exactly as possible the age period during which child behaviour resembles in all respects that of the chimpanzee. The addition of speech in the child's case was regarded by those authors as exogenous, secondary and independent of practical operations. Speech, at the most, was looked on as an element accompanying operations just as harmony assists the main melody. The tendency to ignore speech while studying the laws of practical intellect was a normal development; the analysis of the child's practical action boiled down to the simple mechanical subtraction of speech from the integral system of child activity.

The isolated examination of the use of tools and of symbolic activity was a common tendency in the research work of authors who studied the natural history of practical intellect: psychologists, studying the development of symbolic processes in the child, followed the same principle.

The origin and development of speech, and of all other symbolic action, was treated as a factor having no ties with the organization of the child's practical activity, the child being regarded as purely *res cogitans*. Such an approach could not but lead to the proclamation of pure intellectualism; psychologists, preferring to study the development of symbolic activity as the spiritual, as opposed to the natural, history of the child, often attributed this activity to the spontaneous discovery by the child of the relationship between signs and their meaning. This happy moment, according to the well known expression of W. Stern, constitutes 'the greatest discovery in the child's life'.<sup>22</sup> A number of authors fix this moment at the borderline between the child's first and second year, and regard it as the result of the child's conscientious activity. The problems of the *development* of speech and other forms of symbolic activity was thus erased, being supplanted by a purely logical process projected into early childhood, and containing in complete form all the stages of future development.

From the examination of symbolic speech activities on the one hand and practical intellect on the other, as isolated phenomena, it followed that not only the genetic analysis of these functions led to their being regarded as having completely different origins, but also to their participation in a common operation being considered as accidental and of no basic psychological importance. Even in cases when speech and the use of tools were closely linked in one operation, they were still studied as separate processes belonging to two completely different classes of independent phenomena. At the most, the reason for their mutual appearance was defined as exterior.

If authors, studying practical intellect in its natural history, concluded that its natural forms were not in the slightest degree connected to symbolic activity, child psychologists who studied speech made the similar assumption, albeit from the opposite side. Observing psychological development of the child, they established the fact that, during the whole period of development, symbolic activity, accompanying the general activity of the child, discloses its egocentric nature but, being in essence separated from action, does not co-act but merely runs parallel to it. In his description of the egocentric speech of the child Piaget held this viewpoint. He did not attribute any important role to speech in organizing the child; nor did he admit its communicative functions, although he was obliged to admit its practical importance.

A series of observations lead us to assume that such an isolated examination of practical intellect and symbolic activity is absolutely wrong. If the one could exist without the other in the case of higher animals, then one must logically conclude that the unity of these two systems is the very thing to be regarded as specific to the complex behaviour of man. For this results in symbolic activity's beginning to play a specific organizing part, penetrating into the process of tool use and giving birth to principally new forms of behaviour.

We arrived at this conclusion after the most careful study of child behaviour and new research which helped to establish the functional features strictly pertaining to the child as opposed to animals, while simultaneously defining the child's specific behaviour as a human being.

Further research convinced us that nothing can be more false than the two viewpoints discussed earlier and which, while continuing to dominate the scene, regard practical intellect and speech thought as two independent and isolated lines of development. The first of these, as we have seen, expresses the extreme form of the zoological tendency which, once having found the natural root of human behaviour in anthropoids, attempts to examine the higher forms of human labour and thought as the direct prolongation of these roots, thus ignoring man's leap forward, made in his transition to social existence.

The second viewpoint, which proclaims the independent origin of the higher forms of speech-thought and qualifies it as the 'greatest discovery in the child's life', made on the threshold of the second year and consisting of the discovery of the relation between sign and meaning, this viewpoint expresses, first and foremost, an extreme form of spiritualism typical of those modern psychologists who regard thought as a purely spiritual act.

### *Speech and action in child behaviour*

Our research leads us not only to the conviction of the fallacy of this approach, but also to the positive conclusion that *the great genetic moment of all intellectual development, from which grew the purely human forms of practical and gnostic intellect, is realized in the unification of these two previously completely independent lines of development.*

The child's use of tools is comparable to that of an ape's only during the former's pre-speech period. As soon as speech and the use of symbolic signs are included in this

operation, it transforms itself along entirely new lines, overcoming the former natural laws and for the first time giving birth to authentically human use of implements.<sup>23</sup>

From the moment the child begins to *master the situation with the help of speech, after mastering his own behaviour*, a radically new organization of behaviour appears, as well as new relations with the environment. We are witnessing the birth of those specifically human forms of behaviour that, breaking away from animal forms of behaviour, later create intellect and go on to become the base of labour: the specifically human form of the use of tools.

This unification appears with the greatest clarity in our experimental genetic research.

The very first observations of a child in an experimental situation similar to that in which Köhler observed the practical use of tools by apes, show that the child not only acts endeavouring to achieve its goal, but at the same time also *speaks*. This speech as a rule arises spontaneously in the child and continues almost without interruption throughout the experiment. It increases and is of a more persistent character every time the situation becomes more difficult and the goal more difficult to attain. Attempts to block it (as the experiments of our collaborator, R. E. Levina,<sup>24</sup> have shown) are either futile or lead to the termination of all action, 'freezing' as it were the child's behaviour, something quite apparent and easily observed in the experiment.

In this situation, it thus seems both natural and necessary for the child to speak while it acts, and experimenters are under the impression that speech does not simply follow in the wake of practical activity, but plays some kind of specific role of no little importance. The impressions we are left with as the result of similar experiments place the observer face to face with the following two facts, both of capital importance:

- 1 A child's speech is an inalienable and internally necessary part of the operation, its role being as important as that of action in the attaining of a goal. The experimenter's impression is, that the child not only speaks about what he is doing, but that for him speech and action are in this case *one and the same complex psychological function*, directed toward the solution of the given problem.
- 2 The more complex the action demanded by the situation and the less direct its solution, the greater the importance played by speech in the operation as a whole. Sometimes speech becomes of such vital importance that without it the child proves to be positively unable to accomplish the given task.

These observations lead us to the conclusion that *the child solves a practical task with the help of not only eyes and hands, but also speech*. This newly born unity of perception, speech and action, which leads to the inculcation<sup>25</sup> of the laws of the visual field, constitutes the real and vital object of analysis aimed at studying the origin of specifically human forms of behaviour.

Investigating experimentally the egocentric speech of the child engaged in one activity or another, we were able to establish yet another fact of great importance for

the explanation of psychological function and the genetic description of this stage in the development of speech in the child. This fact is that the coefficient of egocentric speech, calculated according to Piaget, quite obviously increases along with the introduction of difficulties and obstacles into the child's activity.

As our experiments have shown, for a given group<sup>26</sup> of children this coefficient almost doubles during moments of difficulty as compared with other moments<sup>27</sup> of the same situation.

This one fact forced us to assume that egocentric speech in the child at a very early age begins to fulfil the function of primitive speech-thinking:<sup>28</sup> thinking aloud. The further analysis of the character of this speech and of its connection with difficulties fully support this assumption.

On the basis of these experiments we developed a hypothesis that egocentric speech in the child should be regarded as the transitional form between external and internal speech. According to this hypothesis, egocentric speech, if we take into consideration its function, is psychologically inner speech, but in its form of expression it is external speech.

From this point of view, we are inclined to assign to egocentric speech the function performed by inner speech in the developed behaviour of an adult, i.e. the intellectual function. From the genetic point of view, we are inclined to regard the general sequence of fundamental stages in speech development as formulated, for instance, by Watson:<sup>29</sup> external speech – whispering – inner speech; or in other words: external speech – egocentric speech – inner speech.

What is it that really distinguishes the actions of the speaking child from the solution of practical problems by an ape?

The first thing that strikes the experimentalist is the incomparably greater *freedom* in children's operations, their incomparably greater independence from the structure of the given visual or actual situation, as compared to that of the animal. The child constructs with words much greater possibilities than the ape can realize through action.

The child is much more easily able to ignore the vector that focuses attention on the goal itself, and to execute a number of complex preliminary acts, using for this purpose a comparatively long chain of auxiliary instrumental methods. The child proves able to include independently, in the process of solution of the task, objects which lie neither within the near nor the peripheral visual field. By creating through words a certain intention, the child achieves a much broader range of activity, applying as tools not only those objects that lie near at hand, but searching for and preparing such articles as can be useful in the solution of its task and planning its future actions.

Two facts seem remarkable in the transformation undergone by practical operations through the inclusion in them of speech. First of all, the practical operations of a child that can speak become much less impulsive and spontaneous than those of the ape that makes a series of uncontrolled attempts to solve the given problem. Due to speech, the child's activity is divided into two consecutive parts: the first consists of

the solution of the problem in the field of speech, achieved through speech-planning, while the second is the simple motor realization of the prepared solution. Direct manipulation is replaced by a complex psychological process, where inner motivation and the creation of intentions, postponed in time duration, stimulate their own development and realization. These entirely new psychological structures are absent in apes in even moderately complex forms.

On the other hand – and this is of decisive importance – among the different objects open to the child's transformation, speech introduces *the child's own behaviour*.

Words directed toward the solution of the problem pertain not only to objects belonging to the external world, but also to the child's own behaviour, to its actions and intentions. With the aid of speech the child for the first time proves able to the mastering of its own behaviour, relating to itself as to another being, regarding itself as an object. Speech helps the child to master this object through the preliminary organization and planning of its own acts of behaviour. Those objects which were beyond the limits of accessible operations, now, thanks to speech, become accessible to the activities of the child.

The fact described here cannot be regarded as a secondary issue in the development of behaviour. Here we see cardinal changes in the very attitude of the individual toward the outside world. On closer examination these changes prove to be exceptionally important. The behaviour of an ape, described by Köhler, is limited to the animal's manipulation in a given field of vision, whereas the solution of a practical problem by a speaking child becomes, to a great extent, removed from this natural field. Thanks to the planning function of speech, geared to the child's activity, the child creates, parallel to the stimuli of his environment, a second series of auxiliary stimuli standing between him and his environment and directing his behaviour. And it is due to this very secondary series of stimuli, created with the aid of speech, that the behaviour of the child reaches a higher level, acquiring a relative freedom from the situation that directly attracts it, and impulsive attempts are transformed into a planned, organized behaviour.

These auxiliary stimuli (in the given instance, speech) which carry out the specific function of organizing behaviour, prove to be no other than those very symbolic signs that we have been studying here. They serve the child, first and foremost, as a means of social contacts with the surrounding people, and are also applied as a means of self-influence, a means of auto-stimulation, creating thus a new and superior form of activity in the child.

An interesting parallel to the facts cited above, pertaining to the role played by speech in the inception of specifically human forms of behaviour, may be found in the exceptionally interesting experiments of *Guillaume et Meyerson* involving the analysis of the use of tools by apes. Our attention centred chiefly on the conclusions of this work, which compares the intellectual operations of an ape with the process of solving concrete problems as exhibited by people suffering from aphasia (studied clinically and experimentally by Head).<sup>30</sup> The authors find that the methods used by the aphasic and the ape to accomplish a given task are similar in principle and coincide in certain

essential points. This fact thus reaffirms our statement that speech plays an essential role in the organization of higher psychological functions.

If, in the genetic plane,<sup>31</sup> we witnessed the unification of practical and speech operations and the birth of a new form of behaviour, a transition from lower forms of behaviour to higher, then, in the case of the disintegration of the entity of speech and action, we witness a diametrically opposed movement, namely man's transition from higher forms to the lower. The intellectual processes of a man with impaired symbolic functions, that is, an aphasic, does not result in a simple lowering of the functions of practical intellect or in difficulties concerning their realization, but reflects rather a picture of another, more primitive level of behaviour, that of the ape.

What is lacking in the actions of the aphasic and what, consequently, owes its origin to speech? It suffices to analyse the behaviour of a person suffering from aphasia in a practical situation new to him, to see how greatly that behaviour differs from that of a normal, speaking person in an analogous situation. The first thing that strikes the eye when we observe an aphasic in a similar experiment is his *extraordinary confusion*. As a rule, there is not even a trace of the slightest form of a complex plan for the solution of the problem. The creation of a preliminary intention with its consequent systematic realization proves to be absolutely beyond the capacity of our patient. Each stimulus arising from the situation and attracting his attention creates an impulsive attempt to respond directly; hence the corresponding reaction, without taking account of the situation and its solution as a whole. The complex chain of reactions, presupposing the creation of intention and its systematic, consecutive realization proves here unattainable and becomes a hodgepodge of disrupted and disorganized groups of attempts.

Sometimes these activities are retarded and assume a rudimentary form, sometimes they become a complex and unorganized mass of apractical actions.<sup>32</sup> If the situation proves sufficiently complex and can be solved only through a consecutive system of previously planned acts, the aphasic becomes bewildered and appears to be quite helpless. In simpler cases he solves the problem with the aid of simple simultaneous combinations within the limits of the visual field, and the methods of solution are fundamentally quite similar to what Köhler observed in his experiments with apes.

Unable to speak (speech would have freed him from being tied to the visually evident situation and rendered possible the planned consecutiveness of successive actions), he becomes the slave of the situation – one hundred-fold more than the speaking child.

#### *The development of the child's higher forms of practical activity*

What has just been stated leads us to conclude that, in what concerns the behaviour of both child and adult, the practical use of tools and the symbolic forms of activity connected with speech do not represent two parallel links [*tsep'* – better 'chains' – eds] of reaction. They form a complex psychological entity in which symbolic activity

is directed toward organizing practical operations by means of the creation of secondary order stimuli and the planning of the subject's own behaviour. Contrary to the higher animals, in man there occurs a complex functional connection between speech, the use of tools and the natural visual field, and without the analysis of this link, the psychology of man's practical activities would remain forever incomprehensible.

It would, however, be absolutely wrong to believe (as some behaviourists do) that this unity is simply the result of training and habit, and represents a line of natural development, beginning in animals, which only accidentally acquired an intellectual character. It would be just as erroneous to conceive the role of speech as the result of a sudden discovery on the child's part, as is presumed by a number of child psychologists.

The forming of the complex human unity of speech and practical operations is the product of a deeply rooted process of development in which the subject's individual history is closely linked to his social history.

Due to the lack of space, we have been obliged to simplify the actual problem as far as possible and to study the phenomena of interest to us in their extreme genetic forms, comparing for brevity's sake only the beginning and end of the examined process of development. The process of development itself, with its variegated phases and emergence of new factors, must remain here beyond our field of investigation. We consciously take the phenomenon in its most developed form, passing over transitional stages.

This makes it possible to present the final result of this development with the maximum clarity and, consequently, to evaluate the basic trend of the entire process of development. This merging of the logical and historical approaches to research which voluntarily ignores a number of stages of the examined process, has inherent dangers that have wrecked more than one seemingly faultless theory. The experimenter must avoid these dangers and bear in mind that this is only a way of studying a given phenomenon with its particular historic background, something he must inevitably turn to the analysis of.

We cannot dwell here on all the consecutive changes of the process we examined. Within the limits of this article we can only single out the central link, the examination of which will be sufficient to render a clear understanding of the general character and discretion of the entire process of development.

We must, therefore, once again turn to experimental data.

We observed a child's activity in a number of experiments, analogous in structure, but drawn out in time and representing a series of situations, each following one more difficult than the preceding. We established one most important point ignored by psychologists, which permits us to characterize with certainty the difference between the behaviour of an ape and that of a child in the genetic plane, while former observations allowed us to do the same with regard to the structure of activity. The fact is that over the course of a series of experiments, the examined activity of the child changes, not only perfecting itself as is the case in the process of teaching

[russian *obuchenie* – better rendered as ‘complex of teaching/learning’ – eds], but undergoing such great qualitative changes as can only be regarded in their totality as development in the literal meaning of the word.

As soon as we moved on to the study of activity from the viewpoint of the process of its ‘Werden’<sup>33</sup> (in a series of experiments drawn out in time), we immediately found ourselves faced with a cardinal fact: that, actually, we were not studying one and the same activity each time in its new concrete expressions, but that, over a series of experiments, the object of research itself changed. Thus, in the process of development, we acquired forms of activity that were completely different in structure. This represented an unpleasant complication for all psychologists who at any cost endeavour to preserve the invariability of the examined activity; but for us it as once became central, and we concentrated all our attention on its study. This study led us to the conclusion that the activity of the child differs in organization, structure and methods from the ape’s behaviour, does not appear in a ready-made form, but arises out of the *consecutive changes of genetically inter-related psychological structures* and, thus, forms an *integral historical process of development of the higher psychological functions*.

This process is the key to the understanding of the organization, structure and methods of activity in child development. In it we are inclined to see from a new angle the basic difference distinguishing the complex behaviour of the child from that of the ape. Actually, the use of tools by apes essentially remains unaltered over the entire course of experiments, at least if we ignore secondary changes, probably due more to gradual perfection of these functions as a result of exercise than to changes in their organization. Neither Köhler nor any other investigator of the complex behaviour of higher animals ever observed in their experiments the appearance of qualitatively new operations, formed in a genetic series that were drawn out in time. The constancy of the operations observed and their invariability in various situations constituted one of these studies’ most remarkable features.

The situation was, however, completely different in the case of the child. Having combined in experiments a whole series of evolutions [*preobrazovania* or ‘transformations’ – eds] and creating thus a model of development of sorts, we never observed (except in extreme cases of mentally handicapped children) this constancy, this invariability of activity. The actual transformation of the process was obvious to us at each new stage of the experiment.

We shall describe this process of transformation, first from the negative side.

The first thing that attracts our attention and might seem paradoxical is that the process of the forming of higher intellectual activity least of all resembles a developed process of logical transformations. This means that the subject forms, connects and separates the operations following a different law of connection than that which would inter-relate them through logical thought. Very frequently the psychological process of development of a child’s thought is presented as being similar to the process of the discovery of logical thought. It is alleged that the child first encompasses the basic principle of thought, and later the individual, variegated concrete forms are deduced, resulting from the child’s fundamental discovery as a logical, and

not genetic, consequence. The process of development is here misunderstood: actually, Köhler's statement to the effect that intellectualism is nowhere so false as in the theory (and, we must add, in the history) of intellect, is here justified.

This is the first and basic conclusion which our experiments lead us to make. The child does not invent new forms of behaviour nor does he deduce them logically, but forms them in the same way as walking supplants creeping and speaking baby talk, and not because the child becomes convinced of the advantage of the one over the other.

Another accepted point of view that we must refute on the strength of our observations, is that the higher intellectual functions develop during the process of the perfection of complex habits, during the process of the child's training, and that all the qualitatively differing forms of behaviour represent changes of the same type as that of the memorizing of a text through repetition. This kind of possibility was excluded from the very beginning because each experiment created a different situation requiring the child to adapt adequately to new conditions and a new method of solving the problem. What is more, the problems presented to the child posed new and qualitatively different demands, following development. The complexity of the structure of the solution of the problems increased in accordance with these requirements, so that even the strongest and most 'trained' could only be inadequate in view of the new demands and became more of an obstacle than a helpful factor for the solution of a new problem.

In the light of the data characterizing the process of development under discussion, it becomes clear that, not only from the point of view of fact, but also from that of theory, the two assumptions we refuted initially are indeed false. According to one of them, the essence of the process is regarded as the *causa efficiens* of intelligent actions; according to the other, it is viewed as the product of the automatic process of the perfecting of habit, appearing as a *deus ex machina* at the very end of the process. Both these theories to an equal extent ignore the presence here of development and both prove to be clearly unsatisfactory when faced by facts.

#### *Development in the light of facts*

The actual process of development, as demonstrated by our experiments, is quite different in form.

Our records show that from the very earliest stages of the child's development, the factor moving his activities from one level to another is neither repetition nor discovery. The source of development of these activities is to be found in the social environment of the child and is manifest in concrete form in those specific relations with the experimentalist which transcend the entire situation requiring the practical use of tools and introduce into it a social aspect. In order to express in one formula the essence of those forms of infant behaviour, characteristic of the earliest stage of development, it must be noted that the child enters into relations with the situation not directly, but through the medium of another person. Thus we arrive at the

conclusion that the role of speech, singled out by us as a separate point in the organization of the child's practical behaviour, proves decisive not only for the comprehension of the latter's structure, but also for its genesis – speech lies at the very beginning of the child's development and becomes its most decisive factor. The child who speaks as he solves a practical task calling for the use of tools and who combines speech and action into one structure, in this way introduces a social element into his action and thereby determines that action's fate and the future path of development of his behaviour. In this way, the child's behaviour is transferred for the first time to an absolutely new plane, is guided by new factors and leads to the appearance of social structures in the child's psychical life. His behaviour becomes socialized: this is the main determining factor of the entire further development of its practical intellect. The situation as a whole acquires for him a social meaning, where people act, just as do objects. The child views the situation as a problem posed by the experimentalist, and he senses that, present or not, a human being stands behind that problem. The child's activities acquire a meaning of its own in the system of social behaviour and, being directed towards a definite purpose, are refracted through the prism of his social thought.

The entire history of the child's psychological development shows us that, from the very first days of development, its adaptation to the environment is achieved by social means, through the people surrounding him. The road from object to child and from child to object lies through another person.

The transition from the biological to the social way of development constitutes the central link in this process of development, the cardinal turning point in the history of child behaviour.

This road – passing through another person – proves to be the central highway of development of practical intellect, as demonstrated by our experiments. Speech here plays a role of primary importance.

The following picture appears before the experimentalist's eyes: the behaviour of very small children in the process of solving a given task presents a very specific fusion of two forms of adaptation: to objects and people, to environment and the social situation, which are differentiated only in the case of adults. Reactions to objects and people represent in child behaviour an elementary undifferentiated entity which, later, gives birth to both actions directed at the external world and to social forms of behaviour. At that moment, the child's behaviour presents a strange mixture of the one and the other – a chaotic (from the adult's viewpoint) hodgepodge of contacts with people and reactions to objects. This union in one activity of different subjects of behaviour, explained by the child's entire preceding history of development beginning from the first days of his existence, is apparent in each experiment. The child, left to himself and stimulated to action by the situation, begins to act according to the very principles according to which its relations with environment were organized previously. That means that action and speech, psychological and physical influences are syncretically fused. We call this central peculiarity of child behaviour 'syncretism of action', by way of analogy to the syncretism of perception and verbal

syncretism, so thoroughly studied in modern psychology in the works of Claparède and Piaget.

The records of the experiments carried out with children give a clear picture of syncretism of action in their behaviour.

The small child, placed in a situation where the direct attainment of his purpose seems impossible, displays a very complex activity which can only be described as a jumbled mixture of direct attempts to obtain the desired end, emotional speech, sometimes expressing the child's desire and at other times substituting actual and unattainable satisfaction by verbal 'Ersatz', by attempts to achieve the end through verbal formulations of means, by appeals to the experimentalist for help and so on. These manifestations present an imbroglio of actions, and the experimentalist is at first bewildered by this rich and often grotesque mixture of mutually contradictory forms of activity.

Further observations draw our attention to a series of actions that, at first, seem not to belong to the general scheme of the child's activities. The child, after having completed a number of intelligent and inter-related actions which should help him successfully solve the given problem, suddenly, upon meeting a difficulty in the realization of his plan, cuts short all attempts and turns for help to the experimentalist, asking him to move the object nearer and thus give him the possibility to accomplish his task. The obstacle in the child's way thus interrupts his activity, and his verbal appeal to another person represents an effort to fill this hiatus. The conditions that psychologically play the decisive role consist in the child appealing for help at the critical moment of his operation, thus showing that he knows what to do in order to attain his purpose, but cannot attain it by himself and that the plan of the solution is, in the main, ready although beyond the limits of his own action. That is why the child, first separating verbal description of the action from the action itself, crosses the border of co-operation, socializing his practical thinking by sharing his action with another person. It is due to this that the child's activity enters into new relations with speech. The child, consciously introducing another person's action into his attempts to solve a problem, thus begins not only to mentally plan his activity, but also to organize the behaviour of another person in accordance with the requirements of the given problem. Thanks to this, the socializing of practical intellect leads to the necessity of socializing not only objects, but also actions with the help of social means, creating thus reliable conditions for the problem's realization. The control of another person's behaviour becomes, in the given instance, a necessary part of the child's entire practical activity.

This new form of activity, aimed at controlling another person's behaviour, is not yet differentiated from the general syncretic whole. We have more than once observed that, over the whole course of fulfilling the task, the child flagrantly confuses the logic of his own activity with the logic of the solution of the task by co-operation, introducing into his own activity the actions of an outsider, absolutely foreign to him. The child seems to unite two approaches to his own activity, combining them into one syncretic whole.

Sometimes this syncretism of action manifests itself on the background of primitive child thought, and in a number of experiments we observed how the child, having realized the hopelessness of his attempts, appealed directly to the object of attraction, asking it to draw closer or lower, depending on the concrete conditions. In this case we see the same type of confusion of speech and action, as when the child, producing some kind of action, talks to the object, addressing it equally with both words and stick.<sup>34</sup> In these latter cases we witness the experimental demonstration of how fundamentally and inseparably speech and action are tied together in the child's activity and how great the difference of this tie is compared to that usually observed in the adult.

The behaviour of a small child in the situation just described presents, consequently, a complex skein; it consists of a mixture: direct attempts to attain the goal, the use of tools, speech either directed at the person conducting the experiment or simply accompanying the action, as if strengthening the child's efforts, and, finally, a paradoxical-sounding direct appeal to the object of attention.

This strange alloy of speech and action becomes meaningless if considered separately from dynamics. If, however, we analyse it genetically following each stage of the child's development or in a condensed form, in a number of consecutive experiments, this strange alloy of two forms of activity displays both a most definite function in the history of the child's development, and an inner logic of its own development.

We shall dwell here on two points in the dynamics of this complex process, two points which play, however, a decisive role in the appearance in the child of higher forms of controlling his own behaviour.

#### *The function of socialized and egocentric speech*

The first of the processes we study here is connected with the formation of 'speech for oneself', which, as we noted earlier, regulates the child's actions and permits him to achieve a given task in an organized way, through preliminary control of himself and his activity.

If we study carefully the records of our experiments with small children, we find that, along with the appeals to the experimentalist for help, there is a wealth of manifestations of egocentric speech by the child.

We already know that difficult situations evoke excessive egocentric speech and that, under conditions of hyper-difficulties, the coefficient of egocentric speech is almost doubled in comparison to uncomplicated situations. In another case, hoping to achieve a deeper study of the connection between egocentric speech and difficulties, we created extra experimental difficulties in the child's activities; we were confident that a situation requiring the use of tools, the focal point of which was the impossibility of direct action, would create the best conditions for the appearance of egocentric speech. The facts confirmed our expectations. Both of the psychological factors related to difficulties – the emotional reaction and the de-automatization of action,

requiring the intervention of intellect – determine in the main the nature of the egocentric speech and of the situation of interest. For a correct understanding of the nature of egocentric speech and for the clarification of its genetic functions in the process of the socialization of the child's practical intellect, it is important to remember that egocentric speech is linked to the child's social speech by thousands of transitional stages, a fact both experimentally proven and emphasized by us. Very frequently these transitional forms were not clear enough for us to determine to what form of speech one or another of the child's expressions could be related. This resemblance and mutual relation of both forms of speech is reflected in the close ties of those of the child's functions which are carried out by both forms of the child's verbal activity. It would be a mistake to think that his social speech consists solely of appeals to the experimentalist for help: it always consists of emotional and expressive elements, communications as to what he intends to do, and so on. It sufficed to obstruct his social speech during the experiment (for instance, by the experimentalist leaving the room, or by not answering the child's questions, etc.) for egocentric speech to increase immediately.

If at the earliest stages of a child's development egocentric speech does not yet indicate the method of solution [of a given problem faced by the child – eds], this is first expressed by speech addressed to the adult. The child, hopeless of attaining his end directly, turns to the adult and describes verbally the method, which he himself is unable to use in a direct way. The greatest change in child development occurs when this socialized speech, previously addressed to the adult, *is turned to himself*, when, instead of appealing to the experimentalist with a plan for the solution of the problem, the child appeals to himself. In this latter case the speech, participating in the solution, *from an inter-psychological category, now becomes an intra-psychological function*.

The child applies to itself the method of behaviour that it previously applied to another, thus *organizing its own behaviour according to a social type*. The source of intelligent action and control over his own behaviour in the solution of a complex practical problem is, consequently, not an invention of some purely logical act, but the application of *a social attitude to itself*, the transfer of a social form of behaviour into its own psychological organization.

A series of observations permits us to trace this complex path, followed by the child in his transition to the interiorization of social speech. The cases we described in which the experimenter, to whom the child formerly appealed for help, left the scene of the experiment, throw this climax into bold relief [demonstrates this decisive moment most clearly – eds].<sup>35</sup> It is in such a case when the child is deprived of the possibility of appealing to an adult that this socially organized function switches over to egocentric speech, and suggestions as to the ways of solving the problem gradually lead to their independent realization.

The series of consecutive experiments drawn out in time gives us the possibility of singling out a number of stages of this process, while the formation of a new system of behaviour of a social type becomes considerably clearer. The history of this process

is, therefore, the history of the socialization of the child's practical intellect and, at the same time, the social history of its symbolic functions.

*The change of the function of speech in practical operation*

We would like to emphasize the second, and no less important, transformation which the child's speech undergoes in the series of experiments described. Tracing the child's speech-action relation in time and studying that dynamic structure, displayed in time and arising from that relation, we were able to establish the following fact: this structure does not remain permanent over the entire course of the experiments; speech and action change in relation to each other, forming a mobile system of functions with a changing character of inter-relations. Ignoring certain complex changes, that are of interest only in a different area, we must single out the basic functional change in this system, bearing a decisive influence on its fate and bringing out its inner reconstruction. This change consists in the fact that the *child's speech, which previously accompanied its activity and reflected its chief vicissitudes* in a disrupted and chaotic form, *moves more and more to the turning and starting points of the process, beginning thus to precede action and throw light on the conceived of but as yet unrealized action.* In the development of practical intellect we observed a process analogous to that occurring in another mobile system of functions – speech-drawing [*risovanie s uchastiem rechi*]. Just as the child first draws and, only *post factum* seeing the results of its work, recognizes and states the drawing's theme in words, so in the practical operation the child begins by verbally describing the operation's result or its individual elements. At best, the child does not state the result but conveys the preceding moment of action. In our experiments the 'scheme of action' begins to be verbally described by the child directly prior to its beginning (just like in the development of drawing the naming of the theme of the drawing moves closer to the beginning of the process), thus anticipating its further development.

This displacement signifies not only the temporary transfer of speech as related to action, but also the transfer of the entire system's functional centre. In the first stage speech, following action, reflecting it and strengthening its results, remains structurally subject to action and provoked by it, while at the second stage speech, transferred towards the starting point of the process, begins to dominate over action, guides it and determines its subject and development. Therefore the second stage gives birth to speech's real function of planning, and thus speech begins to fix the direction of future operations.

This planning function has usually been studied separately from the reflective function of speech and was even seen as opposing it. The genetic analysis, however, shows that such an opposition is based on the purely logical construction of both functions. In experiments we noted, on the contrary, that there exist different forms of inner connection between both functions, and this fact leads us to the conclusion that the transition from one function to another, the emergence of the planning function of speech from the reflective, comprises that very vital genetic point

that links the higher functions of speech with the lower and explains their true origin.

The child's speech – *due to the fact* that it is first a verbal mould of operation or its parts – reflects action and strengthens its results, starts at a later stage to move towards the action's beginning, to predict and direct the action, *forming it according to that mould of former operation, that was previously fixed by speech.*

This process of development has nothing in common with the process of logical 'deduction' of logical conclusions made by the child's discovery of the principle of speech's practical application. Studies furnish countless facts that force us to believe that this recapitulative speech, forming a mould of past experience, plays an important role in the formation of a process because of which the child acquires the possibility of not only accompanying his action by speech, but aided by it, of searching for and finding a problem's correct solution.

As speech becomes an intra-psychological function, it begins to prepare a preliminary verbal solution to a problem which, in the course of further experiments, perfects itself and, from a speech-mould recapitulating past experience, becomes the preliminary verbal planning of future action.

This reflecting function of speech helps us to trace the process of the formation of its complex, planning function and to understand its actual genetic roots. We are capable of following the origins of the higher stage of the intellectual activity in all its complexity and with all the wealth of its consecutive change of stages. What was formerly considered to be a process of sudden 'discovery' by the child, actually proves to be the result of a lengthy and complicated development where the emotional and communicative functions of primary speech, the reflecting and mould-creating<sup>36</sup> functions, each take their place at a given rung of the genetic ladder, the bottom rung corresponding to the child's primitive optical reactions, the top rung to complex operations planned in time.

This history of speech, which occurs over the course of practical activity, is tied in to a basic reconstruction of the child's entire behaviour. But there is more to this than the mere fact that speech, formerly an inter-psychological process, now becomes an intra-psychological function, or that, at first leading away from the solution of a problem, speech at the top genetic ladder begins to play an intellectual role, becoming the instrument of the problem's organized solution. The reconstruction of behaviour, mentioned above, is of an incomparably deeper nature. If, at the bottom of the genetic ladder, the child operated in a spontaneous situation, aiming his activity directly toward the object of attraction, now the situation becomes more complex. Between the object (attracting the child as its aim) and behaviour, there appear *stimuli of the second order*, now directed not immediately at the object but at the organization and personal *planning of the child's behaviour*. These self-directed speech stimuli, changing in the process of evolution from a means of stimulation of another person into *auto-stimuli*, radically reconstruct the child's entire behaviour.

The child proves to be able to adapt itself to the given situation by *indirect means*, through preliminary self-control and the preliminary organization of its behaviour,

and this in principle differs from the behaviour of animals; it includes as a mandatory factor of its make-up a social attitude toward itself and its actions, and this attitude becomes social activity transferred ['to the realm' – eds] within the subject. The child acquires this as a result of the lengthy development it undergoes, thus acquiring that freedom of behaviour in respect to the situation, that independence from the concrete surrounding objects of which the ape is deprived, the latter being, according to Köhler's classic expression, 'the slave of its optic field'. What is more, the child ceases to act in the immediately given and evident *space*. Planning its behaviour, mobilizing and summarizing its past experience for the organization of its future action, the child passes over to active operations *drawn out in time*.

At the moment when, thanks to the planning assistance of speech, a view of the future is included as an active agent, the child's whole operational psychological field changes radically and its behaviour is fundamentally reconstructed. The child's perception begins to develop according to new laws that differ from those of the natural optic field. The fusion of sensory and motor fields is overcome, and the spontaneous impulsive actions with which it responded to each stimulus appearing in the optic field and attracting it, is now restrained. The child's attention begins to function in a new way, while its memory from a passive 'registrator' becomes a function of active selection and of active and intellectual recollection.

With the appearance of the complex indirect level of higher psychological functions, a new base is provided for a radical reconstruction of behaviour. Having examined the genetic progress achieved as a result of the inclusion of symbolic forms of activity in the development of the use of tools, we must now turn to the analysis of those reconstructions brought about by this progress in the development of the main psychological functions.

## 2 The function of signs in the development of higher psychological processes

After examining a period in the child's complex behaviour, we came to the conclusion that, in cases involving the use of tools, the small child's behaviour differs radically from that of the ape. It might be said, in fact, that in many respects it is diametrically opposed in structure to the latter: instead of the operation's total dependence on the structure of the visual field, we observe the child's considerable degree of emancipation from it. Thanks to the participation of speech in the operation, the child acquires an incomparably greater degree of freedom than that observed in the instrumental behaviour of apes. The child was thus given the possibility to solve practical problems of tool use outside its direct sensory field. The child mastered the external situation by first mastering itself and organizing its own behaviour. In all these operations the structure of the psychological process underwent an essential alteration; operations aimed directly at the field of action were supplanted by complex indirect acts, and speech, entering into the operation, proved to be that system of psychological signs

which acquired an absolutely special functional importance, and led to the complete reorganization of behaviour.

A series of observations leads us to conclude that such a cultural *reorganization* is characteristic of not only that complex form of behaviour connected with the use of tools such as has been described by us. In fact, even separate psychological processes, of a more elementary nature and included as part of the complex act of 'practical intellect', appear in the case of the child to be profoundly altered as compared to their process in the higher animals.

Even these functions, usually regarded as the most elementary, are, in the case of the child, subject to completely different laws than those that rule at phylogenetically earlier stages of development and are characterized by the same indirect psychological structure as described in connection with the complex act of using tools. A detailed analysis of the structure of separate psychological processes participating in the described act of child behaviour furnishes us with the proof of this fact and shows that even the doctrine concerning the structure of separate 'elementary' processes of child behavior stands in need of a basic revision.

#### *The development of higher forms of perception*

We will begin with *perception*, an act which always appeared to be entirely subordinate to the elementary natural laws, and we shall try to demonstrate that, over the course of the child's development, even this most dependent of all processes on the actual situation is reconstructed on an absolutely new basis. Preserving the external 'phenotypical' resemblance to this function in animals, it belongs, by reason of its internal composition, structure and mode of action, its entire psychological nature, to the higher functions, formed in the process of historical development and having their own particular history in ontogenesis. Here, in this higher function of perception, we shall meet with laws entirely different from those discovered through the application of psychological analysis to its primitive or natural forms. Obviously, the laws governing the psycho-physiology of natural perception are not nullified in the transition to the higher forms treated by us at the moment but, as it were, sink into the background, continuing to exist within these new laws in a shrunken and subordinate form. In the history of development of the child's perception, we observe a process analogous in its essentials to the one which has been well studied in the history of the formation of the nervous system, where the lower, and genetically more ancient systems, with their more primitive functions, become incorporated in the newer and higher 'storeys', continuing their existence as subordinated units within the new whole.

Köhler's work threw new light on the vital importance of the structure of the visual field in the process of the ape's practical operation; the entire process of the solution of a given task, from its very beginning to its conclusive moment, is essentially the function of perception. In this respect Köhler had ample grounds to state that these animals are the slaves of their sensory field to a much greater degree

than adult humans, that they are incapable of following the given sensory structure by means of voluntary effort.<sup>37</sup> It is precisely in this subjection to the optic field that Köhler sees what links the ape with other animals, including such remote relatives in organization as the crow (M. Herz's experiments); indeed, it would probably not be very wrong to see this slave-like dependence on the structure of the sensory field as being a general law, governing perception in all the variations of its natural forms.

This is a common characteristic present in *all perception*, since it does not go beyond the limits of its natural psycho-physiological forms or organization.

A child's perception, since it becomes *human* perception, develops not as a direct continuation and further perfection of the forms seen in animals, including even those that stand nearest to man, but leaps from the zoological to the historical form of psychological evolution.

A special series of experiments conducted by us to clarify this problem enables us to discover the basic laws characterizing these higher forms of perception. We cannot, of course, discuss this problem here in all its magnitude and complexity, and we shall confine ourselves to an analysis of only one – yet central – fact of importance. The most convenient way to do this is by turning to tests on the development of perception of pictures at various stages of infant development.

The tests that made it possible for us to describe specific peculiarities of infant perception and its dependence on the inclusion of the higher psychological mechanism, were carried out earlier in their fundamental essentials by Binet, and analysed in detail by W. Stern.<sup>38</sup> As they studied the process of the description of pictures by small children, both these authors established the fact that this process differs at different stages of the child's development. If a two-year old usually limits it to indicating separate objects of a different kind when describing a picture, it later begins to describe actions, in order to complete the description at a still later stage by indicating the complex relation between the picture's several separate objects. All these facts led W. Stern to establish a certain path of development of infant perception and to describe the stages of perception of separate objects, actions and relations as stages that perception goes through during childhood.

These data alone, accepted by modern psychology as firmly established, force us to harbour the most serious doubts: indeed, it suffices to reflect on this material to see that it contradicts everything we know concerning the development of infant behaviour and its basic psycho-physiological mechanisms. What is more, a number of indisputable facts show that the development of psycho-physiological processes in the child has its origin in diffused, integral forms and only later becomes more differentiated.

A considerable number of physiological observations demonstrate this for motor reactions; tests carried out by Volkelt, Werner and others clearly indicate that this is the path followed also by the visual perception of the child. Stern's claim that the stage of perception of separate objects precedes that of perception of the whole situation stands in direct contradiction to all these data.

What is more, if we follow this to its logical conclusion, we are forced to suppose that at even earlier phases of development the child's perception bears an even more splintered and particular character, and that the perception of separate objects is preceded by a stage when the child is apparently able to perceive merely their separate parts or qualities and only later combines the latter into whole objects, and finally unites objects into effective situations.

We obtain a picture of the development of infant perception permeated with rationalism and contradictory to all that has been made known by the latest researches.

The contradiction observed between the main line of development of psycho-physiological processes in the child, and the facts described by Stern, can be explained only if we presume that the process of perception and description of pictures is considerably more complicated than a simple, natural psycho-physiological act, and that it includes new factors radically reconstructing the process of perception.

Our first task was to show that the process of describing pictures studied by Stern was not adequate to that direct perception of the child, the stages of which Stern endeavoured to disclose in his experiments. A very simple experiment made it possible for us to establish this. It sufficed to ask a two year old to describe for us the contents of a picture without using speech; we suggested that the description be made *in pantomime*: this was enough to become convinced that a child, still at the 'object' stage of development according to Stern, both perceived the actual situation in the picture and reproduced it with the greatest ease.<sup>39</sup>

Behind the phase of 'object perception' actually lay a living and integral perception, quite adequate to the picture while destroying the supposition of the 'elementary' character attributed to perception at this phase. What was usually regarded as a property of the child's natural perception, proved to be really a peculiarity of its *speech* or, in other words, a peculiarity of its *verbalized perception*.

A series of observations relating to very small children showed us that the primary function of speech as used by the infant is, in fact, limited to *indication*, to the singling out of a given object from the entire situation perceived by the child. The fact that the child's first words are accompanied by very expressive gestures, as well as a number of control observations, convinces us of this.

From the first steps of the child's development, the word intrudes into the child's perception, singling out separate elements overcoming the natural structure of the sensory field and, as it were, forming new (artificially introduced and mobile) structural centres. Speech does not merely accompany the child's perception, from the very first it begins to take an active part in it: the child begins to perceive the world not only through its eyes, but also through its speech, and it is in this process that we find an essential point in the development of the child's perception.

It is this very complex, indirect structure of perception that makes itself felt in the type descriptions obtained from children by W. Stern in his experiments with pictures. When the child renders an account of the pictures shown to it, it is not merely verbalizing its natural perception of them, expressing them in imperfect

speech; speech articulates its perception, singles out in the entire complex salient points of support, introduces an analytical factor into perception, and thus supplants the natural structure of apperception by a complex and psychologically indirect one.

Later, when the intellectual mechanisms related to speech change, when the singling-out function of speech attains a new synthesizing function, then verbalized perception undergoes further change overcoming its primary articulative character and achieving a more complex form of perception [*poznajushchee vosprijatie*]. The natural laws of perception, most clearly observed in the receptive processes of the higher animals, undergo basic changes due to the inclusion of speech in human perception, and human perception thus acquires an entirely new character.

The fact that the inclusion of speech really does exercise a certain reconstructive influence on the laws of natural perception is especially evident in those cases when speech, interfering with the process of reception, complicates adequate reception and constructs it according to laws that differ in principle from the natural laws of reflection of a perceived situation.

This verbal reconstruction of perception in the child is best seen in a special series of tests designed for this purpose.<sup>40</sup>

For a more detailed study of the structure and development of the function of perception we used Kohs' non-verbal tests as experimental material, which usually are used for testing combinatory activity. In these tests the child must combine blocks with different coloured sides, so as to produce a copy of the more or less complex coloured figure offered as a model. In this experiment we have the possibility of studying how the child perceives both model and material, how it renders form and colour in various combinations, how it compares their structure with the model, and many other moments which characterize the activity of the child's perception. This research included over 200 subjects and was carried out in a comparative genetic aspect. Besides normal children (aged four to 12), adults were also studied (normal, of various cultural levels, and psychopathical: hysteria, aphasia, schizophrenia) and also handicapped children: deaf, dumb and oligophrenic (Dr L. S. Gueshelina).<sup>41</sup>

This experiment showed (if we dwell on the connection which interests us, only on the most fundamental and general of its results) that the commonly accepted viewpoint concerning the independence of the processes of perception from speech, and the possibility by means of non-verbal tests to study adequately the nature of the function of perception at all stages of its development, and quite independently of speech, is not supported by factual data.

Facts point to the contrary. Just as in our experiments concerning the description of pictures by verbal and by play action, where we discovered deep alterations introduced by speech into the process of perception, here, in this special study, we were able to follow how speech-thinking, becoming ever more an integral part of the process of perception, transforms the very laws of perception. This becomes apparent when we compare the solution of a given problem by a deaf-and-dumb and normal

child, or by an aphasic and a normal subject; their respective stage of development notwithstanding. This is especially easy to observe because at the early stages both laws manifest diametrically opposed tendencies: perception is integral, speech analytical in character.

In processes of so-called 'immediate perception' and the transmission of perceived forms uninfluenced by speech, the child grasps and fixes an impression of the whole (spots of colour, the basic features of the form, etc.). Yet no matter how correctly and skilfully the child does it, at the very first stages of speech its perception ceases to be bound by the immediate impression of the whole; in its field of vision there arise new centres, fixed by words, and ties appear between these centres and the different parts of the situation being perceived; perception ceases to be the 'slave' of the field of vision and, independently of the degree of correctness and perfection of solution, the child transmits impressions transformed by words.

Very important conclusions may be drawn regarding non-verbal tests: should the solution of a problem occur without a sound being uttered, this certainly should not be conceived as meaning that speech did not participate – as shown in our experiments. 'The capacity of human thought, but without words, is given only by word.' This thesis of psychological linguistics (A. Potebnya) finds its full support and justification in the data of genetic psychology and particularly in the data of our investigation.

#### *The separation of the primary unity of the sensori-motor functions*

The transition to qualitatively new forms of behaviour observed in the child is not, however, confined to the changes we described and which take place within the sphere of perception; what is much more important is the change in its relation to other functions participating in the integral intellectual operation, its place and part in that dynamic system of behaviour which is tied to the use of tools.

Even in the behaviour of the higher animals perception never acts in an independent and isolated way, but always forms part of a more complex whole, and it is only in connection with this whole that the laws of this perception can be understood. The ape does not perceive the visible situation passively, its entire behaviour is directed toward acquiring the object which attracts it. The complex structure, consisting of the real interweaving of instinctive, affective, motor and intellectual factors, is the only actual object of psychological research, from which, by means of abstraction and analysis only, it is possible to isolate perception as a comparatively independent self-contained system. Experimental-genetic research in perception shows that the whole dynamic system of connections and relations between separate functions changes no less radically in the process of the child's development than separate factors in the system of perception itself.

Among all these changes that play a decisive role in the psychological development of the child, the leading place, objectively speaking, must be given to the basic relation: perception-movement.

It has long been established in psychology that all perception has its dynamic continuation in movement; but only recent research, and particularly Gestalt-psychologie, has overcome the concept of past psychology according to which perception and movement, as separate independent elements, may enter into associative relations with each other in the same way as two meaningless syllables in memory tests. Modern psychology is moving ever closer to the concept that the primary unity of sensory and motor processes is a hypothesis that corresponds much more to facts than the concept of their separateness. As early as in primary reflexes and the most elementary reactions we observe such a fusion of perception and movement as to demonstrate beyond the shadow of a doubt that both the parts are indivisible features of one dynamic whole, of one psycho-physical process. The specific adaptability of the structure of the motor response to the nature of the stimulus (an unsolvable riddle to those holding old views) can be explained only if we admit the primary units and integrity of sensori-motor structures.

The same relation between the structure of sensory and motor processes, explained by the dynamic nature of perception, is to be found not only in the elementary forms of reactive processes but also in the higher stages of behaviour, in experiments concerning intellectual operations and the use of tools by apes. The self-observations made by the experimenter (Köhler) indicate that objects, as it were, appear to acquire 'vectors' and move within the visual field toward the goal, during the examination of a situation to be solved by an ape. The lack of self-observations on the monkey's part is perfectly made up for here by an excellent description of its movements which constitute an immediate dynamic continuation of its perception. A successful experimental commentary (which we had the opportunity of verifying in our laboratories) is given by E. R. Jaensch in his experiments with eidetics;<sup>42</sup> they solved the problem by purely sensory means, and the movements of the ape were replaced here by a shifting of the object in the field of vision. Thus, the unity of sensory and motor processes in intellectual operations appears here in a pure form; movement proves to be included already in the sensory field, and the internal mechanisms, accounting for the correspondence between the sensory and motoric parts of the intellectual operation of the ape, become absolutely clear. In experiments concerning the study of motorics<sup>43</sup> tied into affective processes, we<sup>44</sup> showed that the motor reaction is so fused to and inseparably part of the affective process that it can serve as a 'reflecting' mirror in which one can literally 'read' the structure of the affective process, hidden from direct observation. This fact, of intrinsic importance, makes it possible to use the involuntary correlated motor reflection as an excellent symptomatological medium that permits us to establish objectively both the patient's secret experiences (experiments concerning the diagnostic tracing of crime) and the repressed complexes hidden from the subject (as, for instance, post-hypnotic suggestion, subconscious affective traces and so on).

As is shown by experimental-genetic researches, this primary natural relation between perception and movement, their inclusion in a common psycho-physical

system, disintegrates in the process of cultural development, and is replaced by relations of a quite different structure, beginning from the moment when words or some other sign is introduced between the initial and concluding stages of the reactive process, and the entire operation assumes an indirect character.

It is due only to such a psychological structure and to the disappearance of the primary relations between perception and movement which occurs because of the inclusion of functionally speaking new stimuli – signs – into this sphere, that the overcoming of primitive forms and possibilities of behaviour becomes possible, this in turn being a mandatory condition for the development of all specifically human higher psychological functions.

Experimental–genetic studies here, too, followed this complex and tortuous path of development in a special series of experiments, one of which it will be instructive to examine here.

Studying the movements of the child during the complex reactions of choice in experimental conditions, we were able to establish that these movements did not remain absolutely the same at all the stages but, on the contrary, underwent a complex evolution, the central and crucial moment of which consisted in a fundamental change in the relations between the sensory and motor parts of the reactive process.

Up to this turning point, the movement of the child is directly linked to the perception of the situation, blindly follows each move in the field, and also directly reflects the structure of perception in the dynamic of movement, as in Köhler's well known example where the hen near the garden fence repeats in movement the structure of the field perceived.

A concrete experimental situation gives us the opportunity to follow this. We pose before a small child, aged four or five, a problem, i.e. to press one of five keys of a keyboard when identifying a given stimulus. The task exceeds the natural capabilities of the child and, therefore, causes intensive difficulties and still more intensive efforts aimed at solving the problem. What we have here is the actual process of selection *in vivo* as differing from the analysis of memorized reaction of selection '*post mortem*', which always substituted the process of genuine selection by multiple-habit stereotyped functioning. But the most remarkable thing is that the entire process of selection by the child is not separate from the motor system, but is externally placed and concentrated in the motoric sphere: the child selects, directly achieving whatever moments the given situation, i.e. choice, calls for. The structure of the child's decision does not in the least resemble an adult's decision, for the latter begins by taking a preliminary decision, subsequently carried out in the form of one fulfilling movement. The child's choice resembles rather a somewhat delayed selection of its own movements, vacillations in the structure of perception find here their direct reflection in the structure of movement, and the mass of diffused gropings and trials delayed in the very motoric process, interrupting and succeeding one another, are in reality the child's process of selection itself: it suffices to glance at the cyclographic curve, recorded by us, to become convinced of the motor nature of the reactive process both

in child and adult, as well as to grasp the basic difference between this act as standing at the source of all the complex forms of human behaviour and representing them in their completed aspects.

We cannot better express the main point of this difference in the process of selection in a child and in an adult than by saying that, in the former, a series of trial movements are substituted for selection. The child does not choose the *stimulus* (the necessary key) as the starting point for the consequent movement, but selects the *movement*, checking its result by the instructions. Thus, the child solves its problem of selection not in perception, but in movement, hesitating between two stimuli, its fingers hovering above and moving from one key to another, going halfway and then coming back; when the child transfers its attention to a new point, creating a new centre in the dynamic structure of perception, which is also *shaken by selection*, the child's hand obediently moves towards this new centre, forming one whole with the eye. In short, its movement is not separated from its perception: the dynamic curve of both processes coincides almost exactly in both one and the other case.

And yet this primitive diffusive structure of the reactive process undergoes a fundamental change as soon as a complex psychological function enters the process of direct selection, transforming the natural process, fully apparent in animals, into a higher psychological operation characteristic of man.

Directly upon having observed in the child a diffusive impulsive process, organically fused with perception of selection of movement, we attempted to simplify the task of selection by marking each key with a corresponding sign, which would serve as an additional stimulus, directing and organizing the process of selection. As early as age five or six, the child fulfils this task with the greatest ease,<sup>45</sup> marking the key that it must press, upon the appearance of a certain stimulus, with that stimulus's corresponding sign. The use of this auxiliary sign does not, however, remain a secondary and additional fact only slightly complicating the nature of the operation of choice; the structure of the psychological process is radically changed under the influence of the new ingredient applied to it, and the primitive natural operation is replaced here by a new and cultured one. When the child turns to the auxiliary sign in order to find the key corresponding to the given stimulus, it no longer has those motor impulses, arising directly from perception, those uncertain groping movements in the air, which we observed in the primitive reaction of choice. The use of auxiliary signs destroys the fusion of the sensory field with the motor system, it places a sort of 'functional barrier' between the primary and final moments of reactions replacing the direct switching over of the reaction to the motor sphere of preliminary circuits, achieved with the aid of the higher psychological systems. The child that formerly solved the problem impulsively, now solves it through the internal re-establishment of the connection between the stimulus and the corresponding auxiliary sign, while the movement which previously made the choice, now serves only as a system fulfilling the prepared operation. The system of symbols reconstructs the whole psychological process, and the speaking child masters its movement on a totally new foundation.

The inclusion of a 'functional barrier' transfers the complex reactive processes of the child to another plane. It excludes blind impulsive attempts, in the main affective and distinguishing the primitive behaviour of animals from the intellectual behaviour of man based on preliminary symbolic combinations. Movement detaches itself from direct perception and submits to symbolic functions included in the reactive act, thus breaking with the natural history of behaviour and turning a new page: that of the higher intellectual activity of man.

Pathological material affords us a particularly fine opportunity for becoming convinced that the inclusion in behaviour of speech and of the higher symbolic functions connected with it, reconstructs the motorics, transferring it to a new and higher level. We have observed that during aphasia – with loss of speech – the 'functional barrier', described by us, was also affected, and movement once again became impulsive, fusing with perception. We observed, in an experimental situation analogous to that described, a number of cases of aphasia: invariably, we met in all cases with diffused and premature motor impulses, attempted groping movement, by way of which selection was accomplished, and which showed that the movements ceased to be guided by that preliminary planning at the symbolic stages which transformed the movements of the cultured adult into intellectual behaviour.<sup>46</sup>

We have discussed the genesis and the fate of two fundamental functions in the behaviour of the child. We saw that, in the complex operation of the use of tools and practical intellectual activity, these functions, which indeed play a decisive role, do not remain one and the same over the course of the child's history, but in the process of its development undergo a complex transformation, not only changing their inner structure, but also entering into new functional relations with other processes. Hence, the use of instruments, as we have observed in the behaviour of the child, is not in its psychological content a simple repetition or direct continuation of what comparative psychology has observed before in apes. Psychological analysis finds in this act essential and qualitatively new features. The inclusion of higher, historically created symbolic functions (among which we have just discussed speech and the use of signs), reconstructs the primitive process of solving problems on an entirely new basis.

True, there is a certain external resemblance between the use of tools by apes and the child, and this has led certain scholars to consider these two cases as being akin in principle. This resemblance is due only to the fact that in both cases functions with ultimately analogous purposes are called into play. Research shows, however, that these externally similar functions differ from each other to no less degree than the various layers of the Earth's crust, each belonging to different geological periods. If, in the first case, functions of biological formation solve the problem set before the animal, in the second case analogical functions of historical formation come to the fore, and they begin to take a leading part in the solution of the problem. These functions which, from the point of view of phylogenesis, are not products of the biological evolution of behaviour but of the historical development of the human personality, possess also, from the point of view of ontogenesis, their own particular

history of development, closely connected with its biological formation but not coinciding with it and forming along with it a second line of the child's psychological development. We call these functions *higher functions*, meaning by this, first and foremost, their place in the plan of development, while we are inclined to call the history of their formation, as distinguished from the biogenesis of the lower functions, *sociogenesis of the higher psychological functions*, having in mind above all the social nature of their inception.

The appearance in the process of child development of new historical formations, along with the comparatively primitive strata of behaviour, proves, hence, to be the key, without which the use of tools and all the higher forms of behaviour remain locked away from the research worker.

#### *The reorganization of the functions of memory and attention*

The condensed character of these notes does not allow for any kind of detailed analysis of all the fundamental psychological functions that take part in the operations here studied. We will confine ourselves, therefore, to touching only in a very general way on the fate of the major functions without which the psychological structure of the use of tools would remain unclear to us.

According to the extent of its role in this operation, *attention* should be given first place among these functions. All scholars, beginning with Köhler, have noted that the corresponding direction of attention, or its distraction, is an essential factor in the success or failure of a practical operation. This fact, noted by Köhler, preserves its importance in the behaviour of the child. The essential point in the development of this process, however, is that the child, unlike the animal, proves to be capable of transferring its attention actively and independently, reconstructing its perception and thus freeing itself, to a tremendous extent, from submission to the structure of the given field. Linking the use of tools with speech at a certain stage of development (which enters into the operation at first syncretically and later synthetically), the child in this way transfers the activity of its attention to a new plane. With the help of the indicative function of words, noted above, the child begins to master its attention, creating new structural centres of the perceived situation. By this means, as Koffka<sup>47</sup> so aptly put it, the child evaluates not the degree of clarity of one or the other part of the perceived field, but its 'centre of gravity' (Schwerpunkt), the importance of its separate elements, singling out ever new 'figures' from its background, and thus limitlessly widening the possibilities for mastering its activities.

All this frees the child's attention from the power of the actual situation that immediately effects it. Creating along with the space field for its action, with the help of speech, *a time field* just as visible and real as the optic situation (although, perhaps, more vague), the speaking child obtains the possibility of dynamically directing its attention, acting in the present from the viewpoint of the future field, and often reacting towards the changes actively created in the present situation from the point

of view of past activities. Owing to the part of speech and the transition to such a free distribution of attention, the future field of action is transformed from an old and abstract verbal formula to an actual optic situation; in it, standing out sharply as the basic configuration, are all the elements that make up the plan of this future activity, distinguishable thus from the general background of possible activity. The specific difference between the operation of the child and that of the higher animals lies in the fact that this field of attention, which does not coincide with the field of perception, with the assistance of speech singles out from the latter the elements of the actual 'future field'. In the case of the child, the field of perception is organized by the verbalized function of attention; if, in the case of the ape, the absence of direct optic contact between the object and the aim is sufficient to render the task unsolvable, in the instance of the child this is easily overcome by verbal interference; the child simply reorganizes its sensory field.

Owing to this circumstance, it becomes possible to combine in one field of attention the 'figure' of the future situation consisting of elements of the past and present sensory fields; thus the field of attention embraces not one perception, but a whole series of potential perceptions that form successive dynamic structural entity in time. The transition from the simultaneous structure of the optic field to the successive structure of the dynamic field of attention is achieved as a result of the reconstruction, on the basis of the inclusion of speech, of all the major connections between the separate functions that take part in the operation: the field of attention that has detached itself from the field of perception and unfolded itself in time, including the given actual situation, as one of the moments of a dynamic series.

The ape, perceiving a stick one moment in one optic field, ceases to pay attention to it the next moment, after its optic field has changed and when an aim appears in its centre. The ape must first see the stick in order to pay attention to it; the child may pay attention in order to see.

The possibility of combining in one field of attention elements of the past and present optic fields (for instance, tool and aim) leads, in turn, to a basic reconstruction of another vitally important function taking part in the operation: that of *memory*. Similar to the way in which the action of attention, as Koffka correctly noted, is apparent not in the increase in clarity of one or another part of the sensory field, but in the displacement of the centre of gravity, in its structure, in the dynamic alteration of this structure, in the alteration of figure and background, so the role of memory in the child's operation manifests itself *not simply* in the widening of that fragment of the past which actually fuses in a united whole with the present, but in the *new method of uniting the elements of past experience with present*; this method is based on the inclusion of *speech formulas* of past situations and past activities into a single point of attention. As we have seen, speech shapes the operation according to laws other than those of direct action. Similarly, it also fuses, unites and synthesizes the past and present in a different way, freeing the action of the child from the power and influence of direct recollection.

*The voluntary structure of the higher psychological functions*

After subjecting to further analysis the psychological operation of practical intellect related to the use of tools, we see that the time field created for action with the help of speech extends not only backwards but also forwards. The anticipation of the following points of action in symbolic form allows for the inclusion in the present operation of special stimuli, which should represent in the operation these points of future activity and should actually achieve their influence in the organization of behaviour at the present moment.

Here, as in the case of the operations of memory and attention, the inclusion of symbolic functions does not lead to a simple lengthening of the operation in time, but creates conditions for an entirely new kind of connection between the elements of the present and the future: the actually perceived elements of the present situation are included in one structural system with symbolically represented elements of the future. An absolutely new psychological field for action is created, leading to the appearance of the function of *formation of intention* and previously planned *purposeful action*.

This change in the structure of the child's behaviour is related to alterations of a much more basic type. Lindner, comparing the way deaf and dumb children solved tasks with Köhler's experiments, called attention to the fact that *motives* pushing the ape and the child to the mastering of a given aim cannot be regarded as one and the same.<sup>48</sup> The instinctive disturbance predominating in the animal become secondary in the child's case, giving way to new motives of a social nature. These have no natural analogy but, nevertheless, attain in the child a considerable degree of intensity. These motives, also of decisive importance in the mechanism of a developed voluntary act, were called by Lewin 'Quasibedürfnisse',<sup>49</sup> who noted that their inclusion leads to a new reconstruction of the whole affective and voluntary system in the behaviour of the child and in particular, changes its attitudes to the organization of future action. The peculiarity of this new 'motor' strata of human behaviour consists in two main points: the mechanism of the fulfilment of intention is, in the first place, separated from the motorics at the moment of its arising; in the second place, it contains in itself the impulse to act, this being realized in the future field. Both these points are absent in action organized by natural needs in which motorics are inseparable from direct perception, and all the action is concentrated in the present psychological field.

The way in which this action, related to the future, arises has remained up to this time insufficiently accounted for. Now it can be explained from the viewpoint of study of symbolic functions and their participation in behaviour. The 'functional barrier' between perception and motorics, mentioned above, and which owes its origin to the intrusion of word or some other symbol between the initial and final points of action, explains this separation of impulse from the immediate realization of the act which, in turn, constitutes the mechanism preparing postponed future action. It is the inclusion of symbolic operations which makes possible the formation of an absolutely new psychological field in composition, a field that does not lean on the

existing present, but rather sketches an outline of the future situation of action and thus creates free action, independent of the immediately effective situation.

By studying the mechanisms of the symbolic situations, with the help of which action is, as it were, torn away from those natural primary ties that are given by the biological organization of behaviour, and is transferred to an entirely new psychological system of functions, we achieve an understanding of by what means man arrives at the possibility of forming 'a free intention'. This is a fact on which too little attention has yet been focused and which, according to Lewin, distinguishes the civilized adult from the child and primitive man.

If we try to sum up the results of an analysis as to how separate psychological functions and their structural relations change under the influence of the inclusion of symbols, and if we compare the wordless operations of an ape with the verbalized operations of a child, we will find that one relates to the other as *a voluntary action to an involuntary*.

The traditional approach has been to qualify as voluntary action everything that is not primarily or secondarily automatic (instinct or habit). However, actions of a third order exist which are neither automatic, nor voluntary. These include, as Koffka has shown, the 'Intelligenzhandlungen' of apes which cannot be reduced to pure automatism, but are also not of a 'voluntary' character. Research upon which we base our views furnishes an explanation as to what is lacking in the ape's action which does not allow it to be qualified as 'voluntary': 'voluntary' action is manifest there, where we find *the mastering of one's own behaviour with the assistance of symbolic stimuli*.

Upon achieving this stage of development of behaviour, the child 'leaps' from the 'intelligent' action of the ape to the intelligent and free action of man.

### 3 Sign operations and the organization of the psychological processes

#### *Problems of signs in the formation of the higher psychological functions*

The facts described in the previous pages bring us to psychological conclusions the significance of which leads us far beyond the limits of analysis of the specific, concrete group of phenomena that has, until now, been the principal subject of our research. The functional, structural and genetic laws that manifest themselves in the study of these facts prove on closer inspection to be laws of a more general order and force us to revise the question of the structure and genesis of all the higher psychological functions as conceived of today.

Two roads lead us to this revision and generalization: on the one hand, a broader study of other forms of the symbolic activity of the child shows that not only speech, but all operations related to the use of signs, their differing concrete forms notwithstanding, are governed by the same laws of development, structure and functioning, as ['is characteristic of' - eds] speech in the role discussed above. Their psychological

nature proves to be the same as the speech activity examined by us, where we found, in a complete form, the properties common to all the higher psychological processes. We should, consequently, examine in the light of what we have learned concerning the functions of speech, other psychological systems akin to it, no matter whether we shall be dealing with second order symbolic processes (such as writing, reading, etc.) or with such basic forms of behaviour as speech.

On the other hand, not only operations related to practical intellect, but all no-less primary and, frequently, even more elementary functions belonging to biologically shaped forms of activity, manifest laws in the process of development that we discovered when analysing practical intellect. Hence, the route followed by the practical intellect of the child, discussed above, constitutes the common path of development of all the basic psychological functions; these, in turn, have one thing in common with practical intellect: they all have their 'man-like' forms in the animal world. This route is analogous to the one described on the previous pages in that, beginning with the natural forms of development, it soon outgrows them and causes radical reconstruction of these functions on the basis of the use of signs as a means of organizing behaviour. Thus, however strange it may seem from the point of view of traditional doctrine, the higher functions of perception, memory, attention, movement and so on, prove to be internally connected with the development of the sign using activity of the child, and their comprehension is possible only on the basis of an analysis of their genetic roots and of that reconstruction which they underwent in the course of their cultural history.

We stand, at this juncture, before a conclusion of great theoretic importance: we perceive the unity of the higher psychological functions as based on the essential sameness of their origins and mechanism of development. Such functions as voluntary attention, logical memory, the higher forms of perception and movement which, until the present time, were examined separately and were regarded as individual psychological facts, in the light of our experiments now appear as phenomena of essentially one psychological order, as the product of a fundamentally integral historical development of behaviour. Through this, all the given functions are introduced into a broad field of genetic research, and instead of being treated as lower and higher varieties of several permanently co-existing and neighbouring functions, they are admitted as being what they actually are: different stages of the integral process of the personality's cultural formation. From this standpoint, we have as much reason to speak of logical memory or of voluntary attention, as we do of voluntary memory, of logical attention, of voluntary or logical forms of perception, which sharply differ from the natural forms of calculation by laws peculiar to another genetic stage.

The logical consequence of the recognition of the primary importance of the use of signs in the history of development of the higher psychological functions, is the inclusion of external symbolic forms of activity (speech, reading, writing, counting and drawing) into the system of psychological categories. They were usually regarded as foreign and additional in relation to the inner psychological processes, but from the new point of view we defend they are included into the system of higher psychological

functions on an equal footing with all other higher psychological processes. We are inclined to regard them, first of all, as particular forms of behaviour, shaping themselves in the course of the social-cultural development of the child and forming an external line in the development of symbolic activity along with the inner line, represented by the cultural development of such functions as practical intellect, perception, memory, etc.

Thus, in the light of our historical theory of the higher psychological functions, the usual, customary borderlines dividing and uniting separate processes (as conceived by modern psychology) are shifted; what was formerly considered to belong to different compartments, now proves actually to belong to one and the same, and on the other hand, what seemed to belong to one class of phenomena, is actually located at absolutely different levels of the genetic ladder and proves subject to completely different laws.

Thus the higher functions form a psychological system, integral in its genetic character, although manifold in composition, built on foundations entirely different from those of the elementary psychological functions. The factors uniting the whole system, determining whether one or another individual psychological process should be attributed to it or not, is the common origin of their structure and function. *Genetically* they differ in that in their phylogenesis they are the *product not of biological evolution, but of the historical development of behaviour*, while in ontogenesis they have also a special social history. With regard to structure, their peculiarity consists in that, unlike the direct reactive structure of elementary processes, they are constructed on the basis of the use of stimuli-means (signs) and, depending on this, reflect an indirect character. Finally, they are characterized functionally speaking by the fact that behaviour-wise they fulfil a new and essentially different role as compared to the elementary functions, a role that brings about an organized adaptation to the situation, preceded by a preliminary mastering of one's own behaviour.

#### *The social genesis of the higher psychological functions*

If, then, sign organization proves to be the most important distinguishing feature of all the higher psychological functions, it is natural that the first question the theory of higher functions must decide upon is that of the origin of this type of organization.

While traditional psychology sought for the origin of symbolic activity either in the series of 'discoveries' or other intellectual operations of the child, or in the processes of the formation of ordinary conditional ties [usually translated as 'conditioned associations' — eds], seeing them only as the product of invention or a complicated form of habit, our researches lead us to the necessity of singling out an independent history of sign processes as forming a special line in the general history of the child's psychological development.

In this history we find, occupying their subordinate place, both various forms of habit connected with the complete functioning of one or another system of signs, and the complex processes of thought so necessary for their intelligent application. But

both of these can not only not furnish an exhaustive explanation as to the origin of higher functions, but can themselves be explained only in the broader context of their relation to those processes of which they constitute an auxiliary part; the process of origin of operations, related to the use of signs, can not only not be deduced from the formation of habits or inventions, but is, in general, a category not to be deduced at all as long as we remain within the confines of individual psychology. By its very nature *it is a part of the history of the social formation of the child's personality*, and only in the content of this whole can the laws governing it be disclosed. The behaviour of man is the product of development of a broader system of social ties and relations, collective forms of behaviour and social co-operation.

This social nature of all the higher psychological functions has until now escaped the attention of scholars, to whom it never occurred to regard the development of logical memory or voluntary activity as part of the child's social formation, for in its biological beginning and at the end of its psychological development it appears as an individual function. Only genetic analysis uncovers the path that connects the starting and final points. This analysis shows that every higher psychological function was formerly a peculiar form of psychological co-operation, and only later became an individual way of behaviour, transplanting inside the child's psychological system a structure that, in the course of such transfer, preserves all the main features of its symbolic structure, altering only its situation.<sup>50</sup>

Thus, the sign primarily appears in the child's behaviour *as a means of social relations, as an inter-psychological function*. Becoming afterward a means by which the child controls its behaviour, *the sign simply transfers the social attitude toward the subject within the personality*. The most important and basic of genetic laws, to which the study of the higher psychological functions leads us, reads that every symbolic activity of the child was once a social form of co-operation and preserves throughout its development, to its highest point, the social method of its functioning. The history of the higher psychological functions is disclosed here *as the history of the transformation of means of social behaviour into means of individual psychological organization*.

#### *The main rules of development of the higher psychological functions*

These general propositions, lying at the basis of our historical theory of the higher psychological functions, lead to certain conclusions related to the main rules governing the process of development under discussion. We shall deal with these only in the form of the shortest indications that generalize what has been said and, hence, render a detailed discussion unnecessary.

1 *The history of the development of each of the higher psychological functions, contrary to being simply the direct continuation and further perfecting of the corresponding elementary function, presumes a radical change of the very direction of development and the further movement of this process along entirely new lines; each higher psychological function comprises, therefore, a specific new form.*

This viewpoint is easily observed in phylogenesis, since the biological and historical formation of all function are so sharply divided and so obviously belong to different types of evolution that both processes are evident in a pure and isolated form. In ontogenesis, however, both lines of development appear as an interwoven complex combination, and this has frequently misled the research worker who, perceiving these two lines as one integral entity, came to consider the higher processes as the simple continuation and development of the lower.

We shall limit ourselves to only one factual consideration that confirms our approach on the basis of data obtained concerning the most complex psychological operations; let us examine the development of *counting and arithmetical processes*.

In a large number of psychological researches we meet a viewpoint according to which the child's arithmetical operations are from the very beginning an example of complex symbolic activity and that they proceed from elementary forms of operations with quantities by way of uninterrupted development.

Experiments conducted in our laboratories (by Kuchurin and Menchinskaya) convincingly show that there can be no question here of a direct and gradual perfecting of elementary processes and that the change of form in counting operations is of a profound qualitative nature, a change of the psychological processes participating in the operation. Observations have shown that, if at the beginning of development, quantitative operations are limited to *the immediate perception of given pluralities and number groups*, and that *the child does not really count but perceives quantities*, further development is characterized by *the breakdown of this immediate form* and its replacement by other processes. In these latter a number of *indirect auxiliary signs* take part, in particular, articulative speech, the use of fingers and other aids that lead the child to the *process of counting*. The further development of the counting operation is again connected with the radical reconstruction of the participating psychological functions; calculation with the help of complex counting systems again presents a qualitatively new and specific psychological formation.

We arrive at the conclusion that the development of counting may be reduced to the process of the participation in this operation of the main psychological functions; the transition from pre-school to school arithmetics is not a simple, uninterrupted process, but rather a process of the overcoming of primary elementary laws and their replacement by new and more complex ones.

A concrete example of this may be found in the simplest experiment. If the counting process for the small child is entirely determined by form perception, at a later stage this attitude is reversed and form perception itself is determined by the articulative tasks of counting. In our experiments a cross made up of counters (figure 7.1, A) was presented to a small child to count up.<sup>51</sup> Invariably the child made a mistake: it perceived the figure as an integral system of a cross (B), twice counting the central piece common to both the crossing systems. It was only much later that the child proceeded to another type or process. Perception becomes determined by the problem of counting and is broken down into three separate groups of elements, which were consecutively counted (C). In this process we cannot but see the supplanting of one psychological method of behaviour by another, the emancipation from

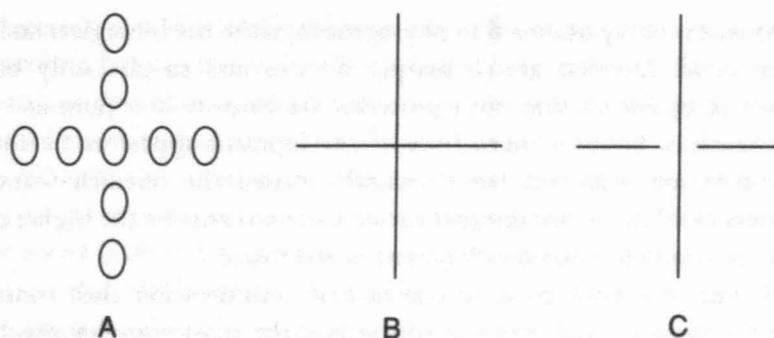


Figure 7.1

direct connection of the sensory and the motor field and the processing of perception by means of complex psychological attitudes.

All these researches show conclusively that evolutionism must give way, in the study of the development of child behaviour, to more adequate ideas that take into consideration the absolutely original and dialectic character of the process of formation of new psychological forms.

2 *The higher psychological functions are not superimposed as a second storey over the elementary processes, but represent new psychological systems which include a complex knot of elementary functions that, upon being included in the new system, begin to act according to new laws. Each higher psychological function thus presents a unity of a higher order, determined mainly by the particular combination of a series of more elementary functions into a new whole.*

This approach, of decisive importance concerning research on the formation and structure of the higher psychological functions, has been examined by us on the foregoing pages, where we dealt with experiments pertaining to the re-organization of perception due to the inclusion of speech and, in a broader sense, to the mutual and radical change of functions during the formation of the complex psychological system 'speech-practical intellectual operation'. In all these cases we actually observed the formation of complex psychological systems with new functional relations between separate parts of the systems and corresponding changes in the functions themselves. If perception, connected with speech, began to function not according to the laws of the sensory field, but to those of the organized system of attention; if the meeting of the symbolic operation with the use of tools resulted in new forms of indirect control of the object, with the preliminary organization of the child's own behaviour – then in this case we must speak of a certain general law of psychological development and formation of higher psychological functions.

After several series of psychological researches we became convinced that both the most primitive and the most complex of higher functions undergo such a reconstruction. Thus, experiments on the psychological study of imitation (carried out in our laboratories<sup>52</sup> by Bozhovich and Slavina) showed that primitive forms of reflective imitation form, upon entering the system of sign operations, a new entity built on

entirely new laws and having another function. In other experiments pertaining to the psychological study of the process of concept formation (according to a method created by L. S. Sakharov), our collaborators Kotelova and Pashkovskaya demonstrate that at higher stages of psychological processes, too, the inclusion of complex speech functions is related to the creation of entirely new forms of categorial behaviour hitherto not observed.

3 *In cases of disintegration of the higher psychological functions due to pathological processes, the first link to be destroyed is that between the symbolic and natural functions; this results in the cutting off of a number of natural processes which then start functioning according to their primitive laws, i.e. as more or less independent psychological structures. It follows, then, that the disintegration of the higher psychological function represents a process which, quality-wise, is the reverse of their formation.*

It would be difficult to imagine a more clear cut example of such a general disintegration of the higher psychological functions, due to the disruption of speech, than in the phenomenon of aphasia. The breakdown of speech is accompanied here by the disappearance (or serious disruption) of sign operations. This disappearance, however, by no means takes place as an isolated monosymptom, but results in far reaching and general disruptions in the functioning of all the higher psychological systems. In a special series of studies we were able to establish the fact that the aphasic suffering from an affliction of higher sign operations becomes in his practical actions completely subject to the elementary laws of the optic field. In another series we experimentally established the sharp changes characteristic of the active operations of the aphasic as they return to the primitive indivisibility of the sensory and motor spheres. The most serious consequences of the affliction of the higher symbol systems manifest themselves in the following ways: the immediate motor manifestation of impulses coupled to an impossibility of delaying action and of forming an intention postponed in time; the inability of transforming a given image through transferred attention; the total incapability of abstracting judgement and action from intelligent and familiar structures; and, finally, the reversion to primitive forms of reflective imitation.

Studies of aphasia furnish an exceptionally convincing argument that the higher psychological functions do not exist simply next to, or on top of, the lower ones; in reality, they penetrate them and so radically reform them all, including even the deepest layers of behaviour, that their disintegration, related to the break off of lower processes in their elementary form, alters the whole structure of behaviour, throwing it back to the most primitive, 'paleopsychological' type of activity.

#### 4 The analysis of sign operations in the child

We are now in a position to return to the subject mentioned at the beginning of this chapter, where we pointed out that the laws governing the development of the child's

practical intellect are only a particular case of the laws pertaining to the construction of all the higher psychological functions. The conclusions we reached confirm this viewpoint and show that these higher functions arise as specific new forms, as a new structural entity, characterized by new functional relations established within it. We have already noted that these new functional relations are linked to the operation of sign use, this being the central and basic moment in the construction of all the higher psychological functions. This operation thus proves to be a symptom common to all the higher psychological functions (including the use of tools which remains our starting point), a symptom we must regard as a kind of common multiplier and, at the conclusion of our experiment, submit to special examination.

Several series of experiments, carried out during the last few years by my colleagues and myself,<sup>53</sup> dealt with this problem, and now, basing ourselves on the acquired data, we are able to describe in a schematic form the basic laws that characterize the structure and development of the child's sign operations.

It is only through experiments that we can hope to penetrate sufficiently deeply into the laws of these higher processes. Only experiment permits us to provoke in one artificially created process all those most complex changes that are so widely separated in time, often lying latent for years, changes that, in the child's normal genesis, are never accessible in all their real conjunctions, and cannot be taken in at one glance in their multiple co-relations. The research worker striving to comprehend the laws of a whole and who hopes to penetrate external manifestations so as to arrive at the causal and genetic links of these factors, must resort to a special form of experimentation. Its methodology will be touched on further. As for its essence, it consists in the creation of processes that, in the experiment, disclose the actual course of development of a given function.

This experimental genetic study gives us the opportunity to follow the problems interesting us in the three mutually inter-related aspects: we shall describe the structure, origin and further fate of sign operations in the child, these leading us to an understanding of the inner essence of the higher psychological processes.

#### *The structure of sign operation*

We shall dwell here on the history of *child memory*, in the example of the development of which we shall try to show the general characteristics of sign operations along the lines mentioned above. Memory is an exceptionally advantageous subject for analysis for the comparative study of the structure and method of action of the elementary and higher functions.

The phylogenetic investigation of human memory shows that, even at the most primitive stages of psychological development, we can clearly see two, principally different types of memory functions. One, dominating in primitive man's behaviour, is characterized by the immediate impression of material by the simple after-effect of actual experiences, the retention of those mnemonic traces the mechanism of which

was so brilliantly outlined by E. R. Jaensch in the phenomena of 'eidetic images'. This kind of memory is very near to perception, with which it has not yet broken off its immediate connection, and arises out of the direct influence of external impressions on man. From the point of view of structure the immediate character noted by us is the major point of the whole process, a point linking the memory of man with that of the animal. And that is what entitles us to call this form of memory 'natural memory'.

This form of memory functioning is not, however, the only one, even in the case of primitive man. On the contrary, even in his case other types of remembering may be seen alongside it, types that, upon closer analysis, prove to belong to a completely different genetic line and that lead us to an absolutely different formation of the human psyche. Even in such comparatively simple operations as the tying of a knot or marking something to remind oneself to remember, the psychological structure of the process changes completely.

Two essential factors distinguish this operation from simple elementary retaining in mind: the process here obviously goes far beyond the limits of elementary functions directly linked with memory and is supplanted by the most complicated operations that, *per se*, may have nothing in common with memory but carry out in the general structure of the new operation the function formerly fulfilled by direct retention. On the other hand, the operation here also goes beyond the limits of natural, intracortical processes, also adding to the psychological structure environmental elements that begin to be used as active agents governing the psychological process from without. As a result, both these factors produce an entirely new form of behaviour. After analysing its inner structure, we can call it *indirect (instrumental)*; evaluating its difference from natural forms of behaviour, we can qualify that type of behaviour as 'cultural'.

An essential factor in this operation is the participation of certain *external signs*. Here the subject does not solve the problem by way of the direct mobilization of his natural capacities; he has recourse to certain external manipulations, organizing himself through the organization of objects, creating artificial stimuli which differ from others in that they have *reverse action*, being directed not at other people but at himself and allowing him to solve the problem of remembering with the aid of external signs.

Examples of such sign operations organizing the memory process are manifest at a very early period in the history of culture. The use of notched sticks and knots, the beginnings of writing and primitive *aides-mémoire* – all these serve to show that at the early stages of cultural development man already went beyond the limits of the psychological functions given to him by nature, and proceeded to a new, cultural organization of his behaviour.

Obviously, such a superior symbolic operation as the use of signs for remembering is the product of the most complex historical development; comparative analysis shows that such types of activity are absent in all species of animals, including the

highest, and there is reason to believe that it is the product of specific conditions of *social* development; it is no less obvious that such auto-stimulation could appear only after similar stimuli had already been created for the stimulation of others, and that behind it lies a complicated process of social history. Sign operation, to all appearances, follows the same course as the one taken by speech in ontogenesis, speech having been formerly a means of stimulating another person and afterwards becoming an intra-psychological function.

With the transition to sign operations we not only proceed to psychological processes of the highest complexity, but in fact leave the field of the psyche's natural history and enter the domain of the historical formation of behaviour.

The transition to higher psychological functions by way of their becoming indirect (instrumented) and the construction of sign operation can be followed successfully in experiments on a child. With this aim in mind we can move from elementary direct reaction tests to tests in which the child solves problems with the aid of a number of auxiliary stimuli that organize the psychological operation. When the problem consists of remembering a certain number of words, we can give the child some objects or pictures that do not repeat any of the words to be remembered, but serve as conditional signs which might later help the child to reproduce the words. It follows that the process studied in this experiment must differ sharply from simple elementary memorizing. The task here must find its solution through an indirect operation, through the establishment of a definite relation between the stimulus and the sign. Instead of simple memorizing, we have here an integral process that presupposes a considerably more complicated method of organizing behaviour than that inherent in psychological functions. In fact, if every elementary form of behaviour basically presupposes a *direct* reaction to the task set before the organism, expressed by the simple formula  $S \longrightarrow R$ , the structure of sign operation proves to be much more complicated. Here an intermediate link appears between the stimulus and the reaction directly connected earlier, an intermediate link that plays a special role completely different from everything we observed in the elementary forms of behaviour. This *stimulus of a second order* must be drawn into the operation where it

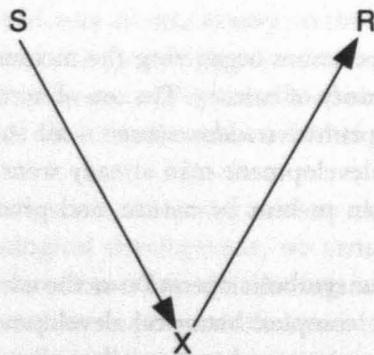


Figure 7.2

assumes the special function of serving its organization: it must be established by the individual, and must have reverse action, thus causing specific reactions. The formula of the simple reactive process is replaced, consequently, by that of the complex indirect act [figure 7.2],<sup>54</sup> where the direct impulse to react is held back, and the operation follows a roundabout way, establishing a certain auxiliary stimulus that fulfils the operation by indirect means.

Careful investigation demonstrates the fact that we see this structure in the higher psychological processes, although in much more sophisticated forms than that shown here. The intermediate link in this formula is not, as might have been supposed, simply a method of improving and perfecting the operation. By possessing the specific functions of reverse action, it transfers the psychological operation to higher and qualitatively new forms, permitting man, by the aid of outer stimuli, to *control his behaviour from without*; the use of signs, which are at the same time a means of auto-stimulation, leads man to a completely new and specific structure of behaviour, breaking away from the traditions of natural development and creating for the first time a new form of cultural psychological behaviour.

Memory tests with the use of external signs carried out in our laboratories<sup>55</sup> showed that this form of psychological operation is not only essentially new in comparison with direct memorizing, but that it helps the child *to overcome the limits set for memory by natural laws of mnema, and that, what is more, it is primarily this mechanism in memory which is subject to development.*

The presence of these higher or roundabout ways of memorizing is nothing new, no more than is the possibility of similar indirect operations. Their empiric description is the merit of experimental psychology. Classic studies, however, failed to see in them *new, specific and integral forms of behaviour, acquired in the process of historical development.* Such kinds of operations (as, for instance, mnemotechnical memorizing) were regarded as nothing more than simply an artificial combination of a number of elementary processes where, as a result of a lucky coincidence, a mnemotechnic effect occurred. This practical method, created *ad hoc*, was not conceived of in psychology as an essentially new form of memory, as a new method of activity.

Our tests lead to diametrically opposite conclusions. Examining the operation of memorizing with the help of external signs, and analysing its structure, we became convinced that, far from being a simple 'psychological trick', it presents all the features and properties of a *really new and integral function*: an entity of the highest order, the separate parts of which are united in relations *sui generis*. These cannot be reduced either to the laws of association or to those of structure, fundamentally studied in direct psychological operations. We define these specific functional relations as the *sign function of auxiliary stimuli*, on the basis of which a principally new correlation of psychological processes included in this operation takes place.

This integral and specific nature of the sign operation can be observed with particular clarity in experiments. The latter demonstrate that even if the links the child turns to, when striving to remember, by the sign, a given word, are indeed formed following the laws of association or structure (we do not in essence go into

that question's solution here), the specific quality of the sign operation itself cannot be explained by these laws. Clearly, the simple associative or structural link is not reversible, and the sign linked to the word does not, on being produced, necessarily serve again as a reminder of the given word. We have a great number of cases when a process that proceeded according to the usual laws of structural or associative connections did not necessarily lead to the indirect operation, and the repeated demonstration of the picture evoked in the child new associations instead of bringing it back to particular word. What was needed was that the child realize the operation's purposeful character, that the child come into a specific *sign relation* with the auxiliary stimulus; only then will the structural or associative connection acquire its mandatory *reversible character* and the repeated demonstration of the sign will necessarily bring it back to the word, memorized earlier with the help of the sign.

At a later stage we shall dwell on the roots of these complex psychological processes; at this point, however, we should like only to remark that *associative or structural processes begin to play their auxiliary, indirect role, within the limits of this 'instrumental operation', and that what we witness here is not an accidental combination of psychological functions but a really new and special form of behaviour.*

The process described is characteristic only for the construction of the higher forms of memory. On the other hand, we would be wrong if we thought that such operations enhance only quantitative aspects of the activity of psychological functions. Special tests show that the described schema is a general principle of the construction of the higher psychological structures; due to them, new psychological structures are created which were formerly non-existent and, probably, impossible without such sign operations. We shall illustrate this with the example of a genetic study of the activity of the child's *voluntary attention*.

A child of seven or eight years was placed in conditions calling for a high degree of constant and concentrated attention (for instance, asking the child to name the colour of a number of objects without repeating the same colour or naming two 'forbidden' colours). A direct attempt to solve the task led to a total inability to achieve a correct solution. However, as soon as the child switches over to an indirect organization of the process by using certain auxiliary signs, the task becomes easy to solve.

In the experiments carried out in our laboratories<sup>56</sup> by Leont'ev, the child was given a number of coloured cards to be used for the simplification of the task. In cases when the child did not use them in its activities (as, for instance, putting 'forbidden' colours aside and removing them from the fixed field), the task proved to be unsolvable. It was easily carried out, however, when instead of naming the colours, the child used a complex structure of replies based on the auxiliary signs given him: placing the two 'forbidden' colours inside the fixed field and adding each newly named colour, the child thus formed an auxiliary control group, and the task was easily fulfilled. Replying each time *with the aid* of these auxiliary stimulus signs, the child organized its *active attention* from without, thus becoming adapted to a task that could not be solved by direct, elementary forms of behaviour.

*The genetic analysis of sign operation*

We discussed the indirect nature of psychological operations as a specific feature of the structure of higher psychological functions. It would be a great mistake, however, to believe that this process appears in a purely logical way, that it is invented and discovered by the child in the form of a lightning-quick guess (a so-called 'aha' reaction), thanks to which the child once and for all comes to realize the relation between the sign and the method of using it, resulting in this entire operation's further development proceeding along purely deductive lines. It would be equally wrong to believe that the symbolic attitude to some stimuli is reached intuitively by the child, derived as it were from the depths of the child's own spirit, or that symbolization is the primary and further irreducible Kantian *facultas signatrix*, from the beginning a part of human consciousness capable of creating and comprehending symbols. Both these points of view – the intellectual and the intuitive – in essence metaphysically dispose of the question of the genesis of symbolic activity since, for one of them, the higher psychological functions are given previous to any experience, as if they were inherent to consciousness and only waiting for an opportunity to manifest themselves upon meeting with the empiric perception of things. This point of view leads inevitably to an *a priori* conception of higher psychological functions (see Cassirer).<sup>57</sup> For the other point of view, the question concerning the origin of the higher psychological functions poses no problems at all, since it postulates that signs are invented, and after that all corresponding forms of behaviour are deduced from them as conclusions from logical premises. Finally, we have touched on what we consider to be the failure of attempts to deduce complex symbolic activity from the simple interference and accumulation of habits.

Observations over a course of a series of experiments of various psychological functions, as well as a step-by-step study of development, led us to conclusions diametrically opposite those described above. Facts contributed to our realization of the tremendous importance of the process which we call the natural history of sign operations. We saw that sign operations appear as a result of the most complex and prolonged process that reflects all the typical features of real *development* and is subject to all the basic laws of psychological evolution. This means that they are not simply invented or passed down by adults, but rather arise from something that is originally not a sign operation and that becomes one only after a series of qualitative transformations, each of which conditions the next stage and is itself conditioned by the preceding one and thus links them like stages of an integral process, historical in nature. In this respect the higher psychological functions are no exception to the general rule and do not differ from other elementary processes. *They, too, are subject to the fundamental law of development which knows no exceptions.* They appear in the child's general process of psychological development not as something introduced from without or from within, but as the natural result of this same process.

True, if we include the history of the higher psychological functions in the general context of psychological development and attempt to arrive at an understanding of

their source from its laws of development, we cannot but arrive at a new concept of the process itself and of its laws. *Within* this general process of development two qualitatively original main lines can already be distinguished: the line of biological formation of elementary processes and the line of the socio-cultural formation of the higher psychological functions; the real history of child behaviour is born from the interweaving of these two lines.

Accustomed as we were over the course of our observations to distinguish between these two lines, we nevertheless met with a stunning fact that threw light on the entire question of the origin of sign function in the child's ontogenesis: a series of studies established that a genetic link exists between both lines, i.e. that there exist a number of transitional forms between the elementary and higher psychological functions. We found that the earliest flowering of the most complex sign operation occurs as early as in the system of purely natural forms of behaviour, and thus that the higher functions have their 'pre-natal' period of development linking them with the natural foundation of the child's psyche. Objective observations showed that between the purely natural layer of the elementary functioning of psychological processes and the higher layer of indirect forms of behaviour, there lies a huge area of *transitional* psychological systems; in the history of behaviour, an area of primitive forms lies between the natural and the cultural. We qualify these two points, that is, the idea of the development of higher psychological functions and their genetic connection with the natural forms of behaviour, as '*the natural history of the sign*'.

The idea of development proves here to be the key to the comprehension of the unity of all psychological functions and, at the same time, of the inception of higher, qualitatively different forms. We arrive, therefore, at the conclusion that these *most complex psychological formations arise from the lower by way of development*.

Tests pertaining to the study of indirect memorizing provide the possibilities of studying this process of development in its entirety. A certain primitiveness of all psychological operations is found, to a considerable extent, to be characteristic of the first stage in the use of signs. Close study shows that the sign, applied here as a reminder of a certain stimulus, is not yet fully separated from the latter; along with the stimulus it forms a kind of *general syncretic structure embracing both the object and the sign* and as yet does not really serve as a *means of memorizing*.

The idea of purposefulness of the operation, linked to the use of signs, is still foreign to the child at this stage of development. Even if the child does turn to the auxiliary picture so as to memorize a given word, this does not necessarily mean that the reverse operation – reproducing the word upon being shown the sign – is as easy for him. Tests along such lines show that the child at this phase does not usually recall the primary stimulus when being shown the sign, but further produces a whole syncretic situation, as a result of this sign's influence, which, along with other elements, may also include the main stimulus that was to have been completed according to the given sign. In this case, instead of the usual scheme typical of indirect memorizing (figure 7.3) (where the word's auxiliary sign turns the subject back to the given word) we get a different scheme (figure 7.4), where the sign arouses

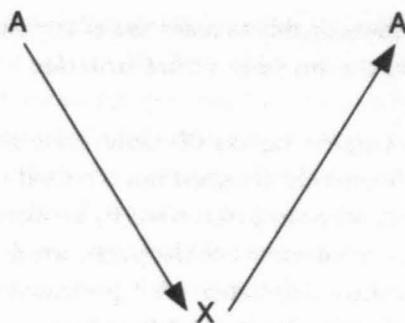


Figure 7.3

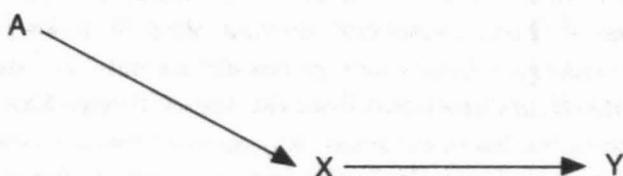


Figure 7.4

in the subject a new associative (or better, syncretic) series, and the entire operation does not as yet bear a definitely expressed, indirect, 'cultural' character.<sup>58</sup> During the further unwinding of the process this *y* may lead to a whole series of new associations, among which the subject may arrive at the starting point *A*. But the process here is still bereft of its purposeful 'instrumental' character, and correct reproduction can at best be the result of the interplay of complex associative or image laws. The period when the auxiliary sign does not act as a specific stimulus that always brings the child back to the starting point, but is always merely an impulse to the further development of the whole syncretic structure of which it is a part, is undoubtedly typical of the first, primitive phase in the history of the development of sign operations.

Certain facts certify that, at this stage of development, the sign acts as part of the general syncretic situation:

1 By no means does any sign prove to be useful in the child's operation, and not every sign can be linked to any meaning. The limitation of the use of a sign is related to its belonging mandatorily to a definite ready complex, which includes both the main meaning and the sign related to it. This tendency was especially apparent in the case of small children (aged four to six). Among the different signs offered, the child looks for one that has a ready-made link with the word to be memorized. And the statement that among the cards given, 'nothing works' to help remember the stimulus offered, is one of the most typical of a child of this age. Whereas the child easily memorizes a given word with the help of a picture which makes up a ready complex

with the word, the child proves unable to make use of any sign having linked it to the given word with the aid of the auxiliary verbal structure.

2 In tests where meaningless figures (Zankov) were presented as auxiliary aids for memorizing, we very frequently obtained not a refusal to make use of them, and not an attempt to link them with the given word by artificial means, but attempts to turn these figures into direct reflections of the given word, a drawing of it.

Thus, in Zankov's tests shape *a* in figure 7.5,<sup>59</sup> presented as a reminder of the word 'bucket', was turned upside down by the child, and served to remind it of the word only when shape *b* really began to resemble a bucket: in the same way, shape *c* became the sign of the word 'bench' only when turned upside down as in *d*. In all these cases the auxiliary figure was not linked to the given meaning by any type of indirect link, but proved to be a direct, immediate drawing of it. It follows then, that the introduction of meaningless figures into the test did not only stimulate (as we might have supposed) the child's transition from the use of already formed links to the creation of new ones, but led to a diametrically opposed result: to the child's urge to see the given figure as the direct, albeit schematic, description of one or another object and to the refusal to memorize when this was impossible.

3 A similar phenomenon was as a rule apparent in tests with small children, where concrete-meaning pictures, not immediately related to the word presented, served as auxiliary stimuli. Tests carried out by Yussevich showed that in a great number of cases this auxiliary picture was also not used as a sign: the child looked at it trying to see the object that had to be remembered. When asked to remember the word 'sun' with the help of a picture showing an axe, the child did it very easily, pointing to a small yellow spot in the drawing and saying 'There it is, the sun'. The complex instrumental nature of the operation is replaced by an elementary attempt to directly create an 'eidotoid' reflection of the contents present in the auxiliary sign. Thus in both cases we can also not speak of the child's reproducing the given word through memory – any more than when we name the original upon glancing at a photograph.

All these facts show that at this stage of development the word links up with the sign following completely different laws than in the case of developed sign operation. It is

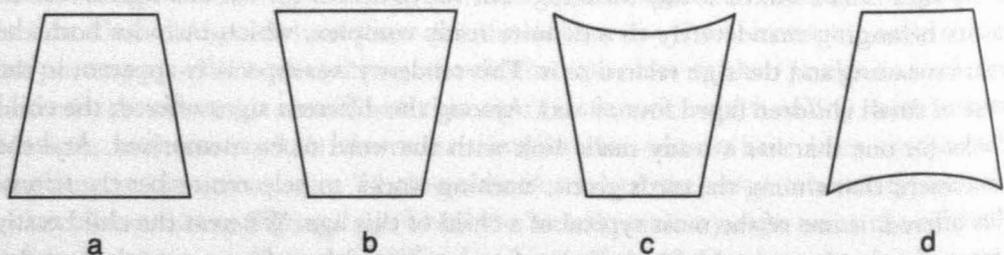


Figure 7.5

in this connection that all psychological processes included in indirect operation, as, for instance, the selection of an auxiliary sign or the process of recollection and restoration of a filled-out meaning, proceed here in a fundamentally different way; and it is this fact that stands as the fundamental verification and confirmation that the intermediate stage of development between the elementary and fully instrumented processes actually has its own laws of connections and relations, out of which the finished indirect operation will develop fully only later.

Special tests enabled us to make a more detailed study of this *natural history of the sign*. The study of the use of signs by the child and of the development of this form of activity could not but lead us to investigate how sign activity appears in the child. This problem was the subject of special studies. They may be divided into four series:

- 1 Research related to how sign meaning originates in the child during experimentally organized games with objects.
- 2 Research pertaining to the tie between sign and meaning and between word and object.
- 3 Studies of the statements made by the child when explaining why a given object is called by a given word (according to the clinical method of Piaget).
- 4 Investigation by means of choice-reaction (N. G. Morozova).

If we sum up the results of these studies negatively, we are led to the general conclusion that sign activity makes its appearance in the child differently from complex habits, discoveries or inventions. The child neither invents, nor does it learn this form of activity. Intellectualist and mechanist theories are both equally erroneous, although the training of habits as well as intellectual 'discoveries' are not infrequently interwoven with the history of the child's use of signs; however, they do not determine the inner development of this process, they are incorporated only as auxiliary, subordinate, secondary components of its structure.

*Sign operations are the result of a complex process of development, in the full sense of the word.* At the beginning of this process, one may observe transitional, mixed forms that combine both natural and cultural components of child behaviour. We called these forms the stage of child primitiveness or the natural history of the sign. In contrast to naturalistic theories of games, our experiments lead us to the conclusion that play constitutes the main avenue of the child's cultural development and, in particular, of the development of the child's symbolic activity.

Experiments show that both in plan and in speech the child is far from consciously realizing the relativity of the sign operation or of the arbitrarily established connection of sign and meaning. In order to become an object's (word's) sign, the stimulus finds support in the properties of the designated object itself. Not 'everything can represent everything' for the child in this game. The objects' real properties and their sign meanings come into complex structural interaction during play. Thus, for the child, the word is linked to the object through the latter's properties and is incorporated in one structure, common to it. That is why the child in our experiments refuses to call the floor a mirror (it cannot walk on a mirror), but has no qualms at

transforming a chair into a train, using its properties in play, i.e. manipulating it as if it were a train. When asked to call a lamp 'table' and vice versa, the child refuses, because one 'can't write on a lamp, or turn on a table'. To change (or swap) meanings for the child means to change the properties of objects.

We can think of nothing more obviously underlining the fact that at the very beginning of speech the child sees no connection between sign and meaning, nor does it begin to become conscious of this connection for quite some time. Further experiments show that the 'function of naming' (Nennfunktion) is not the creation of a single discovery, but has its own natural history, and that probably at the beginning of speech formation the child does not discover that every object has its own name, but rather learns new ways of dealing with them – and that is what gives them names.

Thus, the relations between sign and meaning which, because of their similar way of functioning and thanks to their external resemblance, begin at an early stage to remind us of the corresponding ties in the adult, are really by their inner nature psychological features of quite a different kind. To put the mastering of this relation at the very beginning of the child's cultural development means to ignore the complex history of inner formation of this relation, a history at least a whole decade long.

#### *The further development of sign operations*

We have described the child's sign operations in both structural and genetic roots; it would, however, be incorrect to think that instrumentation with the help of certain outer signs is the permanent form of the higher psychological functions; a careful genetic analysis convinces us of exactly the reverse and makes us think that this form of behaviour, too, is merely a stage in the history of psychological development, a stage growing from primitive systems and presupposing a transition at later stages to considerably more complex psychological formations.

The observations made earlier concerning the development of indirect memorizing underline an extremely peculiar fact: if, at the beginning, indirect operations proceeded exclusively with the help and use of external signs, at the late stages of development we observe that this outer instrumentation ceases to be the only operation by way of which the higher psychological mechanisms master the task before them. Experiments show that not only the forms of use of signs change here, but that the very operation's structure undergoes radical changes. The essential quality of this change might be expressed by saying that from an external-instrumented operation the process becomes an inner-reconstructed operation. This is expressed in that the child begins to memorize the given material principally in the same way as those described above, but without turning to outer signs, which from that minute on are no longer required. The entire operation of indirect memorizing takes place now as a purely inner process; judging from external appearances, it does not seem to differ in any way from the primary forms of direct memorizing. In fact, if we judge *only* from external appearances we will be under the impression that the child has simply

begun to memorize more and better, has somehow perfected and developed its memory and, most important of all, has reverted to the method of direct memorizing which our experiment forced it to abandon. However, this is only illusory: development, as often happens, proceeds here not in a circle, but in a spiral, passing through one and the same point at each new revolution at a higher level.

We call this withdrawal of the operation within, this reconstruction of the higher psychological functions related to new structural changes, the process of interiorization, meaning, mainly, the following: the fact that at their first stages, the higher psychological functions are built as outer forms of behaviour and find support in the outer sign is by no means accidental; on the contrary, it is determined by the very psychological nature of the higher function which, as we have mentioned above, does not appear as a direct continuation of elementary processes but is a *social method of behaviour applied by itself to itself*.

This transfer of social means of behaviour inside the system of individual forms of adaptation is far from being a purely mechanical operation; it is not accomplished automatically, but is related to a structural and functional change of the entire operation, and it stands as a special stage in the development of the higher forms of behaviour. Transferred to the sphere of individual behaviour, complex forms of co-operation now begin to function according to the laws of that primitive whole, an organic part of which they now constitute. Between the one statement, that the higher psychological functions (of which the use of signs is an inalienable part) originate in the process of co-operation and social intercourse, and the second statement, that these functions develop from primitive roots on the basis of lower or elementary functions, i.e. between the sociogenesis of higher functions and their natural history, there exists a contradiction that is not logical but genetic in character. The transition from the collective form of behaviour to the individual at first lowers the level of the whole operation, since it becomes incorporated in the system of primitive functions, thus acquiring qualities common to all functions of this level. Social forms of behaviour are more complicated and are in advance in their development in the child; when, however, they become individual, they are 'lowered' and begin to function according to simpler laws. Egocentric speech *per se*, for instance, is structurally lower than normal speech, but as a stage in the development of thought it is higher than social speech in the child of the same age; that may be the reason why Piaget regards it as the predecessor of socialized speech and not as a form derived from it.

Thus we proceed to the conclusion that every higher psychological function inevitably begins by bearing a character of external activity. In the beginning the sign, as a rule, is an external auxiliary stimulus, an external means of autostimulation. This is conditioned by two causes: first, by the fact that the roots of this operation are found in the collective form of behaviour which always belong to the sphere of external activity, and, second, because of the primitive laws of the individual sphere of behaviour which, in their development, have not yet become separated from external activity, are not set apart from direct perception and external action (for

instance, from practical thought in the child); yet the laws of primitive behaviour state that the child masters its external activity earlier and with less difficulty than inner processes.

Herein lies the reason for this operation not becoming at once an inner process of behaviour when being transformed from an *inter-psychological* to an *intra-psychological* operation. For a long time, it continues to exist and to change as an external form of activity, before definitively turning inward. For many functions, this stage of external sign lasts forever as the final stage of their development. But other functions go further in their development and gradually become inner functions. They take on the character of inner processes as a result of a prolonged development. Their transfer inward is coupled once more to changes in their laws of activity, and they are again incorporated into a new system where new laws rule.

We cannot dwell on the details of this transition of higher functions from the system of external activity to the system of inner activity. We are forced to omit many related events in this development, and we shall only attempt, albeit briefly, to touch on some of the principal moments connected with this inward transition of higher functions.

The fact of 'interiorization' of the sign operation was experimentally traced by us in two situations: in mass tests with children of different ages, and individually by means of prolonged experimenting with one child. In the work carried out by Leont'ev in our laboratories, a great number of children, aged from seven years to adolescence, underwent tests pertaining to direct and indirect memorizing. The change in the quantity of filled-in elements, in both cases, resulted in two lines that demonstrate the dynamics of sign operations over the course of the entire process of child development. The figure given below<sup>60</sup> illustrates the line of development of direct and indirect memorizing in children of various ages. Several things are at once evident: the way these two lines are situated in relation to each other is not accidental, but displays a certain order. Quite clearly, the line of direct memorizing is situated below that of indirect memorizing, and both show a certain tendency to grow according to the age of the child. This growth, however, displays an irregularity at the different stages of child development, and if we witness up to the ages of ten to 11 a particularly rapid *growth of outward indirect memorizing* which the lower line noticeably lags behind, this period stands as a turning point after which the *growth of outward direct memory* is particularly dynamic and which overtakes in pace the line of development of the outward instrumented operation.

An analysis of this diagram, which we have called the 'parallelogram of development' and which remains constant in all tests, shows that it is conditioned by forms that play a primary role in the development of the child's higher psychological processes. If the first stage of the child's development was characterized by the ability to mediate its memory only by turning to certain external methods (hence, the sharp rise of the upper line), and all memorizing without the aid of external signs remained in essence a direct and almost mechanical kind of keeping in mind, then at the second stage a leap forward occurs: the development of outward sign operations, generally

speaking, reaches its limit, but now the child *begins to reconstruct the inner process of remembering, unaided by outward signs. The 'natural' process becomes indirect*, the child begins to apply certain inner methods, and the sharp rise in the lower curve indicates this turning point.

In the development of inwardly mediated operations, the phase of application of outer signs plays a decisive role. The child proceeds to inward sign processes because it has already gone through the phase when these processes were on the outside. We are convinced of this by a series of individual experiments. Measuring in these the coefficient of 'natural' memorizing in the child, we carried out a series of experiments with outwardly instrumented memorizing, and then once again checked the operations which are not supported by the application of outer signs. The results, shown in figure 2,<sup>61</sup> illustrate the fact that even in experiments with a mentally retarded child, we obtain, first, a considerable growth of outwardly instrumented and then of 'direct' memorizing which, after this intermediate series of tests, renders a double or triple effect, transferring, as corroborated by analysis, the methods of outward sign operation to inner processes.

In all the operations described we observe a two-pronged process. On the one hand, the natural process undergoes radical reconstruction, being transformed into an indirect, instrumented act; and on the other hand, the sign operation itself changes, ceasing to be external and becoming transformed into the most complex inner psychological systems. This two-fold change is symbolized in our diagram by the turning point of both curves, meeting in one point and indicating the inner dependence of both these processes.

We are present at what is actually a process of the greatest psychological importance: what was an outward sign operation, i.e. a certain cultural method of self-control from without, is now *transformed into a new intra-psychological layer* and gives birth to a new psychological system, incomparably superior in content, and cultural-psychological in genesis.

The process of 'interiorization' of cultural forms of behaviour, which we have just touched upon, is related to radical changes in the activity of the most important psychological functions, to the reconstruction of psychological activity on the basis of sign operations. On the one hand, natural psychological processes as we see them in animals, actually cease to exist as such, being incorporated in this system of behaviour, now reconstructed on a cultural-psychological basis so as to form a new entity. This new entity must by definition include these former elementary functions which, however, continue to exist in subordinate forms acting now according to new laws characteristic of this whole system. On the other hand, the operation *per se* of the use of external signs is also radically reconstructed. Formerly a decisively important operation in young children, it is replaced here by essentially different forms. The inwardly instrumented process begins to make use of entirely new connections and methods unlike those that were characteristic of the outward sign operation. The process here undergoes alterations analogous to those observed in the child's transition from 'outward' speech to 'inward'. As a result of the process of

interiorization of the higher psychological operation, we have a new structure, a new function of formerly applied methods and an entirely new composition of psychological processes.

It would be most superficial to suppose that the further reconstruction of the higher psychological process, under the influence of the use of signs, takes place on the basis of the inward transfer of the entire ready-made sign operation. It would be equally incorrect to think that, in the development of the system of higher psychological processes, we have a simple superimposition of a higher stage over a lower and the simultaneous existence of two relatively independent forms of behaviour – natural and instrumented. Actually, as a result of the 'interiorization' of the cultural operation, we find a qualitatively new combination of systems that sharply distinguishes human psychology from the elementary functions of animal behaviour. These most complex interlacements are, generally speaking, as yet little known, and at present we can point to only a few of their principal and most characteristic features.

During the process of 'interiorization', i.e. the inward transfer of functions, there occurs a complex reconstruction of their entire structure. Experiments reveal that the following moments, characteristic of this reconstruction, are essential: (1) the substitution of functions; (2) the alteration of natural functions (or of the elementary processes forming a basis for, and constituting a part of, the higher function); (3) the appearance of new psychological functional systems (or systems of functions) which assume the role in the general structure of behaviour that was previously performed by separate functions.

Briefly, these three interconnected aspects may be explained by the example of the changes that occur in the higher functions of memory in the process of 'interiorization'. Even in the simplest forms of indirect memorizing, the fact of the substitution of functions is quite obviously apparent. Binet was not wrong when he called the mnemotechnique of the memorizing of a row of numbers the replica of numerical memory.<sup>62</sup> Experiments show that neither the power nor level of development of memory constitutes the decisive factor in memorizing of that sort but, rather, the activity of combination, building and changing of structures, the perception of relations, thought in the broad sense, and other processes which in this case take the place of memory *per se* and determine the structure of this activity. With the inward transfer of activity, this substitution of functions in itself leads to the verbalization of memory and, connected with it, to memorizing with the aid of concepts. Thanks to this substitution of functions, the elementary process of memorizing is moved from the place it first occupied, and yet is not fully cut off from the new operation, but uses its central position in the psychological structure and occupies a new place in relation to the entire new system of co-acting functions. Entering into this new system, it begins to function according to the laws of the whole of which it is now a part.

As a result of all these changes, the new function of memory (which has now become an inner indirect process) corresponds only in name to the elementary processes of memorizing; in its inner essence it is a new specific formation with its own special laws.

## 5 Methods for the study of higher psychological functions

The methods of the contemporary psychological experiment have always been closely tied to the general basic questions of psychological theory and have essentially always been the reflection of the way in which the principally important psychological problems were solved. Because of this, criticism of the main views concerning the essence and development of psychological processes must inevitably result in a re-examination of the basic principles of the methods of research.

The two schools of psychology described above as the school of pure spiritualism, on the one hand, and that of pure naturalism, on the other, led to the creation of two absolutely independent methods of psychological research; in due time they both acquired a certain degree of finality and both must become the subject of complete revision as soon as their philosophic basis undergoes criticism.

Thus, if the first of these saw a specific object for psychological research in the states of consciousness, proposing that these higher forms were a special property of the human spirit, closed to further analysis, then pure phenomenology, inner description and self-observation could be the only adequate methods for psychological studies. One aspect, however, proved to be fatal to spiritual attempts to create a method for the study of psychological processes: the higher psychological functions always evaded spiritualistic attempts to establish their origin and structure. They proved once and for all to be beyond the grasp of spiritualistic description *because* of their socio-historic genesis and indirect structure. These methods found a particularly unsuitable soil in child psychology, and it may be said that they suffered defeat in that field even before their philosophic premises were subjected to criticism and revision.

The second group of psychological systems proved to be considerably more stable in the sphere of child psychology. Starting from the presumption that the higher forms of child behaviour are actually the uninterrupted continuation of the forms already known through the study of animals (differing from them in their greater complexity but basically remaining the same in structure), this system found that the mechanism of responsive movement to external stimulation from environment, already well known in zoopsychology and physiology, was fully suitable as the basic mechanism of child behaviour. This relation  $S \rightarrow R$  was preserved, as these psychologists assumed, both in the simplest and in the most complex acts of behaviour, and being a universal scheme guaranteed thus the preservation of the unity of psychological studies encompassing a considerable field.

Obviously, this generalized concept of structure acquired a concrete character in the research methods which these authors considered adequate for their purposes. These methods consist historically in the simple transfer of methods applied in animal physiology and psychology to child psychology; they became generally accepted over the past decade in the majority of psychological laboratories, a decade of great progress in psychological experiments. Directed primarily at the study of those

primitive or complex responses by which the organism adapts itself to its environment, these methods always were in the type of structure already known in experiments on simple reflexes; offering the subject a stimulus, the psychologist diligently studied the reactions and regarded his task as completed if these were described in sufficient detail and with the objectivity of natural science.

This method, however, had two very doubtful aspects: first, *though objective, it was not objectivizing*: the psychologist's vital problem, that of uncovering and bringing to light the hidden psychological mechanisms with the help of which complex reactions were achieved, was here left unsolved; if the method was adequate for the study of simple reflexory acts, it was not so in the case of attempts to understand the structure of complex psychological processes. The inner methods by which the processes were carried out remained hidden, not brought to light, and the psychologist was forced willy-nilly to turn to the subject's verbal answers if he wished to know something more definite about these processes.

The second defect prevailing in the methods of 'stimulus reaction' in experimental child psychology was undoubtedly its *antigenetic attitude*. Approaching functions, that differed in complexity, and different stages in the child's history with one and the same experimental scheme, and repeating (on the child) tests that had been applied to animals, this method was fated to ignore development *per se* related to the appearance of qualitatively new formations and the interaction of psychological functions in principally new relations. Following Wundt in the stability of the methods and the repetitions of one and the same experiment in possibly constant conditions, this method of studying 'reactive' behaviour once and for all cuts itself off from the possibility of studying inter-relations specific to development.

Lastly, and we find this point important, any method built on these lines *proves inadequate for the very problems facing the study of the higher psychological functions*; while disclosing the reactive mechanism, it describes merely the subordinate category present in all processes, including the elementary psychological and thus, *a priori*, makes its study meaningless and fruitless, actually brushing aside what is characteristic of the higher psychological systems, what distinguishes them from the elementary and what makes them what they are. The peculiarity of the genesis, structure and functioning of these higher psychological processes remained, thus, quite beyond the grasp of this elementary psychological method.

In all our studies we followed a basically different route. We established, in our studies of child development, that the latter proceeded along lines leading to a radical alteration of the very structure of child behaviour, and that at each new stage the child changes not only the form of its reaction, but carries out this reaction to a considerable extent by new ways, drawing on new 'instruments' of behaviour and replacing one psychological function by another. A prolonged analysis made it possible for us to establish that development follows, first of all, a direction leading to the *indirect* character of those psychological operations which, at the first stages, were achieved through direct forms of adaptation. The growing complexity and development of forms of child behaviour are reflected in the change in the means used for fulfilling the

task, in the inclusion of formerly 'uninterested' psychological systems in the operation, and in the corresponding reconstruction of psychological processes. It can readily be seen that, as indicated above, an essential mechanism of this reconstruction is to be found in the creation and employment of a number of artificial stimuli that play an auxiliary role and permit man to master his own behaviour, at first from without and later by more complex inner operations.

It can be understood that, when the structure of psychological development is such, the process can no longer be expressed by the simple S→R scheme and the method of the simple study of reactive responses ceases to be adequate to the complexity and peculiarity of the process studied; this method, which so easily registers the subject's response, proves useless when the main problem becomes the study of the means and methods by the aid of which the subject is able to organize his behaviour in those concrete forms which are most adequate to the given task.

Directing all our attention to the study of just these (outer or inner) means of behaviour, we must undertake a radical revision of the very method of psychological experiment.

We regard the functional method of two-fold stimulation [usually referred to as 'functional *method of double stimulation*' – eds] as most adequate to our task. Seeking to study the inner structure of the higher psychological processes, we do not limit ourselves to the usual method of offering the subject simple stimuli (no matter whether elementary stimuli or complex tasks) to which we expect a direct response; we simultaneously offer a second series of stimuli which must play a functionally special role, serving as a means by which the subject can organize his own behaviour. In this way, we study the *process of accomplishing a task by the aid of certain auxiliary means*, and the whole psychological structure of the act thus proves to be within our reach over the entire course of its development and in all the variety of each of its phases. Examples of our experiments, noted above, show that this way of *bringing auxiliary means of behaviour* to the surface permits the tracing of the entire genesis of the most complex forms of higher psychological processes.

Whether we are studying the development of memorizing in the child, furnishing it with external auxiliary means for this task and observing the degree and character of indirect mastering of the task, or whether we use this method in studying how the child organizes its active attention with the aid of certain external means, or whether we are tracing the development of infant calculation, making the child manipulate some outer objects and applying methods either suggested to the child or 'invented' by it – in all cases we follow one principal route, studying *not only the final effect of the operation, but its specific psychological structure*. In all these cases the psychological structure of the developing process appears with much greater richness and variety than in the classic method of the simple 'S→R' experiment.

We believe two points are worthy of particular mention. If the method of 'stimuli reaction' were an *objective* psychological method, limiting its studies only to those processes which in man's behaviour were already external, then our method may in all truth be qualified as *objectivizing*: its main attention focuses immediately on inner

psychological methods and structures hidden from direct observation. And considering the study of these to be its task, by bringing to the surface the auxiliary operations with the help of which the subject masters this or the other problem, it brings them within reach of objective study; in other words, it objectivizes them. We regard the objectivization of inner psychological processes as incomparably more correct and adequate, where the goals of psychological research are concerned, than the method of studying ready objective responses, for only the former guarantees scientific research the actual exposure of specific forms of higher behaviour as opposed to subordinate forms.

In one respect the method we applied differs sharply from those that prevailed in contemporary child psychology. Whereas the experiment was usually isolated from the comparative-genetic method of study, focusing only on the relatively stable forms of behaviour, while the comparative-genetic method was usually detached from the experiment, we follow a reverse course combining both these lines of research in an integral *experimental-genetic method*. By employing the method of two-fold stimulation, we are able to offer the subject tasks geared to differing phases of development and to provoke in reduced form those processes of mastering tasks which allow us to trace, in the experiment, consecutive stages of psychological development. By shifting the difficulty of our requirements, exposing the methods by which the task is mastered, and by prolonging our experiment over a number of consecutive series, we find ourselves capable of tracing in laboratory conditions the *process of development in all its basic features* and, hence, of arriving at an analysis of the factors that take part in it. By including and excluding speech from the operation, by giving the subject signs and means which he previously never used, by depriving the already developed subject of these signs, we obtained a sufficiently comprehensive idea of separate stages of development, their typical peculiarities, sequence, and also the main structural laws of the higher psychological systems.

With the application of a series of experimental-genetic methods, the psychology of childhood for the first time poses a number of concrete questions pertaining to the genesis of the higher psychological structures and to the structure of their genesis itself.

In our experimental researches there is no mandatory need to proceed each time by presenting our subject with ready-made external means with the help of which he must solve a given problem. The basic outline of our tests does not suffer in the least if, instead of giving the child ready-made external means, we wait until it applies spontaneously some kind of auxiliary method, incorporating in its operation some kind of auxiliary system of symbols.

A considerable part of our experiments was carried out following the above method. When asking our subject to memorize something (stimulus), we suggest that he draw something to make the subject to be memorized more easily kept in mind (auxiliary symbol). We thus created conditions for the reconstruction of the psychological process of memorizing and the application of given auxiliary means. Without furnishing the child with ready-made symbols, we were able to follow in the

spontaneous unfolding of the methods applied, how all the essential mechanisms of the child's complex symbolic activities were manifested.

The best examples, perhaps, of this method of active instrumentation, are our tests with the use of *speech* and the reconstruction, with its help, of the whole structure of child behaviour.

If speech was usually observed either as a system of reactions (behaviourists) or as a means leading to the comprehension of the subject's inner world (subjectivists), we regard speech as a system of auxiliary symbols, i.e. means that help the child to reconstruct its own behaviour. Observations pertaining to the genesis and active application of these means simultaneously allow us to trace the actual social roots of these higher psychological processes and to furnish an analysis of the part played by indirect operations at various stages of child development.

Everything we have said concerning the specific character of the method we applied leads to one conclusion: this method makes it possible to extricate ourselves from the predicament in which psychology has found itself due to the collision of the spiritualistic and mechanistic concepts. While the first of these inclined psychologists to a simple description of spontaneous behaviour, considered as a special and irreducible form of 'vital processes', and while the second led to the study of *reactive* behaviour which in essence represented an experimental mechanism, already present at the lowest stages of the genetic ladder, our approach to the issue leads us to the study of a special form of human behaviour, differing both from the spontaneous and the reactive processes. We see this particular form in those indirect (higher) psychological functions which arose historically (as opposed to being the product of the free spirit) and which transferred behaviour from elementary to the higher forms, creating from the elementary forms of animal behaviour the complex behaviour of civilized man.

## 6 Conclusions

### *The problem of functional systems*

We have come to the end of the exhausting study of the main aspects of the evolution of practical intellect in the child and of the development of its symbolic activity. We must now only group together and generalize the conclusions which our research has led us to reach. We must sum up theoretically our analysis of the problem of development of practical intellect and point out such important theoretic and methodic conclusions which may be drawn from a series of such investigations, each of which is devoted to one or another particular problem.

If we attempt to embrace in one glance everything that has been said until now concerning the evolution of practical intellect in the child, we may note that the basic content of this evolution boils down to the following: instead of one and, what is more, one simple function of practical intellect, as observed in the child prior to its

mastering speech, there appears in the process of development another form of behaviour, complex in content, multiple and composed of different functions.

As our studies show, there occurs not only an inner reconstruction and perfecting of separate functions in the process of psychological development in the child, but the intra-functional ties and relations are also altered in the most radical way. As a result of these changes, new *psychological systems* appear which unite in complex co-operation and in complex combinations various separate elementary functions. Lacking a better definition, we call these psychological systems, these units of a higher order that take the place of homogeneous, isolated elementary functions the *higher psychological functions*.

Everything that has been said up to now compels one to acknowledge that the real psychological function which, in the process of child development, replaces its elementary practical intellectual operations, cannot be defined otherwise than as a psychological system. This concept includes the complex combination of symbolic and practical activity which we have consistently insisted upon, the new co-relation of single functions characteristic of man's practical intellect, and the new unity which this heterogeneous whole is brought to in the process of development.

Thus, we arrive at a conclusion diametrically opposed to that reached by Thorndike in his investigation of intellect. As is well known, Thorndike's starting point is the assumption that higher psychological functions are nothing else but the further development, by way of quantitative growth, of associative connections that are of the same nature as those at the basis of elementary processes. In his opinion, phylogenesis, as well as ontogenesis, displays a principal identity of the psychological nature of the ties underlying the lower and higher processes.

All our investigations contradict this assumption. They compel us to acknowledge that ties of a different nature characterize the specific new formations which we call psychological systems or higher psychological functions. Since Thorndike's concept is, as he personally admitted, directed against the traditional dualism in the teachings of the lower and higher forms of behaviour, and since the problem of overcoming this traditional dualism is one of the fundamental methodological and theoretical problems of modern scientific psychology, we must dwell on the question as to what kind of answer to this problem (dualism or the unity of higher and lower functions) can be furnished in the light of our experimental studies.

But first we must clarify one point so as to prevent any misunderstanding from arising. Objections against Thorndike's theory could be directed primarily along lines which in this case are not our prime source of interest, that is, an exposure of the general incompetence of the associative point of view and of the entire mechanistic concept of intellectual development maintained and based on this viewpoint. We do not intend to touch on that issue here, for our interests lie in a different area. It matters little whether or not we acknowledge the associative or the structural character of psychological functions, for the main problem remains no less vital: can the higher psychological functions be equated to the lower ones in their essentials, basic laws; are they only a more complex and intricate expression of the same laws that prevail

in the lower forms, or are they in their very essence, constitution and method of activity the result of the effect of new laws unknown to the elementary forms of behaviour?

We are of the opinion that the solution of this problem is related to that change of principle viewpoint in contemporary psychology upon which Lewin<sup>63</sup> insists and which he defines as the transition from the 'phenotypical to the conditional-genetic' point of view. Further, we believe that psychological analysis, penetrating beyond the external manifestation of phenomena and revealing the inner structure of psychological processes and, particularly, the analysis of the development of higher forms, compels us to acknowledge *the unity, but not the identity, of higher and lower psychological functions.*

That the problem of the dualism of lower and higher functions continues to exist during the transition from the associative to the structural point of view, is confirmed by the fact that a non-stop argument is going on among structural psychologists concerning two different outlooks on the nature of the higher processes. Some insist on the acknowledgement of two different types of psychological processes and arrive at a strict division of two principal forms of activity, one of which is usually determined as a responsive type and the other as a spontaneous type of activity, the decisive point of which is that it originates in the given individual. They defend the assumption that in psychology we are compelled to proceed from a dualistic understanding of both processes in principle. As they put it, a living creature is not only a system that meets with stimuli, but also a system that pursues aims (Ch. Bühler).

An opposing point of view is presented by those who are against a sharp division of the higher (spontaneous activity) and lower (responsive activity) processes. They attempt to demonstrate that the clear-cut dualism, the metaphysical opposition between the two types of activity which is usually stressed, in reality is non-existent. They try to reveal the responsive character of many aspects of the spontaneous forms of behaviour and, in responsive processes, the active character of aspects depending upon the inner structure of the system itself. They show that in so-called spontaneous processes the organism's behaviour also depends on the character of stimulus and, vice versa, in responsive processes behaviour also depends on the inner structure and state of the system itself. Some of them, as for instance Lewin, see the solution of this problem in the concept of 'needs', i.e. in the fact that objects of the external world may have a definite relation to needs. They may have a positive or negative 'Aufforderungscharakter'.<sup>64</sup>

We see thus that the refutation of the associative theory and the adopting of the structural point of view does not by itself solve the problem without calling for a special investigation, but rather evades it. True, the new point of view helps overcome the metaphysical character of traditional psychological dualism and acknowledges the principal unity of higher and lower functions as related to inner and external features active in both processes. But inevitably there arises here two new problems to which we find no principal answer in the solution usually offered.

The first problem is that the external and inner elements, although of necessity present in both types of processes, may differ in their specific part in each given case and, consequently, may in a qualitative manner determine the whole process of behaviour. Must we or must we not separate the higher processes as compared to the lower – not metaphysically, but empirically? And the second problem manifests itself in the fact that the division between spontaneous and responsive forms of behaviour may not coincide with the division between actions guided chiefly by inner needs and actions guided by outer stimuli.

*The use of tools in animal and human behaviour*

Investigations show that genetically, functionally and structurally the higher processes are so considerably specific that they must be grouped in a special class; but the separation of higher and lower functions does not coincide with the division of the two types of activity mentioned above. We can speak of a higher form of behaviour whenever a person masters his own behavioural processes (in the first place, when the person can control his reactions). The individual, subjecting the process of his own responses to his will, thus enters into a principally new relation with the environment, arrives at a new functional use of environmental elements as stimuli signs, by means of which relying on external means, he guides and regulates his own behaviour externally masters himself externally forcing the stimuli signs to influence him and to provoke and stimulate the desired responses. Inner regulation of purposeful activity originates an external regulation. Responsive action provoked and organized by man himself ceases to be responsive and becomes purposeful.

In this sense, the phylogenetic history of man's practical intellect is closely tied, not only to mastering nature, but also to mastering himself. The history of labour and that of speech can scarcely be understood without each other. Man not only invented tools, by means of which he conquered nature, but he invented also stimuli that motivated and regulated his own behaviour and by means of which he subjugated his own forces to his will. This becomes apparent at the earliest stages of the development of man.

'Thus, on Borneo and the Celebes,' says Bücher,<sup>65</sup> 'special sticks made to dig the soil were found, each having a small stick attached to its top part. When the digging stick is used as a hoe to sow rice, the small stick produces a sound.' This sound is something like a work call or command, the aim of which is to produce a rhythmic pattern to regulate work. The sound of the small stick, fixed atop the hoe stick, replaces the human voice or, at any rate, performs an analogous function.

This intertwining of sign and tool which found its concrete symbolic expression in a primitive hoeing stick shows how early the sign (and later, its highest form, the word) begins to participate in the use of tools by man, and how early it begins to fulfil a highly specific function, to be compared with nothing else in the general structure of these operations that stand at the very beginning of the development of human labour. This stick is fundamentally different from that used by apes, although

without doubt they are related to each other genetically. If we ask ourselves in what does this fundamental psychological difference between man's tool and that of an animal rest, we must answer this question with yet another question, first formulated by Köhler in connection with his discussion of a chimpanzee's activities, activities geared to the future and guided by a notion of the external conditions that must manifest themselves in the near or distant future. Köhler asks: to what limitation of capacities in the chimpanzee must we ascribe the fact that they do not demonstrate even the slightest element of cultural development, this notwithstanding evidence of them manifesting many elements usually found only in civilization (even if they be the most primitive)?

'The most primitive man,' continues Köhler, further developing his thought, 'makes a stick to dig with even when he does not intend to start digging immediately, when the objective conditions for the use of tools are not as yet apparent in any tangible way. The fact that he makes the tool in advance is without the least doubt related to the beginning of culture.'<sup>66</sup>

The activity of man, as it appeared in the process of historico-cultural development of behaviour, is a free activity, i.e. not depending on direct needs and the immediately perceived situation; it is an activity geared to the future. In contrast, as Köhler noted elsewhere, apes are to a much greater extent slaves of their field of vision than adult human beings. All this must have a foundation, and obviously this foundation is at the same time the most reliable criterion for the genetic, functional and structural division between the two types of activity mentioned above. But our studies induce us to advance, instead of a metaphysical foundation for this division, a historical one which is also in full harmony with the facts noted by Köhler in the behaviour of a chimpanzee. Thus, there are two types of activity between which the psychologist must discriminate in principle: one is the behaviour of animals, the other that of man; activity as a product of biological evolution and activity originating in the process of man's historical development.

The temporality of life, cultural development, work – in short, everything that distinguishes man from animals in the psychological field – all this is intimately related to the fact that, parallel to his conquest of nature over the course of his historical development, man also mastered his own self, his own behaviour. The stick mentioned by Bücher is a stick for future use. This is already a work tool. As Friedrich Engels so aptly put it, 'labour created man himself',<sup>67</sup> i.e. created the higher psychological functions which distinguish man as man. Primitive man, using his stick, by means of outer sign masters the processes of his own behaviour and subordinates his activity to the aim which he forces external objects to serve: tool, soil, rice.

In this sense, we may once more touch on Koffka's remark, briefly noted earlier. He asks: is there any sense in calling the actions of a chimpanzee in Köhler's experiments volitional actions? From the point of view of old psychology, this activity, being non-instinctive, non-automatized and, what is more, intelligent, must without doubt be classed as volitional action. But new psychology answers this question in the negative – and with reason. In that sense, Koffka is absolutely right.

Only man's action, subordinated to his will power, can be qualified as volitional action.

In his excellent analysis of the psychology of purposeful activity, Lewin makes a clear-cut definition of free and volitional intention as a product of the historico-cultural development of behaviour and as a specific feature of man's psychology. He says:

The fact that man displays extraordinary freedom in what concerns the formation of any, even the most senseless intention, is astounding in itself . . . This freedom is characteristic of cultural man. It is incomparably less characteristic of a child and, probably, of primitive man, too; there is reason to believe that this, more than his highly developed intellect, distinguishes man from the animals which stand closest to him. This division corresponds to the problem of self-control (*Beherrschung*).

The development of this 'freedom of action', as we have tried to show above, is in direct functional dependence on the use of signs. The specific world-action relation which we have constantly been studying, occupies a central place in the ontogenesis of practical intellect in man, this notwithstanding the fact that in the field of higher functions ontogenesis repeats phylogenesis to an even lesser degree than in the field of elementary functions. Anyone who from this point of view follows the development of free action in the child will agree with K. Bühler's statement that the history of the development of child volition has not yet been written. In order to lay the foundations of this history we must first of all establish this relation between word and action, which lies at the beginnings of the formation of the child's will. Simultaneously this will signify the first resolute step along the way to the solution of the problem of the two types of human activity which we have mentioned above.

#### *Word and action*

To certain psychologists the ancient biblical 'In the beginning was the Word' retains all its fascination. New investigations, however, do not leave any doubt as to the fact that the word does not stand at the beginning of the development of the child's mind.

As Bühler correctly notes along the same lines: 'It was said that speech stands at the source of man's coming to be; perhaps this is true, but prior to speech there is instrumental thinking (*Werkzeugdenken*)'. Practical intellect is genetically more ancient than verbal; action precedes the word, even intelligent action precedes the intelligent word. Now, however, while repeating this thought, very true in itself, there is a tendency to overestimate action at the word's expense. The most common approach is to conceive the relation between word and action (independence of action from the word and primacy of action) characteristic of early age, as remaining thus during all the following stages of development and throughout life. Bühler is more cautious than most others, but he too expresses the general opinion, formulating this thought as follows: 'In man's later life, too, his technical, instrumental thinking is related to speech and ideas to a much lesser degree than other forms of thought'.<sup>68</sup>

This certitude is based on a false assumption that the first relations between isolated functions remain unchanged throughout the process of development. Meanwhile, investigation shows the opposite. At each step it makes us admit that the entire history of the development of higher psychological functions is nothing else than the alteration of primary interfunctional relations and ties, and the appearance and development of new psychological functional systems. This, among other things, applies one hundred per cent to our subject of interest, i.e. the interfunctional relation between word and action.

Together with Gutzmann,<sup>69</sup> we say: 'Even if we, following Goethe, refute the "word's" high value *per se*, that is, the "sounding" word's,<sup>70</sup> and if we translate together with him the biblical dictum as "in the beginning was the deed", it is nevertheless possible to read this verse (understanding it from the point of view of historical development) thus: "*in the beginning* was the deed"'.<sup>71</sup>

But Gutzmann makes a different mistake. Objecting on legitimate ground to Liepmann's<sup>71</sup> doctrine of apraxy, which treats the relation between action and speech and their disturbance in apraxy and aphasia as the relation of the general to the particular, Gutzmann adopts a position that presents the word and action as being completely independent of each other. Liepmann sees aphasia only as a particular case of apraxy, and speech, as a specific type of movement, is only a particular case of action in general. Gutzmann quite justly objects to this concept which merges the word, as a specific function, with the general notion of action. He points out that only action as a more general concept can embrace, on the one hand, expressive movement (speech) and, on the other, actions as co-ordinative, parallel, co-ordinate, co-relative and more particular concepts. To conceive of speech as a partial case of action means to lean upon a philosophically and psychologically erroneous point of view/definition of the concept of action.

This concept, according to which speech and action are logically parallel and independent processes, inevitably leads to an antigenetic point of view, the repudiation of development, to a metaphysical affirmation of the parallelism and, hence, the absence of meeting, of speech and action, as an eternal law of nature, and finally, to an attitude that ignores the capacity for changeability of a system's functional ties and relations. Gutzmann, as he admits himself, adopts the viewpoint of historical development for a minute but only in order to distinguish between what occurred first and what later. He changes nothing in the biblical dictum on the beginning of things except the logical accent. He is interested in what came first and what followed later, what belongs to the more primitive elementary lower forms of behaviour and what should be classed among the more developed complex and higher functions. 'Speech', says he, 'always signifies a higher stage of man's development than even the supreme expression of action - the deed (die Tat).'<sup>72</sup>

But at the same time Gutzmann, like the majority of authors, adopts an attitude of formal logic. He looks upon the relation of speech to action as an object, not as a process; he sees it as static, not dynamic in motion; he considers it as eternal and unchangeable, although it is historical and at every stage of development takes on a different concrete form. All our investigations in this field lead us to believe that there

cannot exist one single formula to embrace the great multiformity of these relations between speech and action at all stages of development and in forms of disintegration. The real dialectical character of development of functional systems cannot be adequately reflected in any one constructive, formal, logical, scheme of relation of concepts – neither in Liepmann's nor in Gutzmann's, for both ignore the *movement* of concepts and processes, the changeability of relations, the dynamics and dialectics of *development* underlying them.

'Practically accomplished action as such,' says Gutzmann formulating his thought, 'has nothing in common with speech, even if we take this word in its broadest sense'.<sup>73</sup> If this approach is true for the beginning of development and characterizes the primary stages in the development of action, it becomes fundamentally false when applied to the later stages of the same process. It reflects one aspect but not the process as a whole. Therefore the theoretical and clinical conclusions which may be drawn from this approach are true for only a very limited sphere, namely the sphere of the first stages of development of the relations we are interested in; and to portray them as characteristic of the process as a whole means to fall inevitably into an irreconcilable contradiction with factual data pertaining to the development and disintegration of higher forms of action. Let us dwell on this contradiction between theory and facts.

Gutzmann sees the basic difference between act and word in the fact that a volitional act, which he, like Wundt, considers as an affect, 'is a clearly expressed unilateral personal attitude of the acting individual to the outer world';<sup>74</sup> the communication of inner states, so characteristic of speech and all types of expressive movements, sinks here into the background and is of a secondary significance.

While the inner character of an action is chiefly personal and egocentric (even in the case of altruistic purposes), the nature of an expressive action is the opposite. Even when following a selfish purpose, it displays, as it were, a kind of altruism, or, using a notion from Comte's doctrine<sup>75</sup> so as to separate it from the usual meaning of this word, a kind of tuism (Tuismus): it is 'tuistic', it inevitably ['eminently' – eds] is of a social character.<sup>76</sup>

But the most remarkable point of what occurs during the process of development of action and word is bypassed: the appearance of *egocentric* speech and *tuistic* action, the transformation of the social method of behaviour into a function of individual adaptation, the inner reorganization of action by means of the word, the social nature of all higher psychological functions, including practical action in its highest forms. It is not astonishing, then, that a volitional act is equated here to affect, with the difference that it leads to external changes that destroy the affect itself. Self-control as the essential inner moment of a volitional action remains beyond the experimenter's field of vision. The new relation of action to personality which arises thanks to the word and leads to the mastering of action; the new attitude of the acting individual to the outer world, manifested in free action directed and guided by the word – all this does not appear at the beginning of the process of development and is therefore not taken into consideration at all.

Yet we were able to observe on a factual basis how, in the process of development, the child's action becomes social, and how, in losing speech because of aphasia, its practical action falls to the level of its elementary zoopsychological form.

He who pays no attention to these facts inevitably presents the psychological nature of speech and of action in a false light, for the source of their changes rests in their functional junction. Anyone who ignores this fundamental fact and who, having the purity of concept classification as his purpose, tries to represent speech and action as two never-meeting parallels, willy-nilly limits the real scope of both concepts because this scope of content is rooted first and foremost in the ties of both of them.

Gutzmann limits speech to expressive functions, communication of inner states, communicative activity. The entire individual-psychological aspect of speech, all the word's reformative inner activity are simply ignored. If this parallel and independent relation between speech and act were preserved throughout the entire process of development, speech would be powerless to change anything in behaviour. The affective aspect of the word is mechanically excluded, therefore there inevitably arises an underestimation of volitional action, action in its highest forms, that is, action tied to the word.

The essence of the matter, as demonstrated in investigations of these ties between word and action in child-age and in cases of aphasia, lies in the fact that speech lifts action to its highest stage, action that was previously independent of it. Both the development and the disintegration of higher forms of activity corroborate this fact. Contrary to Liepmann's concept of aphasia as a particular case of apraxy, Gutzmann asserts that 'apraxical disorder must be placed parallel to aphasia'.<sup>77</sup> It is not difficult to see in this a direct continuation of his fundamental ideas concerning the independence of action and speech. But clinical data pertaining to speech contradict this point of view. The disorder of higher forms of action tied to the word, the disintegration of these higher forms, coupled to a cutting off of the action and its functioning according to independent primitive laws, in fact, the reversion to a more primitive organization of action during aphasia and its fundamentally important sinking to a lower genetic level, something we were able to observe in all our experiments – all this shows that the pathological disintegration of action and speech, as in their genetic construction, does not proceed along two independent, never-meeting parallel lines.

We have, it seems, dwelt sufficiently on this problem in the previous treatment of our topic; as a matter of fact, our entire article was devoted to this problem. Now it is only a question of concentrating its contents into one concise formula which would express with the greatest possible exactness the essence of everything we have found in our clinical and experimental investigations of higher psychological functions in their development and disintegration, and, in particular, in investigations of practical intellect.

We cannot dwell, as should be sufficiently obvious from the preceding passages, on either the evangelical or Goethean formula, no matter which word we accentuate. But we must remark that all these formulae, Gutzmann's included, necessarily

require a continuation. Each speaks about what occurred at the beginning. But what happened later? The beginning is only a beginning, i.e. the starting point of movement. The process of development *per se*, however, must by necessity include a denial of this starting point and movement toward higher forms of action lying not at the beginning but at the end of the whole process. How does this process occur? The attempt to answer this question induced us to write this article. In it we have tried to show how the *word*, becoming intellectualized and developing on the basis of *action*, lifts this action to a supreme level, subjects the child to its power, stamps it with the seal of will. But since we wanted to express all this in one short formula, in one sentence, we might put it thus: if *at the beginning* of development there stands the act, independent of the word, then at the end of it there stands the word which becomes the act, the word which makes man's action free.

### Notes

This is the English language original given to Michael Cole by Alexander Luria in the early 1970s for publication by an international publisher. This publication did not take place, and the manuscript was conveyed by its owner Professor Cole for publication in the present volume. Judging by a number of characteristics, the manuscript was designated to appear in the *Handbook of Child Psychology* (C. Murchison, ed.), but was never published. A remark mentioning that a manuscript of the present title was sent to the *Handbook* in 1930 appears in Vygotsky's bibliography of 1934 (see *Mysblenie i rech*, 1934, p. 322). A version appeared in Russian in Volume 6 of *Sobranie Sochinenii* of Vygotsky in 1984 (see Van der Veer and Valsiner, 1991, p. 188). All through these notes, we will make comparisons between the present English text and the Russian version (henceforth referred to as such), indicating discrepancies and editorial changes traceable in the two. In some cases, the corresponding Russian expression is inserted into the present text, and the English phrasing altered accordingly (as marked by editorial comments). In accordance with the designation in Vygotsky's *Mysblenie i rech*, the co-authorship of Alexander Luria is restored in the present printing.

- 1 This quote seems to be taken from Carl Stumpf's speech at the first meeting of the Berlin Society for Child Psychology, and is reported on p. 1 of Groos, K. 1921: *Das Seelenleben des Kindes*. Berlin: Reuther & Reichard.
- 2 In the English manuscript, 'evolves' was replaced by 'is presented' by an editor. We adhere to the original which is matched in the Russian version (p. 7).
- 3 An editor's change to 'recent experimenters' is changed back to the original 'new investigators', which matches the Russian version (p. 8).
- 4 An editor of the English manuscript had inserted 'activity' after 'child', which is eliminated (also absent in the Russian version, p. 8).
- 5 Refers to pp. 48-9 of Bühler, K. 1929: *Abriss der geistigen Entwicklung des Kindes* (4th and 5th enlarged edn). Leipzig: Quelle & Meyer.
- 6 *Ibid.*, p. 51.
- 7 *Ibid.*, p. 51.
- 8 Refers to Lipmann, O. and Bogen, H. 1923: *Naive Physik*. Leipzig: J. A. Barth.
- 9 An editor of the English manuscript had inserted 'is due' here; we revert to 'proceeds due' as it also fits with the idea in the Russian version (p. 10 - *prodvigaetsia vpered*).

- 10 See p. 89 of Lipmann and Bogen (1923).
- 11 See p. 100 of Lipmann and Bogen (1923). However, the authors italicized the word 'behaviour' and used 'learning' instead of 'teaching'.
- 12 The reference to the book (unidentified here) by (Luise?) Schlüter is absent from the Russian version, p. 11.
- 13 Reference here is made to Brainard, P. P. 1930: The mentality of a child compared with that of apes. *Journal of Genetic Psychology*, 37, 268-92.
- 14 Brainard, 1930, p. 289: 'A three-year-old child has approximately the same difficulties in solving the problems as did Köhler's apes'.
- 15 Reference is made to the research group of M. Ia. Basov (or Bassow, in German transliteration). For further information about the work of Basov and his research group, see Valsiner, J. 1988: *Developmental Psychology in the Soviet Union*. Brighton: Harvester Press (ch. 5); as well as a series of special issues of *Soviet Psychology* (1991, 29, No.'s 5 and 6) by the present editors.
- 16 S. A. Shapiro and E. D. Gerke (or Guerke, as given here) were Mikhail Basov's co-workers, whose experimental techniques served as one of the bases for Vygotsky's notion of 'method of double stimulation'. The reference in the text is to Shapiro, S. A. and Gerke, E. D. 1930: The process of adaptation to environmental conditions in a child's behaviour. In M. Ia. Basov (ed.), *Ocherednyie problemy pedologii* (pp. 73-111). Moscow-Leningrad: Gosudarstvennoe Izdatel'stvo. In English translation see *Soviet Psychology*, 1991, 29, 6, 44-90.
- 17 Shapiro and Gerke, 1991, p. 56.
- 18 *Ibid.*, p. 89.
- 19 Guillaume, P. and Meyerson, I. 1930: Recherches sur l'usage de l'instrument chez les singes. I: Le probleme du détour. *Journal de Psychologie*, 27, 177-236.
- 20 Here is the first major discrepancy between the English original text printed here and the Russian version. The English original text continues directly to the next sub-part, while the Russian version of 1984 includes a number of pages that are word-for-word repetitions of parts of text that occurs later. Most probably these repetitions were a result of editorial manipulation of the Russian text in the 1970s/1980s, since the following exact repetitions occur (references to the pages of the published Russian version): pp. 14-15 are a repetition of pp. 69-70; pp. 15-16 of pp. 74-5 and pp. 16-17 of pp. 71-2.
- 21 This is a reference to Yerkes, R. M. and Learned, B. W. 1925: *Chimpanzee Intelligence and its Vocal Expressions*. Baltimore: Williams & Wilkins.
- 22 See pp. 135-6 of Stern, W. 1927: *Psychologie der frühen Kindheit*. Leipzig: Verlag von Quelle und Meyer.
- 23 In the English manuscript, an editor had introduced 'tools' instead of implements; in the present version the original wording is restored. In the Russian text (p. 22), the word used is *orudie*.
- 24 Roza E. Levina was one of the few co-workers closely related to the tradition of Vygotsky and Luria (see Levina, R. E. and Morozova, N. G. 1984: Memories of L. S. Vygotsky. *Defektologia*, 5, 81-6). Being mostly interested in defectology, Levina performed experiments with children that bridged the difference between the work of Shapiro and Gerke [see note 16] and Vygotsky's theoretical insights. The particular kind of experiment referred to here can be found described in Levina, R. E. 1968: Ideas of L. S. Vygotsky about the planning speech of the child. *Voprosy psikhologii*, 14, 4, 105-15; English translation under the same title in J. V. Wertsch (ed.) 1981: *The Concept of Activity in Soviet Psychology* (pp. 279-99). Armonk, NY: M. E. Sharpe.

- 25 The word 'inculcation' is used in the English original; the Russian version gives the meaning as 're-construction ['perestroika'] of the laws ['zakonov'] of the visual field' (p. 23).
- 26 In the Russian version: *opredelennaia gruppy detei* with the connotation of 'special' (rather than 'given'). See Russian version, p. 23.
- 27 The use of 'moments' here is retained along the wording of the original English manuscript (also corroborated by the Russian text, p. 23); a better meaning here would be 'periods'.
- 28 In Russian *rechevoye myslenie*, i.e. thinking with the help of (and on the basis of) speech.
- 29 Watson, J. B. 1924: *Psychology from the Standpoint of a Behaviorist*. Philadelphia: J. B. Lippincott – Chapter 9: The genesis and retention of explicit and implicit language habits. See especially pp. 343–56.
- 30 The work of Sir Henry Head (1861–1940) in neurology [e.g. see Head, H. 1920: *Studies in Neurology*. London: Frowde, Hodder & Stoughton.] was a relevant source for Vygotsky and Luria. The reference here is probably to Head, H. 1926: *Aphasia and Kindred Disorders of Speech*. 2 vols. Cambridge: Cambridge University Press.
- 31 Given as in the original English text, fits the Russian (*v geneticheskom plane*) meaning 'from the viewpoint of development'.
- 32 In the Russian version: *slozhnyie i neorganizovannyie massivyye praksicheskie deistvii*.
- 33 In the Russian version, the code-switching to German 'werden' (to become) has been replaced by Russian *protsess stanovlenia* (p. 27).
- 34 Allusion here seems to be to the Köhler-type experiments with children, who use speech concurrently with action (see references in notes 16 and 24).
- 35 Clarified on the basis of the Russian version, p. 34.
- 36 In the Russian version (p. 36): *funktsia otrazhenia i sozdanie slepka s situatsii*.
- 37 In the original manuscript, reference (in footnote) is made to Köhler's article in French: 'W. Köhler. La perception humaine. *Journal de Psychologie*, 1929'. The accurate bibliographical reference of this article is *Journal de Psychologie*, 1930, 27, 1–2, 5–30. (It appears with the correct year of publication also in the text of the Russian version, p. 38.)
- 38 In the Russian version (p. 39) the reference to Stern is dated 1922. The issue referred to – personal construction of perceptual images – is treated in Stern, W. 1919: *Die menschliche Persönlichkeit*. Leipzig: J. A. Barth. For English-language summary, see: Stern, W. 1938: *General Psychology from the Personalistic Standpoint*. New York: MacMillan (pp. 179–83).
- 39 'In these tests we used Stern's original pictures which, owing to their dynamic qualities, allowed for an adequate perception by the child in pantomime form' [original footnote].
- 40 The text from here until the next sub-heading ('The separation of the primary unity of the sensori-motor functions') is absent from the Russian version (p. 41). Instead, a Russian editorial footnote asks the reader to return to chapter 1, where the following text is indeed reproduced on pp. 17 (4th paragraph) – 18 (except for the last paragraph).
- 41 Lia Solomonovna Gueshelina (born 1892) is described in a commentary to the Russian version (p. 348) as 'a pedagogue, a specialist in pre-school education'.
- 42 Refers to Jaensch, E. R. 1923: *Über den Aufbau der Wahrnehmungswelt und ihre Struktur im Jugendalter*. Leipzig: Barth.
- 43 In the original manuscript, reference is made in a footnote to: 'A. R. Luria. Die methode der abbildenden Motorik. *Psychologische Forschung*, Bd. 12, 1929'; followed by a reference to Luria's 'Affection, conflict and will. New York: Liveright, 1931'. These

- references are eliminated from the Russian version (p. 43). The correct bibliographic references to these works are Luria, A. R. 1929: *Die Methode der abbildende Motorik bei Kommunikation der Systeme und ihre Anwendung auf die Affektpsychologie. Psychologische Forschung*, 12, 127-79; and Luria, A. R. 1932: *The Nature of Human Conflicts, or Emotion, Conflict and Will*. New York: Liveright.
- 44 In the Russian version, the 'we' form of reference is preserved (p. 43 - while Alexander Luria's role in co-writing the text is eliminated). The experiments referred to here were performed by Luria, and the given form of reference to them indicates the co-written - by Vygotsky and Luria - nature of this manuscript. Undoubtedly, though, Luria played the role of the second author in this text.
- 45 In the original manuscript, reference is here made (in a footnote): 'A detailed analysis of the corresponding stages of mastering signs is described by N. G. Morozova in her article "A psychological analysis of the reaction of choice", in Proceedings of the Psychological Laboratory, Academy of Communist Education'. This footnote is not included in the corresponding locus in the Russian version of text (p. 45). This direction of Morozova's experimental work was directly related with Alexander Luria's investigations (see note 43 for Luria, 1932, p. 388).
- 46 The following compositional division (usual in Russian texts of the 1920s) does not appear in the Russian version of the text in a corresponding location (p. 46).
- 47 In the Russian version, the reference is made to G. Kafka (p. 47).
- 48 We have been unable to locate this reference.
- 49 Footnote in the original manuscript: 'With the transition to these artificially established demands, the emotional centre of the whole situation is shifted *from the aim* to the *solution of the task*. In essence, the situation of the "task" (Aufgabe) in experiments with apes exists only in the eyes of the experimenter: as far as the animal is concerned there exists only the bait and obstacles standing in the way of possessing it. The child strives, above all, to solve the given problem, thus entering a world of entirely different purpose-relations. Due to the possibility of forming quasi-needs, the child proves to be capable of *breaking down* the operation, transforming each of its separate parts into an independent problem which he formulates himself with the help of speech.' (This footnote, without italics and the use of the German 'Aufgabe', also appears in the Russian version, p. 49).
- 50 This sentence is corrected on the basis of the idea as expressed in the Russian text (p. 56).
- 51 Figures A, B and C are absent from the Russian version (p. 57).
- 52 In the Russian version (p. 58) instead of plural ('our laboratories') the singular ('our laboratory') is used.
- 53 In the Russian version (p. 60), the expression is 'ourselves and our colleagues'.
- 54 This scheme is absent from the Russian version (p. 63).
- 55 Here in the Russian version (p. 63) the singular form ('our laboratory') is used. In the original manuscript, the footnote reads: 'See A. N. Leont'ev, The development of memory. Proceedings of the Psychological Laboratory of the Academy of Communist Education, No. 5, 1930.' In the Russian version, this reference is substituted by reference to Leont'ev's book *Development of Memory*. Moscow, 1931 (p. 349). The full bibliographic reference of the latter is: Leont'ev, A. N. 1931: *Razvitie pamiati. Eksperimental'noe issledovanie vysshikh psikhologicheskikh funktsij*. Moscow-Leningrad: Uchpedgiz.
- 56 In the Russian text: 'our laboratory'.
- 57 Reference to Ernst Cassirer is absent from the corresponding locus in the Russian text (p. 66). The reference is to the classic work by Cassirer: Cassirer, E. 1929/1977: *The Philosophy*

- of *Symbolic Forms*. Vol. 3: *The phenomenology of knowledge*. New Haven: Yale University Press. Kant's *facultas signatrix* is mentioned on p. 210 of this book in the chapter 'Toward a pathology of the symbolic consciousness'.
- 58 These schemes are absent in the Russian version (p. 67).
- 59 These schemes are also absent in the Russian version (p. 68).
- 60 The figure is missing from both the English manuscript (with a handwritten note 'see Russian original') and the Russian version (p. 72). In the latter, an editorial footnote refers the reader to A. N. Leont'ev's *Selected Psychological Investigations*, vol. 1, Moscow, 1983 (pp. 55, 56, 58). Quite likely, this and the next figure were similar to the figure given as table 11.2 in chapter 11 of this reader.
- 61 This figure is also missing from both English and Russian versions.
- 62 Refers to Binet, A. 1894: *Psychologie des grands calculateurs et joueurs d'échec*. Paris: Librairie Hachette.
- 63 See Lewin, K. 1926: *Vorbemerkungen über die psychische Kräfte und Energien und über die Struktur der Seele*. *Psychologische Forschung*, 7, 294-329.
- 64 Usually known in English as 'valence' or 'demand character'. The Russian text (p. 83) does not provide the German term, but its Russian literary translation (*kbarakter povelevania*).
- 65 K. Bühler in the Russian version (p. 84). The reference should be to Bücher, K. 1899: *Arbeit und Rhythmus*. Leipzig: B. G. Teubner.
- 66 Refers to p. 3 of Köhler, W. 1922: *Zur Psychologie des Schimpansen*. *Psychologische Forschung*, 1, 2-46.
- 67 Refers to p. 444 of Engels, F. 1925/1978: *Dialektik der Natur*. Berlin: Dietz Verlag.
- 68 The authors repeat the quotes from Bühler (1929) given in the first chapter in a slightly different translation (see note 5). We corrected a mistake (also present in the Russian edition, p. 86) in the second quote. It had 'other forms of speech' instead of the correct 'other forms of thought'.
- 69 Reference here is to p. 72 of Gutzmann, H. 1922: *Psychologie der Sprache*. In G. Kafka (ed.) *Handbuch der vergleichenden Psychologie*, vol. 2 (pp. 1-90). München: Ernst Reinhardt.
- 70 In German the difference here is between 'Wort' and 'Lautwort'.
- 71 The English manuscript had Lipmann (Otto), but the reference is to Liepmann (Hugo). See Cassirer (1929/1977) for a discussion of Liepmann's findings.
- 72 See p. 72 of Gutzmann (1922) (see note 69).
- 73 *Ibid.*, p. 72.
- 74 *Ibid.*, p. 68.
- 75 In the Russian version, the name of Auguste Comte is not mentioned on the corresponding page (p. 88).
- 76 *Ibid.*, pp. 68-9.
- 77 *Ibid.*, pp. 71-2.