CHAPTER 3

The Problem of Activity and Psychology

3.1. Two Approaches in Psychology — Two Plans of Analysis

In recent years in Soviet psychology there has been an accelerated development of its separate branches and of applied research. At the same time theoretical problems of general psychology received less attention. In addition to this, Soviet psychology, formulated on a Marxist-Leninist philosophical basis, suggested a basically new approach to the psyche and was the first to introduce into psychology a series of important categories that need further development.

Among these categories, the category of activity is of greatest significance. Let us remember the famous theses of Karl Marx about Feuerbach, which state that the main inadequacy of former metaphysical materialism was that it considered sensitivity only in the form of contemplation, and not as human activity or practice; in contrast to materialism, idealism understood activity abstractly, and not as actual sensory activity of man.'

This is how the matter stood in all of pre-Marxist psychology. Moreover, in modem psychology that is being developed outside Marxism, the situation remains unchanged. In it activity is interpreted either within the framework of idealistic concepts or along the lines of materialistic and natural science tendencies — as a response to external actions of a passive subject conditioned by his innate organization and training. But it is just this that divides psychology into a natural science on the one hand, and psychology as a science of the spirit, into behavioral and "mentalistic" psychology on

[1] K. Marx and F. Engels, Works, Vol. 3, p. 1.

the other. The crises that this caused in psychology continue even now; they only "retreated into the depths" and began to be expressed in less open forms.

Characteristic for our time is the intensive development of interdisciplinary research connecting psychology with neurophysiology, with cybernetics, and logical-mathematical disciplines, and with sociology and cultural history; this in itself cannot lead to the resolution of the fundamental, methodological problems of psychological science. Leaving them unresolved only increases the tendency toward a dangerous physiological, cybernetic, logical, or sociological reductionism and threatens psychology with a loss of its subject, its specificity. Neither is the circumstance that the conflict of various psychological trends has lost its former sharpness evidence of theoretical progress; militant behaviorism has yielded to compromising neobehaviorism (or some authors say, "subjective behaviorism"), Gestaltism, neo-Gestaltism, Freudism, neo-Freudism, and cultural anthropology. Although the term ***eclectic*** has assumed a meaning of almost the highest praise among American authors, eclectic positions have never yet led to success. It is understood that synthesis of heterogeneous combinations of psychological facts and generalizations that have been made cannot be achieved by means of their simple combinations and common intertwining. It requires further development of the conceptual system of psychology, the search for new scientific theories capable of drawing together the loosened laces of the structure of psychological science.

With all the diversity of the trends about which we are speaking, what they have in common from the methodological point of view is that they are derived from a binomial plan of analysis: ***action on receptor systems of the subject → resulting response — phenomena (subjective and objective) evoked by the given action.***

This plan appeared with classical clarity in psychophysics and in physiological psychology even during the last century. The main problem that presented itself at that time was studying the dependence of the elements of consciousness on the parameters of the stimuli eliciting them. Later in behaviorism, that is, in conformity with the study of behavior, this binomial plan found its first direct expression in the famous formula S → R.

The inadequacy of this scheme is that it excludes from the field of research the cogent process in which real connections of the subject with the object world, his objective activity, are made (in German, *Tätigkeit*, as distinct from *Aktivität*). Such abstraction from the activity of the subject is justified only within the narrow bounds of the laboratory experiment, which is designed to disclose elementary psychophysiological mechanisms. It is necessary only to go beyond these boundaries in order to uncover the insupportability of such an abstraction. This made it necessary for earlier investigators, in explaining psychological facts, to admit intervention of special forces such as active apperception, internal intention, etc., that is, to appeal

everything to the activity of the subject, but only in its mystified, idealistic form.

The principal difficulties in psychology posed by the binomial plan of analysis and by the "postulate of directness,"[2] which hides behind it, gave rise to persistent attempts to overcome it. One of the lines along which these attempts were made stressed the fact that the effects of external action depend on their interpretation by the subject, on those psychological "intervening variables" (Tolman et al.) that characterize his internal state. In his time S. L. Rubinshtein expressed this in the formula that says that "external motives act through internal conditions."[3] This formula, of course, seems to be incontrovertible. If, however, we understand as internal conditions the ongoing condition of the subject exposed to the effect, then it will contribute nothing essentially new to the formula S → R. Even nonliving objects, when their condition is changed, reveal themselves in various ways in interaction with other objects. On damp, softened soil, tracks will be sharply imprinted, but on dry, hardened soil they will not. Even more clearly is this apparent in animals and in man: The reaction of a hungry animal to a food stimulus will be different from that of a well-fed animal, and information about a football match will evoke an entirely different reaction in a man who is interested in football than in a man who is completely indifferent to it.

The introduction of the concept of intervening variables undoubtedly enriches the analysis of behavior, but it does not remove the postulate of directness that was mentioned. The important thing is that even if the variables about which we are speaking are intervening, it is only in the sense of internal conditions of the subject himself. What has been said refers also to "motivating factors," needs, and desires. The working out of the role of these factors proceeded, as is known, along very different lines — in behaviorism, in the school of K. Lewin, and particularly in depth psychology. In all of these schools, however, as different as their directions might be, and as different as they might be in the understanding of motivation itself and its role, the principal thing remained unchanged: the opposition of motivation to objective conditions of activity, to the external world.

The attempts to resolve the problem on the part of so-called culturology must be mentioned specifically. The acknowledged founder of this trend, L. White,[4] develops the idea of "cultural determination" of phenomena in society and in the behavior of individuals. The rise of man and human society leads to the following: Connections between the organism and the environment that were formerly direct and natural become mediated by culture

[2] D. N. Uznadze, *Psychological Investigations, Moscow,* 1966, p. 158.
[3] S. L. Rubinshtein, *Existence and Consciousness, Moscow,* (1957), p. *226.*
[4] L. White, The *Science of Culture, New* York, 1949.

developing on the base of material productivity.' Thus, culture appears, for individuals, in the form of meaning imparted by speech signs-symbols. Based on this, L. White proposed a three-member formula for the behavior of man: ***organism of man X cultural stimuli → behavior.***

This formula creates the illusion of overcoming the postulate of directness and the formula resulting from it, S → R. However, introducing culture communicated by sign systems into this formula as a mediating link unavoidably traps psychological research in a circle of the phenomena of consciousness, social and individual. A simple substitution results: The world of objects is now replaced by a world of signs and meanings developed by society. Thus, we again stand before the binomial formula, S → R, but now the stimulus is interpreted as a "cultural stimulus." This is also expressed by the later formula of White through which he explains the difference in the determination of psychic reactions (minding)[6] of animals and man. He writes these formulas thus:

$$Vm = f(Vb) \quad \textit{in} \text{ animals,}$$
$$Vm = f(Vc) \quad \textit{in} \text{ man,}$$

where V is the variable, ***m*** is the psyche, ***b*** is the body condition, and c is culture.

As distinct from the sociological concept and psychology derived from Durkheim, which in one way or another preserves the idea of the primacy of interaction of man with the object world, contemporary American culturology knows only the effect on man of "extrasomatic objects," which form a continuum developing according to its own "suprapsychological," "suprasociological" laws (which also makes the special science, culturology, indispensable). From this culturological point of view, human individuals appear as only "catalytic agents" and "means of expression" of the cultural process.' Nothing more.

An altogether different line that emerged from the postulate of directness and along which complication of the analysis proceeded was the result of the discovery of regulating behavior by means of reverse connections, evidently formulated some time earlier by N. N. Lange.'

Even the first investigations of the structure of complex motion processes in man made it possible to understand the mechanism of a wide circle of

[5] White's statement that society was organized on the basis of relationships of property served sometimes as a basis to place White somehow among the partisans of historical materialism; it is true, one of his apologists states, that historical materialism in him comes not from Marx but from a "sound mind," from the idea of living (business of living) (H. Barnes, ***Outstanding Contributions to Anthropology, Culture, Culturology, and Cultural Evolution, New York, 1960).***

[6] Translator's note: This parenthetical expression appears in the original text in English.

[7] L. White, The ***Science of Culture,*** p. 181.

[8] N. N. Lange, ***Psychological Investigations,*** Odessa, 1893.

phenomena in a new light. Here the work of N. A. Bernshtein, which showed the role of the reflex ring with reverse connection, must be mentioned.'

During the time that separates us from the early works carried out in the 1930s, theories of regulation and information assumed general scientific significance and encompassed processes in living systems as well as in nonliving systems.

It is interesting that the concepts of cybernetics during these years were later accepted by the majority of psychologists as completely new. They had something of a second birth in psychology – a circumstance that caused certain enthusiasts for the cybernetic approach to think that at last new methodological bases were found for an all-encompassing psychological theory. Very soon, however, it developed that the cybernetic approach to psychology also had its limits, which could be breached only at the price of replacing scientific cybernetics with some kind of "cybernetic mythology"; it is true that psychological realities such as the psychic image, consciousness, motivation, and purpose actually seemed lost. In this sense there even came about a well-known renunciation of early works in which were developed the principle of activity and ideas about levels of regulation among which the level of object effect and higher cognitive levels may be specially mentioned.

Ideas of contemporary theoretical cybernetics form a very important plane of abstraction, which allows a description of the features of structure and motion of a wider class of processes that could not have been described with the help of earlier ideational apparatus. But investigations taking place in this plane of abstraction, notwithstanding their indisputable productivity, in themselves were not capable of resolving the fundamental methodological problem of one or another special area of knowledge. For this reason there is nothing paradoxical in the fact that in psychology the introduction of concepts on regulation, informational processes, and self-regulating systems still does not change the postulate of directness mentioned above.

The conclusion is that evidently no complicating of the original formula coming from this postulate, so to speak, "from within," can eliminate those methodological difficulties that it produces in psychology. In order to remove them, it is necessary to exchange the binomial formula of analysis for a basically different formula, and this cannot be done without giving up the postulate of directness.

The main thesis, the substantiation of which will be presented in a subsequent work, is that the real way to overcome this postulate, which, according to D. K. Uznadze, is "cancerous" for psychology, is through the introduction into psychology of the category of object activity.

[9] N. A. Bernshtein, "Physiology of movement," in: G. P. Konradi, A. D. Slonim, and V. S. Farfel', ***Physiology of Work, Moscow, 1934; N.*** A. Bernshtein, ***The*** Structure ***of Movement, Moscow, 1947.***

Bringing forth this proposal, it is necessary at once to specify it: The question is one of ***activity*** and not one of behavior, and not one of neurophysiological processes that produce activity. The fact is that the "units" isolated by analysis and language, with the help of which behavioral, cerebral, or logical processes are described on the one hand, and objective activity on the other, do not agree with one another.

Thus, in psychology the following alternative was devised: either to keep the basic binomial formula: action of the object → change in ongoing condition of the subject (or which is essentially the same thing, the formula S → R), or to devise a trinomial formula including a middle link ("middle term") — the activity of the subject and, correspondingly, conditions, goals, and means of that activity — a link that mediates the ties between them.

From the point of view of the problem of determining the psyche, this alternative may be formulated thus: We will take either the position that consciousness is determined by the surrounding objects and phenomena, or the position that consciousness is determined by the social existence of people, which, in the determination of Marx and Engels, is nothing more than the real process of their life.[10]

But what is human life? It is that totality, more precisely, that system of activities replacing one another. In activity there does take place a transfer of an object into its subjective form, into an image; also in activity a transfer of activity into its objective results, into its products, is brought about. Taken from this point of view, activity appears as a process in which mutual transfers between the poles "subject-object" are accomplished. "In production the personality is objectivized; in need the thing is subjectivized," noted Marx."

3.2. The Category of Objective **Activity**

Activity is a molar, not an additive unit of the life of the physical, material subject. In a narrower sense, that is, at the psychological level, it is a unit of life, mediated by psychic reflection, the real function of which is that it orients the subject in the objective world. In other words, activity is not a reaction and not a totality of reactions but a system that has structure, its own internal transitions and transformations, its own development.

Introducing the category of activity into psychology changes the whole conceptual system of psychological knowledge. But for this it is necessary to take this category as a whole with its most important dependences and determinations: from the aspect of its structure and in its specific dynamics, in its various aspects and forms. In other words, what we are concerned with

[10] K. Marx and F. Engels, Works, Vol. 3, p. 25.
[11] K. Marx and F. Engels, Works, Vol. 46, Part 1, p. 25.

here is answering the question of how exactly the category of activity enters into psychology. This question presents a series of theoretical problems that are far from being resolved. It is self-evident that I can touch on only certain of these problems.

Human psychology is concerned with the activity of concrete individuals that takes place either in conditions of open association, in the midst of people, or eye to eye with the surrounding object world — before the potter's wheel or behind the writing desk. Under whatever kind of conditions and forms human activity takes place, whatever kind of structure it assumes, it must not be considered as isolated from social relations, from the life of society. In all of its distinctness, the activity of the human individual represents a system included in the system of relationships of society. Outside these relationships human activity simply does not exist. Just how it exists is determined by those forms and material and spiritual means (Verkehr) that result from the development of production and that cannot be realized otherwise than in the concrete activity of people."

It is self-evident that the activity of every individual man depends on his place in society, on the conditions that are his lot, and on how this lot is worked out in unique, individual circumstances.

It is particularly important to guard against understanding human activity as a relationship that exists between man and an opposing society. This must be stressed because psychology is now being flooded with positivist conceptions that are in every way imposing the idea of opposition of the human individual to society. For man society constitutes only that external environment to which he is forced to accommodate, in order not to appear "non-adapted," and to survive in exactly the same way as an animal is forced to adapt to an external, natural environment, From this point of view human activity is formed as a result of its reinforcement, even if not direct reinforcement (for example, through evaluation expressed by a "reviewer" group). In this the main point is lost — the fact that in society a man finds not simply ***external*** conditions to which he must accommodate his activity, but that these same social conditions carry in themselves motives and goals of his activity, his means and methods; in a word, society produces the activity of the individuals forming it. Of course, this does not mean at all that their activity only personifies the relationships of society and its culture. There are complex transformations and transitions that connect them so that no direct information of one to the other is possible. For a psychology that is limited by the concept "socialization" of the psyche of the individual without its further analysis, these transformations remain a genuine secret. This psychological secret is revealed only in the investigations of the genesis of human activity and its internal structure.

[12] K. Marx and F. Engels, Works, Vol. 3, p. 19.

A basic or, as is sometimes said, a constituting characteristic of activity is its objectivity. Properly, the concept of its object (*Gegenstand*) is already implicitly contained in the very concept of activity. The expression "objectless activity" is devoid of any meaning. Activity may seem objectless, but scientific investigation of activity necessarily requires discovering its object. Thus, the object of activity is twofold: first, in its independent existence as subordinating to itself and transforming the activity of the subject; second, as an image of the object, as a product of its property of psychological reflection that is realized as an activity of the subject and cannot exist otherwise.

In the very beginning of activity and psychological reflection their objective nature is disclosed. Thus it was shown that the life of organisms in a homogeneous, even though changing, medium may develop only in the form of complication of that system of elementary functions that sustain their existence. Only in a transition to life in a discrete medium – that is, to life in a world of objects that affect processes, that have a direct biotic significance – are processes built up resulting from activities that may be neutral and abiotic in themselves but that orient it in relation to activity of the first kind. The formation of these processes that facilitate fundamental vital functions takes place because biotic properties of the object (for instance, its nutritional properties) are as if hidden behind other "superficial" properties. These properties are superficial in the sense that before the effects of biotic activity can be tested, it is necessary, figuratively speaking, to pass through these properties (for example, mechanical properties of a hard body in relation to its chemical properties).

Of course, I am omitting here any statement of the concrete, scientific basis for the theoretical positions referred to, just as I have in the evaluation of the problem of their internal connections with the teaching of I. P. Pavlov about the signal function of conditional stimuli and about orientating reflexes; I have explained both of these points in other papers.[13]

Thus the prehistory of human activity begins when the life processes acquire objectivity. This impies also the appearance of elementary forms of psychic reflection – the transformation of irritability (*irribilitas*) into sensitivity (*sensibilitas*), into the "capacity for sensation."

Further evolution of behavior and the psyche of animals may be adequately understood specifically as a history of the development of the objective content of activity. At every new stage there appeared an ever more complete subordination of effect or processes of activity to objective connections and relations of the properties of the objects with which the animals interacted. The objective world seemed all the more to "intrude" into activity. Thus the movement of an animal along a fence is subordinated to the "geometry," becomes assimilated by it, and carries it within itself; the movement of a jump

[13] A. N. Leont'ev, ***Problems of Development of the Psyche, Moscow,*** 1972.

is subordinated to the objective metrics of the environment and the selection of a way around, to interobject relationships.

The development of the objective content of activity finds its expression in subsequent development of psychic reflection, which regulates the activity in the objective environment.

All activity has a circular structure: ***initial afferentation → effector processes regulating contacts with the objective environment → correction and enrichment by means of reverse connections of the original afferent image. Now*** the circular character of the processes that realize the interaction of the organism with the environment appears to be universally recognized and sufficiently well described in the literature. The main point, however, is not the circular structure in itself but that the psychic reflection of the object world is generated directly not by external forces (including among these "reverse" forces) but by those processes through which the subject enters into practical contact with the object world, and which, for this reason, are necessarily subordinated to his independent properties, connections, and relations. This means that the "afferentator" that directs the processes of activity initially is the object itself and only secondarily its image as a subjective product of activity that fixes, stabilizes, and carries in itself its objective content. In other words, a double transfer is realized: the transfer ***object → process of activity,*** and the transfer ***activity → its subjective product.*** But the transfer of the process into the form of the product does not take place only at the pole of the subject. Even more clearly it takes place at the pole of the object transformed by human activity; in this case the activity of the subject controlling the psychic image is transferred into an "extinction property" (*ruhende Eigenshaft*) of its objective product.

At first glance it seems that the representation about the objective nature of the psyche refers only to the sphere of proper cognitive processes; this concept seems not to be applied to the sphere of needs and emotions. This, however, is not so.

The views of the emotional-need sphere as a sphere of states and processes, the nature of which lies in the subject himself and which only change their appearances under the pressure of external conditions, are based on a merging in essence of various categories, a merging that makes itself evident especially in the problem of needs.

In the psychology of needs it is necessary from the very beginning to proceed from the following fundamental distinction: the distinction of need as an internal condition, as one of the necessary precursors of activity, and need as that which directs and regulates concrete activity of the subject in an objective environment. "Hunger is capable of raising an animal up on its feet, capable of giving the hunt a more or less fervent character, but there is no element in hunger that would direct the hunt one way or another or modify it to make it conform to the requirements of the location or of chance

meetings," wrote Sechenov.[14] Need is an object of psychological cognition especially in its directing function. In the first place, need appears only as a condition of the need of the organism and is in itself not capable of evoking any kind of positively directed activity; its function is limited to the activation of appropriate biological function and general excitation of the motor sphere apparent in nondirected seeking movements. Only as a result of its "meeting" with an object that answers it does it first become capable of directing and regulating activity.

The meeting of need with object is an extraordinary act. Charles Darwin noted it in his time-certain data of I. P. Pavlov support it; D. N. Uznadze speaks about it as a condition for the beginning of purpose; and contemporary etiologists give it a brilliant description. This extraordinary act is an act objectifying need, "filling" it with content derived from the surrounding world. This is what brings need to a truly psychological level.

The development of needs at this level takes place in the form of development of their objective content. Incidentally, it may be said that this condition makes it possible to understand the appearance in man of new needs, including those that have no analogues in animals, are not "connected" to biological needs of the organism, and, in this sense, appear "autonomic."[15] Their formation is explained by the fact that in human society needed objects are produced and owing to this the needs themselves are produced.[16]

Thus needs direct activity on the part of the subject, but they are capable of fulfilling this function only under conditions that they are objects. From this arises the possibility of the reversal of terms that allowed K. Lewin to speak about the motivating force of objects themselves (*Aufforderungscharakter*).[17]

No different is the situation with emotion and feelings. Here too it is necessary to distinguish, on the one hand, nonobjective, sthenic, asthenic conditions and other proper emotions and feelings aroused by the relationship between the objective activity of the subject and his needs and motives. But it is necessary to speak about this separately. In connection with the analysis of activity, it is sufficient to indicate that objectivity of activity is responsible not only for the objective character of images but also for the objectivity of needs, emotions, and feelings.

Of course, the process of development of objective content of needs is ot one-sided. Its other side consists of the fact that the object of activity in itself appears to the subject as fulfilling one of his needs or another. Thus needs arouse activity and direct it on the part of the subject, but they are capable of fulfilling those functions in such a way that they appear objective.

[14] I. M. Sechenov, *Collected* Works, Vol. 1, Moscow, 1952, p. 581.
[15] G. Allport, *Pattern and Growth in Personality, New* York, 1961.
[16] K. Marx and F. Engels, Works, Vol. 46, Part 1, pp. 26-3 1.
[17] K. Lewin, *A Dynamic Theory of Personality, New* York, 1928.

3.3. Objective Activity and Psychology

External activity, sensually practical, is a genetically original and basic form of human activity and has a special meaning for psychologists. Psychology has of course always studied activity — for example, thought activity, the activity of the imagination, the memory, and so forth. Only such internal activity as falls under the Cartesian category of *cogito* was properly considered psychological, belonging solely to the field of psychologists. Psychology thus withdrew from the study of practical sensual activity.

If external activity did figure in the old psychology, then it did so only as it expressed internal activity, the activity of consciousness. The rebellion of the behaviorists against this mentalistic psychology, which took place at the beginning of this century, did more to deepen than to eliminate the break between consciousness and external activity, only now the situation was reversed: External activity was removed from consciousness.

The question that had been prepared by the objective course of the development of psychological knowledge now arose in all urgency: Is the study of external practical activity a problem of psychology? Nowhere was activity marked as to which science it belongs to. Besides, scientific experiments show that isolating activity as an object of someone's specific sphere of knowledge, "praxiology," cannot be justified. Just like all empirically given reality, activity is studied by various sciences; it is possible to study the physiology of activity, but just as proper is it to study it in political economics or in sociology, for example. Neither can external, practical activity be isolated from proper psychological investigation. This situation may, however, be understood in essentially different ways.

Even in the 1930s S. L. Rubinshtein" indicated the important theoretical significance for psychology of the thinking of Marx about the fact that in ordinary material work we have before us an open book of human essential strengths, and that a psychology for which this book remains closed cannot become a substantial and real science: Psychology cannot ignore the riches of human activity.

In addition, in his subsequent publications, S. L. Rubinshtein stressed that although practical activity by means of which people change nature and society also enters into the sphere of psychology, the object of psychological study "is only their specifically psychological content, their motivation and regulation, by means of which actions are brought into conformity with reflected sensations, perceptions, and consciousness by the objective conditions in which they are performed."[19]

[18] S. L. Rubinshtein, "'Problems of psychology in the works of K. Marx," *Soviet Psychotechnology, No. 7,* 1934.
[19] S. L. Rubinshtein, *Principles and Means of the Development of Psychology, Moscow,* 1959, p. 40.

Thus practical activity, according to the author, is a subject of study for psychology, but only that specific content that appears in the form of sensation, perception, thinking, and in general in the form of internal psychic processes andconditions of the subject. But this conviction is, to somedegree, one-sided inasmuch as it is abstracted from the major fact that activity – in one form or another – is part of the very process of psychic reflection, part of the content of this process, and its beginning.

Let us consider the most simple case: the process of perceiving the resilience of an object. This is an external motor process by means of which the subject makes a practical contact, a practical connection with an external object; the process may be directed toward accomplishing even a noncognitive but very practical task, for example, the deformation of the object. The subjective image that arises here is, of course, psychic and, correspondingly, indisputably a subject for psychological study. In order to understand the nature of the given image, however, I must study the process that gives rise to it, and this, in the case under consideration, is an external practical process. Whether I want this or not, whether it agrees with my theoretical views or not, I am all the same obliged to include in the subject of my psychological investigation the external, objective action of the subject.

This means that it is incorrect to think that although the external, objective activity presents itself for psychological investigation, it does so only to the extent that it includes internal psychic processes and that psychological investigation advances without studying external activity itself or its structure.

One may agree with this only if one can accept a one-sided dependence of external activity on a psychic image representation of goals or a mental plan directing the activity. But this is not so. Activity necessarily enters into practical contact with objects that confront man, that divert it, change it, or enrich it. In other words, especially in external activity there occurs an opening up of the circle of external psychic processes as if to meet the objective object world imperiously intruding into this circle.

Thus activity enters into the subject matter of psychology, not in its own special "place" or "element" but through its specific function. This is a function of entrusting the subject to an objective reality and transforming this reality into the form of subjectivity.

Let us return, however, to the case of initiating psychic reflection of an elementary property of a material object under conditions of practical contact with it. This case was cited only as an illustrative, much oversimplified example. It has, however, a real genetic sense. It is hardly necessary nowto prove that at initial stages of its development, activity necessarily has the form of external processes and that, correspondingly, the psychic image is a product of these processes connecting the subject in a practical way with objective reality. It is evident that at various genetic stages the scientific explanation

of the nature and specific features of psychic reflection is impossible except on the basis of the study of these external processes. At the same time this does not mean replacing the study of the psyche with the study of behavior but only a demystification of the nature of the psyche. Otherwise we will be left with nothing more than having to acknowledge the existence of a secret "psychic faculty," which consists in this: that under the influence of external stimuli falling on the receptors of the subject, in his brain – in the order of a phenomenon parallel to physiological processes – there arises some kind of internal light that illuminates the world for man, that something like an irradiation of images takes place that subsequently is localized or "objectivized" by the subject in the surrounding space.

It is evident that reality with which the psychologist deals is incontrovertibly more complex and rich than it is protrayed to be by the crude outline given here of the production of an image as a result of practical contact with an object. However, no matter how far psychological reality should depart from this crude outine, no matter how deep the metamorphosis of activity should be, under all conditions it will remain as a factor that realizes life for a physical subject, and this, in its essence, is itself a sensory, practical process.

Complication of activity and, correspondingly, complication of its psychic regulation presents an extraordinarily wide circle of scientific psychological problems from whose number it is necessary first of all to isolate the question of the forms of human activity and their interconnections.

3.4. The Relationship of Internal and External Activity

The old psychology had to do only with internal processes, with the movement of representations, their associations in consciousness, with their generalizations, and the movement of their substitute – words. These processes, and noncognitive internal experiences as well, were considered as exclusively constituting the subject matter for psychological study.

A reorientation of the old psychology began with the posing of the problem of the origin of internal psychic processes. A decisive step in this regard was taken by I. M. Sechenov, who indicated 100 years ago that psychology unlawfully extracts from the total process links that were forged by nature itself, its center, the "psychic," and contrasts it with the "material." Just as psychology was born from this (according to Sechenov) unnatural operation, then afterwards "no device could glue together these broken links." Such an approach to the matter, wrote Sechenov, must be changed. ***"Scientific psychology and all its contents cannot be anything else than a series of teachings about the origin of psychic activity."***[20]

[20] I. M. Sechenov, ***Collected Works,*** Vol. I. p. 209.

It is a matter for the historian to trace the stages of the development of this idea. I will only note that the thorough study of the phylogenesis and ontogenesis of thought that had begun has in fact extended the limits of psychological investigation. Into psychology entered such paradoxical concepts, from the subjective-empirical point of view, as the concept about the practical intellect or manual thinking. The position that internal intellectual action is genetically preceded by external action became almost universally accepted. On the other hand, that is, starting from the study of behavior, a hypothesis was developed on the direct mechanically comprehensible transition of external processes to cryptic internal processes; we may remember, for example, the formula of Watson: speech ***behavior → whisper → completely soundless speech.***[21]

The main role in the development of concrete psychological views on the origin of internal thought operations, however, was played by the introduction into psychology of the concept of interiorization.

Interiorization is, as is known, a transition that results in processes external in form, with external material objects, being transformed into processes that take place on the mental plane, on the plane of consciousness; here they undergo a specific transformation – they are generalized, verbalized, condensed, and most important, they become capable of further development, which exceeds the boundaries of the possibilities of external activity. This is a transition, if we may make use of the short formula of J. Piaget, "leading from the sensory motor plane to thought."[22]

The process of interiorization is now being studied in detail in the context of many problems, ontogenetic, psychological-pedagogical, and in general psychology. Here serious differences are appearing in the theoretical bases of investigation of this process as well as in its theoretical interpretation. For J. Piaget the most important basis for investigation of the origin of internal thought operation from sensory motor acts consists apparently in the impossibility of introducing operative schemes of thought directly from perception. Such operations as unification, ordering, and centering originate initially in the course of carrying out external actions with external objects and subsequently continue to develop in the plan of internal mental activity according to its own logical-genetic laws.[23] Other original positions on the transition from action to thought were determined by the views of P. Janet, A. Vallon, and D. Bruner.

[21] I. B. Watson, ***The Ways of Behaviorism, New*** York, 1928.
[22] J. Piaget, "The Role of Action in the Formation of Thought," "Problems ***of Psychology, No.*** 6, 1965, p. ***33.***
[23] J. Piaget ***Collected Psychological Works, Moscow,*** 1969.

In Soviet psychology the concept of interiorization ("turning") is usually connected with the name of L. S. Vygotskii and his followers, who have done important research on this process. In recent years successive stages and conditions of purposeful, "nonspontaneous" transformation of external (materialized) actions into internal (mental) actions have been studied especially carefully by P. Ya. Gal'perin.[24]

The original ideas that brought Vygotskii to the problem of the origin of internal psychic activity in external activity differ principally from theoretical concepts of other authors who were his contemporaries. These ideas came from an analysis of the features of specifically human activity – work activity, productive activity carried on with tools, activity that is indigenously social, that is, develops only under conditions of cooperation and sharing by people. Correspondingly, Vygotskii isolated two principal interrelated features that must be considered basic to psychological science. These are the equipped ("instrumented") structure of human activity and its incorporation into the system of interrelationships with other people. It is these features that determine the characteristics of psychological processes in man. Equipment mediates activity connecting man not only with the world of things but also with other people. Owing to this, his activity draws into itself the experience of humanity. This is also the basis for the fact that psychological processes in man (his "higher psychological functions") assume a structure that has as its obligatory link socially-historically formed means and methods transmitted to him by the people around him in the process of cooperative work in common with them. But to transmit a means or a method of carrying out one process or another is impossible except in an external form – in a form of action or in the form of external speech. In other words the higher, specifically human, psychological processes may originate only in the interaction of man with man, that is, as intrapsychological actions and only subsequently do they begin to be finished by the individual independently. in this process certain of them continue to lose their original external form, and turn into interpsychological processes.[25]

To the proposition that internal psychological activities originate from practical activity, historically accumulated as a result of the education of man based on work in society, and that in separate individuals of every new generation they are formed in the course of ontogenetic development is attached yet one more very important proposition. It consists of this, that simultaneously there takes place a change in the very form of the psychological reflection of reality: Consciousness appears as a reflection by the subject of reality, his own activity, and himself. But what is consciousness?

[24] P. Ya. Gal'perin, "The development of investigations of the formation of mental actions," ***Psychological Science in the USSR, Moscow, 1959,*** pp. 441469.
[25] L. S. Vygotskii, ***Development of Higher Psychological Functions,*** Moscow, 1960, pp. 198-199.

Consciousness is ***co-knowing,*** but only in that sense that individual consciousness may exist only in the presence of social consciousness and of language that is its real substrate. In the process of material production, people also produce language, and this serves not only as a means of information but also as a carrier of the socially developed meanings fixed in it.

The older psychology considered consciousness as some kind of meta-psychological plane of movement of psychic processes. But consciousness is not granted initially and is not originated by nature. Consciousness is originated by society; it is produced. For this reason consciousness is not a postulate and is not a condition of psychology but its problem, a subject for concrete scientific psychological investigation.

Thus the process of interiorization is not external action transferred into a preexisting internal "plan of consciousness"; it is the process in which this internal plan is formed.

As is known, as a result of the first cycle of works dedicated to the study of the role of external means and their "turning," L. S. Vygotskii turned to the study of consciousness, its "cells" – verbal meanings, their formation and structure. Although in these investigations meaning appeared in its, so to speak, reverse movement and, for this reason, as if it were something that lies behind life and directs activity, for Vygotskii an opposite thesis remained unshakable: Not meaning, not consciousness lies behind life, but life lies behind consciousness.

An investigation of the formation of mental processes and meanings (ideas) may express only one part of the total movement of activity, but this may be a very important part: the assimilation by the individual of methods of thought worked out by humanity. But this does not cover only cognitive activity, its formation, or its function. Psychological thought (and individual consciousness as a whole) is wider than those logical operations and those meanings in whose structures they are encased. Meanings in themselves do not give rise to thought but mediate it -just as tools do not generate activity.

At a later stage of his research L. S. Vygotskii stated that major important proposition many times in various forms. He saw the last remaining "secret" plan of oral thinking in its motivation, in the affective-volitional sphere. The deterministicview of psychic life, he wrote, excludes "ascribing to thought a magical power of determining the behavior of man through one specific system."[26] The positive program resulting from this, having preserved the active function of meaning and thought, requires that the problem be considered once again. And for this it was necessary to turn to the category of objective activity, applying it also to internal processes, the processes of consciousness.

[26] L. S. Vygotskii, *Collected Psychological Works, Moscow,* 1956, p. *54.*

It is exactly in the course of the movement of theoretical thought along this line that the principal community of external and internal activity is uncovered as mediating the interrelations of man with the world in which his real life is realized.

Corresponding to this, the principal distinction lying in the basis of classical Cartesian-Lockeian psychology – the distinction, on the one hand, of the external world, the world of space to which external physical activity also belongs, and on the other hand, the world of internal phenomena and processes of consciousness – must yield its place to another distinction: on the one hand, objective reality and its idealized, transformed forms (*ferwandelte Formen*), and on the other hand, activity of the subject, including both external and internal processes. This means that splitting activity into two parts or sides as if they belonged to two completely different spheres is eliminated. Also this presents a new problem, the problem of investigating the concrete relationship and connection between the various forms of human activity.

This problem existed even in the past. Only in our time, however, did it assume a completely concrete meaning. Now before our eyes there is an ever tighter intertwining and intimacy between external and internal activity: Physical work accomplishing a practical transformation of material objects, ever more "intellectualized," incorporates into itself the carrying out of more complex mental acts; at the same time the work of the contemporary researcher, activity that is specially cognitive, intellectual *par excellence,* is ever more filled with processes that in their form are external actions. Such unification of processes of activity, which vary according to their form, even now cannot be interpreted as a result only of those transitions that are described by the term ***interiorization of external activity.*** It necessarily presupposes the existence of regularly occurring transitions in the opposite direction also, from internal to external activity.

In social conditions that ensure a well-rounded development of people, intellectual activity is not separated from practical activity. Their thinking becomes reproducible to the extent of the need of the moment in the integral life of the individuals.[27]

Moving ahead somewhat, we must say at once that the mutual transitions about which we are speaking form a most important movement of objective human activity in its historical and ontogenetic development. These transitions are possible because external and internal activity have a similar general structure. The disclosure of the common features of their structure seems to me to be one of the more important discoveries of contemporary psychological science. Thus activity that is internal in its form, originating from external

[27] K. Mm and F. Engels, *Works.* Vol. 3, p. 253.

practical activity, is not separated from it and does not stand above it but continues to preserve an essential, twofold connection with it.

3.5. The General Structure of Activity

The community of the macrostructure of external practical activity and internal activity theoretically allows analyzing it, abstracting it initially from the form in which it occurs.

The idea of analyzing activity as a method of scientific human psychology was proposed, as I have already said, in the early works of L. S. Vygotskii. The concept of tooled ("instrumental") operations, the concept of purposes, and later the concept of motive ("motivational sphere of consciousness") were introduced. Years passed, however, before it was possible to describe, in a first approach, the common structure of human activity and individual consciousness. [28] This first description now, after a quarter century, appears in many ways unsatisfactory and too abstract. But it is exactly owing to its abstractness that it can be taken as an initial departure point for further investigation.

Up to this point we were talking about activity in the general collective meaning of that concept. Actually, however, we always must deal with specific activities, each of which answers a definite need of the subject, is directed toward an object of this need, is extinguished as a result of its satisfaction, and is produced again, perhaps in other, altogether changed conditions.

Separate concrete types of activity may differ among themselves according to various characteristics: according to their form, according to the methods of carrying them out, according to their emotional intensity, according to their time and space requirements, according to their physiological mechanisms, etc. The main thing that distinguishes one activity from another, however, is the difference of their objects. It is exactly the object of an activity. that gives it a determined direction. According to the terminology I have proposed, the object of an activity is its true motive.[29] It is understood that the motive may be either material or ideal, either present in perception or existing only in the imagination or in thought. The main thing is that behind activity there should always be a need, that it should always answer one need or another.

Thus *the concept of activity is necessarily connected with the concept of motive.* Activity does not exist without a motive; "nonmotivated" ac-

[28] A. N. Leont'ev, *A Description of ... Psyche, Moscow,* 1947.

[29] Such restricted understanding of ... material or ideal) that evokes and directs activity toward itself differs from ... understanding; but is not the place to enter into polemics on this ...

tivity is not activity without a motive but activity with a subjectively and objectively hidden motive.

Basic and "formulating" appear to be the actions that realize separate human activities. We call a process an action if it is subordinated to the representation of the result that must be attained, that is, if it is subordinated to a conscious purpose. Similarly, just as the concept of motive is related to the concept of activity, the concept of purpose is related to the concept of action.

The appearance of goal-directed processes or actions in activity came about historically as the result of the transition of man to life in society. The activity of participators in common work is evoked by its product, which initially directly answers the need of each of them. The development, however, of even the simplest technical division of work necessarily leads to isolation of, as it were, intermediate partial results, which are achieved by separate participators of collective work activity, but which in themselves cannot satisfy the workers' needs. Their needs are satisfied not by these "intermediate" results but by a share of the product of their collective activity, obtained by each of them through forms of the relationships binding them one to another, which develop in the process of work, that is, social relationships.

It is easy to understand that the "intermediate" result to which the work processes of man are subordinated must also be isolated for him subjectively, in the form of representations. This is also an isolation of the goal that according to the expression of Marx, "determines like a law the method and character of his action ...."[30]

Isolating the purposes and formulating actions subordinate to them leads to a seeming splitting of functions that were formerly merged with each other in motive. The function of excitation is, of course, fully preserved in the motive. The function of direction is another matter: The actions that realize activity are aroused by its motive but appear to be directed toward a goal. Let us suppose that the activity of man is aroused by food; this also constitutes its motive For satisfying the need for food, however, he must carry out actions that are not aimed directly at getting food. For example, the purpose of a given individual may be preparing equipment for fishing; regardless of whether he himself will use the equipment he has prepared in the future or give it to others and obtain part of the total catch, the ... which aroused his activity and that to which his actions were directed,; ... not identical; their coincidence represents a special personal case, the ... of a specific process, which we shall discuss.

Isolation of goal-directed actions ... the content of concrete activity naturally presents a question about ... real relationships that unite them. A# has already been ... additive process. Cor-

[30] Hegel, ... and F. Engels, *Works,* Vol ... Russian

respondingly, actions are not special "units" that are included in the structure of activity. Human activity does not exist except in the form of action or a chain of actions. For example, work activity exists in work actions, school activity in school actions, social activity in actions (acts) of society, etc. If the actions that constitute activity are mentally subtracted from it, then absolutely nothing will be left of activity. This can be expressed in another way: When a concrete process is taking place before us, external or internal, then from the point of view of its relation to motive, it appears as human activity, but when it is subordinated to purpose, then it appears as an action or cumulation of a chain of actions.

In addition, activity and action represent genuine and noncoinciding reality. One and the same action may accomplish various activities and may transfer from one activity to another, showing its relative independence in this way. Let us turn again to a clumsy illustration. Let us suppose that I have a goal – to arrive at point N – and I do this. It is understood that the given action may have completely different motives, that is, to realize completely different activities. The opposite is also obvious, specifically, that one or another motive may be given concrete expression in various purposes and correspondingly may elicit various actions.

In connection with isolating the concept of action as major and "formulating" human activity (its moment), it is necessary to take into consideration that scarcely initiated activity presupposes the achievement of a series of concrete purposes among which some are interconnected by a strict sequence. In other words, activity usually is accomplished by a certain complex of actions subordinated to particular goals that may be isolated from the general goal; under these circumstances, what happens that is characteristic for a higher degree of development is that the role of the general purpose is fulfilled by a perceived motive, which is transformed owing to its being perceived as a motive-goal.

One of the questions that arises from this is the question of goal formation. This is a very important psychological problem. The fact is that only the area of objectively adequate purposes depends on the motive of the activity. This subjective isolation of goals, however (that is, perception of immediate result, the achievement of which realizes a given activity which is capable of satisfying a need objectivized in its motive), presents in itself a special process that has almost never been studied. Under laboratory conditions or in pedagogical experiments we always place before the subject a, so to speak, "ready" goal; for this reason the process of goal formation itself usually escapes investigation. It is only in experiments that coincide in method with the well-known experiments of F. Hoppe that this process is disclosed even if this is a one-sided but adequately distinct presentation from its qualitative–dynamic side. It is another matter in real life where goal formation appears as an important instant of one activity or another of the subject. In th

respect let us compare the development of the scientific activity of Darwin and Pasteur, for instance. This comparison is instructional not only from the point of view of the existence of great differences in the way that isolation of purposes is subjectively realized but also from the point of view of the psychological content of the process of their isolation.

First of all, in both cases it is very clear that purposes are not contrived, are not posed by the subject arbitrarily. They are given in objective circumstances. Besides, isolation and perception of goals by no means occurs automatically, nor is it an instantaneous act but a relatively long process of approbation of the goals by action and by their objective filing, if this can be expressed in such a way. The individual, justly notes Hegel, "cannot determine the goal of his acting as long as he has not acted. ..."[31]

Another important aspect of the process of goal formation consists in the concretization of the goal, in isolating the conditions of its achievement. But this must be considered separately.

Every purpose, even one like the "reaching of point N," is objectively accomplished in a certain objective situation. Of course, for the consciousness of the subject, the goal may appear in the abstraction of this situation, but his action cannot be abstracted from it. For this reason, in spite of its intentional aspect (what must be achieved), the action also has its operational aspect (how, by what means this can be achieved), which is determined not by the goal in itself but by the objective-object conditions of its achievement. In other words, the action being carried out is adequate to the task; the task then is a goal assigned in specific circumstances. For this reason the action has a specific quality that "formulates" it specifically, and particularly methods by which it is accomplished. I call the methods for accomplishing actions, ***operations.***

There is frequently no difference between the terms ***action*** and ***operation.*** In the context of psychological analysis of activity, however, distinguishing between them is absolutely necessary. Actions, as has already been said, are related to goals, operations to conditions. Let us assume that the goal remains the same; conditions in which it is assigned, however, change. Then it is specifically and only the operational content of the action that changes.

In especially visual form, the noncoincidence of action and operation appears in actions with tools. Obviously, a tool is a material object in which are crystallized methods and operations, and not actions or goals. For example, a material object may be physically taken apart by means of various tools each of which determines the method of carrying out the given action. Under certain conditions, let us say, an operation of cutting will be more adequate, in others, an operation of sawing; it is assumed here that man knows how to handle the corresponding tools, the knife, the saw, etc. The matter is essential-

[31] Hegel, Works, Vol. 4, Moscow, 1959, pp. 212-213.

ly the same in more complex cases. Let us assume that a man was confronted with the goal of graphically representing some kind of dependences that he had discovered. In order to do this, he must apply one method or another of constructing graphs -- he must realize specific operation, and for this he must know how to do them. In this case it makes no difference how or under what circumstances or using which material he learned how to do these operations; something else is important -- specifically, that the formulation of the operation proceeds entirely differently from the formulation of the goal, that is, the initiation of action.

Actions and operations have various origins, various dynamics, and various fates. Their genesis lies in the relationships of exchange of activities; every operation, however, is the result of a transformation of action that takes place as a result of its inclusion in another action and its subsequent "technization." A simpler illustration of this process may be the formation of an operation, the performance of which, for example, requires driving a car. Initially every operation, such as shifting gears, is formed as an action subordinated specifically to this goal and has its own conscious "orientational basis" (P. Ya. Gal'perin). Subsequently this action is included in another action, which has a complex operational composition in the action, for example, changing the speed of the car. Now shifting gears becomes one of the methods of attaining the goal, the operation that effects the change in speed, and shifting gears now ceases to be accomplished as a specific goal-oriented process: Its goal is not isolated. For the consciousness of the driver, shifting gears in normal circumstances is as if it did not exist. He does something else: He moves the car from a place, climbs steep grades, drives the car fast, stops at a given place, etc. Actually this operation may, as is known, be removed entirely from the activity of the driver and be carried out automatically. Generally, the fate of the operation sooner or later becomes the function of the machine.[32]

Nonetheless, an operation does not in any way constitute any kind of "separateness," in relation to action, just as is the case with action in relation to activity. Even when an operation is carried out by a machine, it still realizes the action of the subject. In a man who solves a problem with a calculator, the action is not interrupted at this extracerebral link; it finds in it its realization just as it does in its other links. Only a "crazy" machine that has escaped from man's domination can carry out operations that do not realize any kind of goal-directed action of the subject.

Thus in the total flow of activity that forms human life, in its higher manifestations mediated by psychic reflection, analysis isolates separate (specific) activities in the first place according to the criterion of motives that elicit them. Then actions are isolated -- processes that are subordinated

[32] A. N. Leont'ev, "Automatization and man," *Psychological Research, No. 2, Moscow,* 1970, pp. 8-9.

to conscious goals, finally, operations that directly depend on the conditions of attaining concrete goals.

The "units" of human activity also form its macrostructure. The special feature of the analysis that serves to isolate them is that it does so not by means of breaking human activity up into elements but by disclosing its characteristic internal relations. These are the relations that conceal transformations that occur as activity develops. Objects themselves can become stimuli, goals, or tools only in a system of human activity; deprived of connections within this system they lose their existence as stimuli, goals, or tools. For example, a tool considered apart from a goal becomes the same kind of abstraction as an operation considered apart from the action that it realizes.

Investigation of activity requires an analysis specifically of its internal systemic connections. Otherwise we will not be in a position to decide even the simplest problems -- such as making a judgment about whether or not we have an action or an operation in a given case. In this respect activity represents a process that is characterized by continuously proceeding transformations. Activity may lose the motive that elicited it, whereupon it is converted into an action realizing perhaps an entirely different relation to the world, a different activity; conversely, an action may turn into an independent stimulating force and may become a separate activity; finally, an action may be transformed into a means of achieving a goal, into an operation capable of realizing various actions.

The mobility of separate "forming" systems of activity is expressed, on the other hand, in the fact that each of them may become a smaller fraction or, conversely, may incorporate in itself units that were formerly relatively independent. Thus, in the course of achieving an isolated general goal there may occur a separation of intermediate goals as a result of which the whole action is divided into a series of separate sequential actions; this is especially characteristic for cases where the action takes place under conditions that inhibit its being carried out by means of already formulated operations. The opposite process consists of consolidating isolated units of activity. This is the case when objectively attained intermediate results flow one into another and the subject loses conscious awareness of them.

In a corresponding manner there is a fractionation or, conversely, a consolidation also of "units" of psychic images: A text copied by the inexperienced hand of a child breaks up in his perception into separate letters and even into their graphic elements; later in this process the units of perception become for him whole words or even sentences.

Before the naked eye the process of fractionation or consolidation of units of activity and psychic reflection -- in external observation as well as introspectively -- is hardly distinguishable. This process can be investigated only by means of special analysis and objective indicators. Among these indicators is, for example, the so-called ontokinetic nystagmus, the changing

cycles of which, as investigations have shown, make it possible to determine the amount of movement "units" entering into the composition of graphic actions. For example, writing words in a foreign language is divided into significantly smaller units than writing ordinary words of the native language. It may be considered that such a separation, distinctly appearing on oculograms, corresponds to the division of action into the operations that make it up, which are evidently simpler and more primary.[33]

Isolating the "units" that form activity has a paramount significance for resolving a series of major problems. One of these problems, on which I have already touched, is the problem of uniting processes of activity that are internal and external in their form. The principle or law of this uniting is that it always takes place precisely along the "seams" of the structure described.

There are separate activities, all links of which appear to be essentially internal; for example, cognitive activity may be such an activity. More commonly, internal activity that serves a cognitive motive is carried out by processes that are essentially external; this may be through either external actions or external motor operations but never through their separate elements. The same thing applies also to external activity: Some of the actions and operations that realize external activity may have an internal form, as mental processes, but again specifically only as actions or as operations, in their integrity and indivisibility. The basis for such a primarily factual position of things lies in the very nature of the processes of interiorization and exteriorization: No type of transformation of separate "splinters" of activity is possible in general since this would mean not a transformation of activity but its destruction.

Separating actions and operations in activity does not exhaust its analysis. Behind activity and regulating its psychic images there is the grandiose physiological work of the brain. This situation in itself does not require proof. The problem is something else: to find those actual relationships that connect the subject's activity, mediated by the psychic image, and the physiological brain processes.

The relationship of the psychic and the physiological is considered in many psychological works. In connection with the study of higher nervous activity it is theoretically explained in greatest detail by S. L. Rubinshtein, who developed the idea that the physiological and the psychic are one and the same and specifically a reflexive, reflecting activity, but considered from various angles, and that its psychological investigation is a logical continuation of its physiological investigation.[34] Consideration of these positions as well as the positions of other authors leads us away, however, from the intended plane of analysis. For this reason, in recalling some of the stated positions I will limit myself here only to questions about the place of physiological function in the structure of objective activity of man.

I will note that the former subjective-empirical psychology was limited by the conviction of the parallelism of psychic and physiological phenomena. On this basis there arose that strange theory of "psychic shadows" that in any of its variants in essence signified a renunciation of resolving the problem. With the well-known reservation, this refers also to subsequent theoretical attempts to describe the connection of the psychological and the physiological based on ideas of their morphology and interpretation of psychic and physiological structures by means of logical models.[35]

Another alternative is to forgo a direct confrontation between the psychic and the physiological and to continue the analysis of activity on the physiological level. Here, however, it is necessary to overcome the ordinary opposition of psychology and physiology as studying different "things."

Although brain functions and mechanisms constitute an indisputable subject of physiology, it does not follow from this that these functions and mechanisms should remain outside the sphere for psychological investigations, that "what is Caesar's must be rendered unto Caesar."

This convenient formula, while it saves from physiological reductionism, leads into a greater sin, the sin of isolating the psyche from the work of the brain. Actual relations connecting psychology and physiology are more like the relations between physiology and biochemistry; progress in physiology necessarily leads to a deeper physiological analysis to the level of biochemical processes; on the other hand, only the development of physiology (in a wider sense, biology) gives rise to those special problematics that make up the specific sphere of biochemistry.

Continuing this analogy, which is completely conditional, it may be said that psychophysiological (higher physiological) problematics has its origin in the development of psychological science, that even such fundamental concept for physiology as the concept of the conditional reflex had its origin in "psychic" experiments, as I. P. Pavlov originally called them. Subsequently, as is known, on this subject I. P. Pavlov said that psychology in its phase of approximations explains "the general constructions of psychic formations, and physiology on its part attempts to carry the problem further, to understand these formations as a special interaction of physiological phenomena."[36]

[33] Yu. B. Gippenreiter and G. L. Pik, "Fixational ontokinetic nystagmus as au indicator of the role of vision in movements," in: ***Investigations of Visual Activity of Man,*** Moscow, 1973; Yu. B. Gippenreiter, V. Ya. Romanov, and I. S. Samsonov, '*A* method of isolating units of activity." in: ***Perception and Activity, Moscow,*** 1975.

[34] S. L. Rubinshtein, ***Life and Consciousness,*** pp. 219-221.

[35] See, for example, J. Piaget, "The character of the explanation in psychology and psychological parallelism," ***Experimental Psychology,*** P. Fress and J. Piaget, eds., Vols.1 and 2, Moscow, 1966.

[36] I. P. Pavlov, ***Pavlovian Methods,*** Vol. 1, Moscow, 1934, pp. 249-250.

Thus the investigation continues not from physiology to psychology but from psychology to physiology. "First of all," wrote Pavlov, "it is important to understand psychologically and then to translate to physiological language."[37]

Most important is that the transition from analysis of activity to analysis of its psychophysiological mechanisms reflect real transitions between them. Now we can no longer approach the brain mechanisms (psychophysiological) otherwise than as a product of the development of objective activity. It is necessary to keep in mind that these mechanisms are formed variously in phylogenesis and under conditions of ontogenetic (particularly functional) development and therefore do not always appear in the same way.

Mechanisms made up phylogenetically are ready prerequisites for activity and psychic reflection. For example, the processes of visual perception are as if inscribed in the features of the structure of the visual system of man, but only in a virtual form, as their possibility. The latter, however, does not free psychological investigation of perception from penetrating into these specific features. The fact is that we generally can say nothing about perception without referring to these specific features. The other question is, should we make these morphophysiological features an independent subject of study or should we observe their functioning within the structure of actions and operations? The difference in these approaches is apparent as soon as we compare data of the investigations of, let us say, the duration of visual afterimages and the data of investigations of postexpositional integration of sensory visual elements in solving various perceptive tasks.

The situation is somewhat different when the formation of the brain mechanisms takes place during functional development. Under these conditions the given mechanisms appear as new "mobile physiological organs" (A. A. Ukhtomskii), new "functional systems" (P. K. Anokhin), taking shape, so to speak, before our eyes.

In man the formation of functional systems that are specific to him takes place as a result of his mastering of tools (means) and operations. These systems represent nothing other than exterior motor and mental – for example, logical – operations deposited, materialized in the brain. This is not a simple "calque" of them but rather their physiological allegory. In order to read this allegory, it is necessary to use another language, other units. These units are the brain functions, their ensembles – functional systems.

Including in the investigation activity at the level of the brain functions (psychophysiological) makes it possible to encompass very important realities from which the study of experimental psychology actually began its development. It is true that the first works dedicated, as was then said, to "psychological functions" – sensory, mnemonic, elective, tonic – were theoretically

[37] I. P. Pavlov, *Pavlovian Clinical Methods*, Vol. 1, Moscow-Leningrad, 1954, p. 275.

hopeless regardless of the significance of the concrete contribution they made. This was the case because these functions were investigated in isolation from the subject's objective activity that they realized, that is, as phenomena of certain faculties – faculties of the spirit or the brain. The essence of the matter lies in that in both cases they were considered not as elicited by activity but as eliciting it.

The fact of the changeability of the concrete expression of psychophysiological functions depending on content of the activity of the subject became apparent very quickly. The scientific problem, however, was not to ascertain this dependence (it had long ago been ascertained in countless works of psychologists and physiologists) but to investigate those transformations of activity that lead to a reconstruction of the ensemble of brain psychophysiological functions.

The significance of psychophysiological investigations is that they disclose those conditions and consequences of the formation of processes of activity that require a reconstruction or formation of new ensembles of psychophysiological functions, new functional brain systems, for their accomplishment. A simple example is the formation and consolidation of operations. The initiation of one operation or another is of course determined by the presence of conditions, means, and methods of action that are made up or assimilated from outside; the joining, however, of one elementary link to another forming the composition of the operation, their "compression" and their transfer to lower neurological levels, takes place in subordination to physiological laws with which psychology cannot but reckon. Even for the study, for example, of exterior motor or mental habits we always intuitively depend on empirically compounded representations about the mnemonic function of the brain ("repetition is the mother of learning"), and it only seems to us that the normal brain is psychologically mute.

It is another matter when investigation requires precise qualification of the activity processes studied, particularly activity that occurs under deficit time conditions, increased demands, and precision, selection, etc. Here psychological investigation of activity cannot but include as a special problem analysis of the activity at the psychophysiological level.

In engineering psychology the problem of separating activity into its elements, determining their time characteristics and the carrying capacity of separate receiving and "exit" apparatuses, becomes most urgent. The concept of elementary operations was introduced, but in an entirely different sense, not in a psychological, but in a, so to speak, logical-technical sense, which dictated the necessity of extending the method of analysis of machine processes to human processes participating in the work of the machine. This kind of fractionation of activity for the purposes of describing it formally and applying theoretical-informational measures, however, was confronted by the fact that it resulted in a complete disappearance of the

main forming activities from the field of investigation; its main determining factors and activities were, in a manner of speaking, dehumanized. Besides, it was wrong to give up that study of activity that would have gone beyond the limits of the analysis of its general structure. Thus a peculiar controversy arose: On the one hand, while their various connections with the world serve as a basis for isolating the "units" of activity, an individual entering into social relations in this world could initiate activity with its goals and objective conditions before the units could be divided further within the limits of the given system of analysis; on the other hand, the problem of studying intracerebral processes, which requires further division of these units, still persisted.

In this respect in recent years there was developed the idea of "microstructural" analysis of activity, a problem that consists in uniting genetic (psychological) and quantitative (informational) approaches to activity.[38] It was necessary to introduce concepts of "functional blocks," of direct and reverse connections between them forming the structure of processes that realize activity physiologically. Here it is assumed that this structure wholly corresponds to the macrostructure of activity and that isolating separate "functional blocks" allows a more penetrating analysis continuing in smaller units. Here, however, we are confronted with a complex theoretical problem: understanding those relationships that connect among them the intracerebral structures and the structure of the activity that they realize. Further development of microanalysis of activity will necessarily bring this problem forward. The very procedure, for example, of investigating reverse connections of excited elements of the retina of the eye and brain structures responsible for constructing primary visual images is based on the registration of phenomena that take place only because of a subsequent treatment of these primary images in such hypothetical "semantic blocks," the function of which is determined by a system of relations that in their very nature appear to be extracerebral – and this means nonphysiological.

According to the character of their mediation, the transfers about which we are speaking are comparable to the transfers that connect the technology of production and production itself. Of course production is realized with the help of tools and machines, and in this sense production appears to be a consequence of their functioning; however, tools and machines originate in production, which is already a category not technical but social-economic.

I allowed myself to introduce this comparison with only one thing in mind: to single out the idea that analysis of activity at the psychophysiological level, although it proves the possibility of adequate use of precise indicators, the language of cybernetics and theoretical-informational measures, still unavoidably abstracts itself from the consideration of activity as a system initiated by live relations. Speaking more simply, objective activity, just like psychic images, is not produced by the brain but is its function, which consists in the images being realized by means of the physical organs of the subject.

[38] V. P. Zinchenko, "The microstructural method of investigating cognitive activity," *Proceedings of the All-Union Scientific-Research Institute of Technical Aesthetics,* Vol. 3, Moscow, 1972.

As was already said, an analysis of the structure of intercerebral processes, their blocks or constellations, presents a further division of activity, its moments. Such a division is not only possible but often unavoidable. It is necessary only to be clearly aware of the fact that it transfers the investigation of activity to a special level, to the level of the study of a transition from units of activity (actions, operations) to units of brain processes that realize them. I want especially to emphasize that I am speaking particularly about the study of transitions. This distinguishes the so-called microstructural analysis of objective activity from the study of higher nervous activity in concepts of physiological brain processes and the neural mechanisms, the data of which can only be compared with corresponding psychological phenomena.

On the other hand, investigation of intercerebral processes that realize activity leads to a demystification of the concept of "psychic functions" in its former classic meaning – that of a bundle of faculties. It becomes apparent that this is a manifestation of common functional physiological (psychophysiological) properties that generally do not exist as separate units. One must not think, for example, about the mnemonic function as separated from the sensory, or vice versa. In other words, only physiological systems of function realize perceptive, mnemonic, motor, and other operations. But let me repeat, operations cannot be reduced to these physiological systems. Operations always are subject to objective-subjective, that is, extracerebral, relations.

As noted by L. S. Vygotskii, the neuropsychological and pathopsychological are another very important way of penetrating into the structure of activity of the brain. Their general psychological significance is that they allow the observation of activity in its degeneration, depending on exclusion of separate portions of the brain or on the character of those more general disturbances of its function that are expressed in mental illness.

I will note only certain data obtained from neuropsychology. As distinct from naive psychomorphological representations according to which external psychological processes are identified with the function of separate brain centers (centers of speech, writing, thinking in concepts, etc.), neuropsychological investigations indicated that these complex processes of social–historical origin, formed in the course of life, have a dynamic and systemic localization. As a result of comparing the analysis of extensive data collected in experiments with individuals ill with various disturbances of localized

centers of the brain, a picture appears of how various "components" of human activity are specifically "deposited" in its morphology.[39]

Thus neuropsychology on its part — that is, from the standpoint of brain structures — allows a penetration into the "performing mechanisms" of activity.

The failure of separate parts of the brain, which leads to a disturbance of one process or another, presents another possibility: to investigate in these absolutely perfect conditions the functional development of these parts, which appear here in the form of their reestablishment. More precisely, this relates to the reestablishment of external and mental actions, the carrying out of which became impossible for the patient as a result of the fact that the central disturbance excluded one of the links of one operation or another that these actions carried out. In order to bypass a preliminarily carefully diagnosed defect of the patient, the investigator projects a new composition of operations capable of carrying out the given action and then actively formulates in the patient the new composition in which the damaged link does not participate but which includes instead a link that, under normal conditions, is redundant or even nonparticipating. There is no need to speak of the general psychological significance of this direction of the investigation; it is self-evident.

Of course, neuropsychological investigations, just like investigations of psychophysiology, necessarily present the problem of transition from extracerebral relations to intracerebral. As I have already said, this problem cannot be solved by means of direct comparisons. Its resolution lies in the analysis of the working of the system of objective activity as a whole in which is also included the functioning of the physical subject — his brain, his organs of perception and movement. The laws that control the processes of this functioning are, of course, apparent only as long as we do not proceed to the investigation of the objective actions that are realized by these processes or of images that can be analyzed only by investigating human activity at the psychological level. No different is the situation in a transition from the psychological level of investigation to the wholly social: Only here the transition to the new, that is, the social laws, takes place as a transition from investigating processes that realize relationships of individuals to an investigation of relationships that are realized by the common activity of individuals in society, the development of which is subordinated to objective-historical laws.

Thus a systemic study of human activity must also be an analysis according to levels. It is just such an analysis that will make it possible to overcome the opposition of the physiological, the psychological, and the sociological, as well as the reduction of any one of these to another.

[39] A. R. Luria, *Higher Cortical Functions of Man, Moscow, 1969;* L. S. Tsvetkova, *Rehabilitation Studies in Local Brain Damage, Moscow,* 1972.