

## ON SIGNS

We call artificial stimuli-devices introduced by man into a psychological situation where they fulfill the function of autostimulation "signs," giving this term a broader and at the same time a more precise sense than in common usage. According to our determination, every conditioned stimulus created artificially by man that is a means of mastering behaviour - that of another or one's own - is a sign. Two points are therefore essential for the concept of a sign: its origin and its function. We will later consider both in all their details. {LSV Collected Works Vol. 4, p. 54}

New structures that we contrast with lower or primitive structures differ mainly in that direct fusion of stimuli and reactions into a single complex seems to be disrupted. If we analyze thoroughly the unique forms of behavior that we had the opportunity to observe in the selection reaction, then we cannot help but note that in behavior, a seeming stratification of a primitive structure is occurring in this case. Between the stimulus to which behavior is directed and the person's reaction, a new intermediate member intervenes and the whole operation assumes the character of a mediated act. In connection with this, analysis develops a new point of view of the relation that exists between the behavioral act and external phenomena. We can distinguish clearly two orders of stimuli of which some are stimuli-objects and others, stimuli-means; each of these stimuli according to its relations uniquely determines and directs behavior. The uniqueness of the new structure is the presence in it of stimuli of both orders.

In our experiments, we were able to observe how the very structure of the whole process changes depending on a change in the position of the middle stimulus (sign)-the very structure of the whole process changes in behavior. Using words as a means of remembering was enough to make all the processes connected with remembering the instruction assume a single direction. But if only the words were replaced by meaningless geometrical figures, then the whole process took a different direction. Because of simpler experiments that were carried out, we believe it is possible to assume the following as a general rule: in the higher structure, the sign and methods of its use are the functional, determining whole or focus of the whole process.

Just as the use of one tool or another dictates the whole system of a work operation, the character of the sign used is the base on which the construction of the rest of the process depends. The same fundamental relation that lies at the base of the higher structure is the special form of organization of the whole process which consists of the process being constructed by involving certain artificial stimuli in the situation as signs. Thus, the functionally different role of two stimuli and their connection with each other serves as a base of the connections and relations that form the process itself.

The process of involving secondary stimuli in a situation which then acquires a certain functional meaning may be observed most easily in experiments when the child first makes the transition from a direct operation to using a sign. In our experimental studies, we placed the child in a situation in which he was presented with a problem of remembering, comparing, or selecting something. If the problem did not exceed the natural capacity of the child, he dealt with it directly or with the primitive method. In these cases, the structure of his behavior resembled completely the diagram drawn by Volkelt. The essential characteristic of the diagram is that the reaction itself constitutes a part of the situation and is inescapably included in the structure of the situation itself as a whole. This dominant whole of which Volkelt speaks predetermines the direction of the child's grasping movement. But the situation in our experiments was almost never like that. The problem confronting the child usually exceeded his capacity and seemed too difficult to solve with this kind of primitive method. At the same time, beside the child, there usually was some object that was completely neutral in relation to the whole situation, and in this case, under certain conditions, when the child was confronted by a problem he could not solve, we could observe how the neutral stimuli

stopped being neutral and were drawn into the behavioral process, acquiring the function of a sign. {LSV Collected Works, Vol. 4 pp. 84-5}

## **ON TOOLS**

With this we can conclude our elucidation of the concept of signification as a new regulatory principle in human behavior. In establishing differences and similarities between the unconditioned and conditioned reflexes as responses based on various regulatory principles, Pavlov cited the example of a telephone communication. One possible case—the telephone communication connects two points directly through a special conductor. This corresponds to the unconditioned reflex. In the second case, the telephone communication is carried out through a central station with the help of temporary, infinitely various connections that answer a temporary need. The cortex as the organ of closure for conditioned reflexes plays the role of such a central telephone station.

The most important thing that we can draw from our analysis and that lies at the base of signification may be expressed with the help of the same example if we broaden it somewhat. Let us take the case of the knot made to help memory or the throwing of dice. Undoubtedly, here in both cases a temporary conditioned connection is established, a connection of the second type, a typical conditioned reflex. But if we fully comprehend what actually OCCurs here and comprehend it from its most essential aspect, as is only fitting in scientific research, in our explanation of the connection that has arisen, we will be compelled to take into account not only the activity of the telephone apparatus, but also the work of the telephone operator who effected the required closure. In Our example, man made the necessary closure by tying the knot. This is the principal uniqueness of the higher form in comparison with the lower. In this we have the basis of that specific activity that we call signification as distinct from and in conformity with signalization.

Since the principle of signification leads us into the area of artificial devices, the question arises as to its relation to other forms of artificial devices, of its place in the general system of man's adaptation. In a certain specific relation, the use of signs shows a certain analogy to the use of tools. Like all other analogies, this analogy cannot be carried to the bitter end, to a full or partial coincidence of the major essential characteristics of the concepts being compared. For this reason, we must not anticipate finding much similarity to working tools in these devices that we call signs. Moreover, together with similar and common characteristics in one activity or another, we must ascertain the essential characteristics of the difference in a certain relation-contrast.

The invention and use of signs as auxiliary devices for solving any psychological: problem confronting man (to remember, to compare something, communicate, se- I lect, etc.) is, from the psychological aspect, at one point analogous to the invention I and use of tools. As such an essential trait of the two concepts being compared, we consider the role of these devices in behavior to be analogous to the role of the tool in a work operation or, what is the same, the instrumental junction of the sign. We have in mind the function of stimulus-device fulfilled by the sign with respect to any psychological operation, that it is a tool of human activity.

In this sense, based on the conventional, figurative meaning of the term, we usually speak of tools when we have in mind the mediating function of some object or means of some activity. True, such common expressions like "language is a tool of thinking," "auxiliary devices of memory" (aides de memoire), "internal technique," "technical auxiliary device" or simply auxiliary devices with respect to any psychological operation (Geistestechnik—"spiritual technique," "intellectual tools," and many others), are found in abundance among psychologists, are devoid of any specific content, and have scarcely any meaning beyond a simple metaphoric, picturesque expression of the fact that some objects or operations or others play an auxiliary role in the mental activity of man.

In addition, there is no shortage of attempts to ascribe a literal sense to similar signs, equating the sign and the tool, to erase the profound difference between the one and the other, to dissolve in general psychological determinations the specific distinctive characteristics of each type of activity. Thus, J. Dewey,<sup>49</sup> one of the foremost representatives of pragmatism in developing the ideas of instrumental logic and the theory of cognition, defines language as a tool of tools, transferring Aristotle's definition<sup>50</sup> of the hand to speech.

E. Kapp goes still further in his well-known philosophy of technology; he indicates the fact that the concept of the tool is very commonly used in a graphic, figurative sense and in many cases hampers the real and serious understanding of its true meaning. Kapp continues: when Wundt defines language as a convenient instrument and an important tool of thinking and Whitney says that man invents language, this organ of mental activity, like the mechanical devices he uses to ease his manual labor, both understand the word, tool, in the literal sense. Kapp himself adheres fully to this understanding in considering speech to be a "moving material" like a tool.

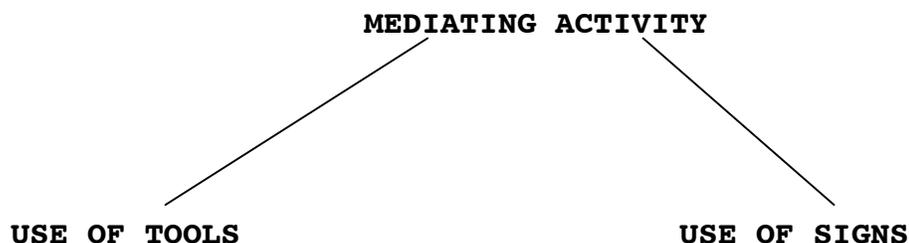
With equal strictness, we separate the analogy we made from both the first and the second interpretation. The indeterminate, vague meaning that is usually connected with figurative use of the word tool actually does not lighten the task of the researcher interested in the real and not the picturesque aspect that exists between behavior and its auxiliary devices. Moreover, such designations obscure the road for research. Not a single researcher has yet deciphered the real meaning of such metaphors. Must we think of thinking or memory as analogous to external activity or do devices play a certain role as a fulcrum giving support and help to the mental process? What does this support consist of? What, in general, does it mean to be a means of thinking or memory? We find no answers to these questions among psychologists who willingly use these vague expressions.

Even more vague is the idea of those who understand such expressions in a literal sense. Phenomena that have their own psychological aspect, but in essence do not belong wholly to psychology, such as technology, are completely illegitimately psychologized. The basis for this identification is ignoring the essence of both forms of activity and the differences in their historical role and nature. Tools as devices of work, devices for mastering the processes of nature, and language as a device for social contact and communication, dissolve in the general concept of artifacts or artificial devices.

We intend to subject to precise, empirical research the role of signs and behavior in all its real uniqueness. For this reason, in continuing this whole presentation in greater detail than is practical here, we will on occasion consider how both functions are united and differentiated in the process of the cultural development of the child. But now as a point of departure, we can establish three points that seem to us to be both adequately elucidated by what has been said thus far and sufficiently important for the understanding of the research method we have chosen. The first point pertains to the analogy and points of contiguity between both types of activity, the second elucidates the basic points of divergence, and the third attempts to indicate the real psychological connection between the one and the other or at least to suggest it.

As has already been said, the basis for the analogy between the sign and the tool is the mediating function of the one and the other. From the psychological aspect, they may, for this reason, be classified in the same category. In Fig. 1, we present a diagram attempting to show the relation between the use of signs and the use of tools; from the logical aspect, both may be considered as coordinative concepts included in a more general concept-mediating activity.

With full justification, Hegel used the concept of mediation in its most general meaning, seeing in it the most characteristic property of the mind. He said that the mind is as resourceful as it is powerful. In general, resourcefulness consists in



**Fig. 1**

mediating activity that, while it lets objects act on each other according to their nature and exhaust themselves in that activity, does not at the same time intervene in the process, but fulfills only its own proper role. Marx refers to this definition when he speaks of the tools of work and indicates that man "makes use of mechanical, physical, chemical properties of things in order to change them into tools to act on other things according to his purpose" (K. Marx and E Engels, Collected Works, Vol. 23, p. 190).

It seems to us that on this basis, the use of signs should be classified as a mediating activity since the essence of this is that man acts on behavior through signs, that is, stimuli, letting them act according to their psychological nature. In both cases, the mediating function is of the first order. We shall not define the relation of these coordinative concepts to each other or to the common generic concept any more precisely. We should like only to note that neither can in any case be considered equivalent in meaning nor of equal value in fulfilling functions, nor, finally, in exhausting the whole range of the concept of mediating activity. Together with these, we might have enumerated quite a few mediating activities, since the activity of the mind is not exhausted by the use of tools and signs.

We must emphasize also that our diagram is intended to present the logical relation of the concepts, but not the genetic or functional (on the whole, real) relations of the phenomena. We would like to point to the relation of the concepts, but not in any way to their origin or real root. So conditionally, but at the same time in a purely logical scheme of relations of the concepts, our diagram presents both types of devices as diverging lines of mediating activity. The second point we have developed consists of this. A more substantial difference of the sign from the tool and the basis of the real divergence of the two lines is the different purpose of the one and the other. The tool serves for conveying man's activity to the object of his activity, it is directed outward, it must result in one change or another in the object, it is the means for man's external activity directed toward subjugating nature. The sign changes nothing in the object of the psychological operation, it is a means of psychological action on behavior, one's own or another's, a means of internal activity directed toward mastering man himself; the sign is directed inward. These activities are so different that even the nature of the devices used cannot be one and the same in both cases.

Finally, the third point, which like the first two, we will develop further, having in view the real connection of these activities and, of course, the real connection of their development in phylo- and ontogenesis. Mastery of nature and mastery of behavior are mutually connected because when man changes nature he changes the nature of man himself. In phylogenesis, we can restore this

connection according to separate, fragmentary, documentary traces that do not leave room for doubt; in ontogenesis, we can trace it experimentally.

Even now there is no doubt about one thing. As the first use of a tool instantly changes Jennings' formula with respect to an organically dependent system of a child's activity, so precisely does the first use of a sign signify going beyond the limits of the organic system of activity which exists for each mental function. The use of auxiliary devices, the transition to mediated activity radically reconstructs the whole mental operation just as the use of a tool modifies the natural activity of the organs, and it broadens immeasurably the system of activity of mental functions. We designate both taken together by the term higher mental function, or higher behavior.

After a long deviation from our path, we can again return to the direct road. We may consider as basically explained the principle required for all our research and can attempt to define the main formula of our method, which must be an analog of the structural principle of higher forms of behavior, which we have found. {LSV Collected Works Vol. 4, pp. 59-63}