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Gregory Bedny,
*Doctor of Psychology, professor,
 Essex County College,
 303, University Ave, Newark, USA*

ACTIVITY THEORY IN THE WEST AS A POTENTIAL APPROACH FOR APPLIED STUDIES

Activity theory has been developed in the former Soviet Union for the period of more than 70 years. It also received recognition in the West, and particularly in the USA. In this work, we present critical analysis of the translation and interpretation of the basic concepts of activity theory in the psychological publications in the West from the systemic-structural activity theory perspectives. According to SSAT framework, activity is understood as a process and a structure that consists of hierarchically organized units that unfolds in time. We will consider basic concepts of activity theory and will outline some difficulties which Western scientists experience in their interpretation and application of the theory in science and practice.

Keywords: *general, applied and systemic-structural activity theories; goal concept in psychology; cognitive and motor actions; self-regulation.*

Introduction

The main stream in psychology and its application in the study of human work, learning and training was based on the achievements of cognitive psychology. During the last two decades, this approach came under increasing criticism because of the serious difficulties in application of this approach to the applied studies. In cognitive psychology, the basic method of study is laboratory-oriented experiments which are not easy to utilize for the study of relationship between multidimensional human activity and multidimensional human technology. This multidimensionality makes it difficult to correctly extract independent and dependent variables and their interrelationship. Experiments in cognitive psychology have a tendency to treat people as computers or as human-information systems, that have such relatively independent separate characteristics like perception, memory, decision-making mechanism, thinking and at the same time ignoring human emotionally-motivational, social and other important characteristics. Of course, in experimental psychology there are more complex experimental methods that help us to adapt particular experimental procedures for particular purposes. However, it is not always possible to do. This is particularly relevant in cases when psychologists are involved in the design of complex man-machine or human-computer interaction systems, or involved in the development of complex training methods for operators of complex systems.

Experienced users of any complex system can acquire their own strategies of various task performance, and therefore utilize their own skills which can deviate from normatively developed methods. Relationship between normatively developed and individually developed methods of performance were not considered in cognitive psychology. We do not reject cognitive psychology and experimental methods of study. Cognitive psychology gives the most complete analysis of the microstructure of

mental processes. Precise explanation of these factors can be found on the basis of comparison of the described structure with data obtained in developmental psychology (Vygotsky, 1978), its dependence on goal-directed characteristics of human activity, and connection of human goals and activity in general with socially organized human labor (Rubinshtein, 1957; 1959; Leontiev, 1978, etc.). The mentioned shortcomings of cognitive psychology explains the fact why the activity theory attracts attention in the West (Cole, M, I. (Eds. 1969), 1974; Nardi, 1997; Engestrom, 1987; Wertsch, 1981, etc). The works of Vygotsky (1978) and Leontiev (1977/1978), were translated into English and made a significant impact on attracting attention to the activity theory in Europe and English speaking countries.

However, in the following very general descriptive studies in AT a little progress toward the development of practical, theoretically justified recommendations for the design of HCI, man-machine systems, and practical recommendations in training was observed. It is possible to outline a number of factors influencing on this situation. The development of general activity theory (AT) in former Soviet Union took place under the conditions of extreme ideological pressure on science and particularly on the psychological science. This influenced publications and translation of different works did not always accurately reflected the basic research in AT. For example, in the West, Leontiev was mistakenly taken as the only founder of activity theory. The works of Sergey Rubinshtein, who was actually the original founder of activity theory, were ignored. Rubinstein was born in Odessa, Ukraine, and lived there at the time when he first introduced the activity approach. He is known as the author of the subject-oriented activity theory, which is fundamentally important for the development of general activity theory. Thus, we cannot agree with the most Western scientists, who consider Leontiev as the founder of the activity theory.

At present, we can outline three versions of activity theory according to its stages of development and the possibility of its successful application in the study of human work. They are: general activity theory; applied activity theory; and systemic-structural activity theory. We will consider general activity theory in the following sections. General activity theory was founded by Rubinshtein and later received farther development in the works of Leontiev and his followers. Vygotsky also had a great influence on the development of the general activity theory. General activity theory has restricted possibilities for its application to the study of human work due to being overloaded by Marxist ideology. There is no sufficiently developed data which can be applied to the study of human work. General activity theory, as many grand theories or frameworks, often not substantially developed empirically and theoretically to provide a unified framework to human factors, to industrial psychology and its branches like engineering psychology, organizational psychology or work psychology in general (Frese and Zapf, 1994). We want to emphasize that sometimes applied theories can be much better developed theoretically than their general theory predecessor.

Cognitive psychology, which arose in the late 50s and early 60s, contributed to the emergence of the applied activity theory and, in the later time, systemic-structural activity theory (SSAT). Significant contribution to the adaptation of cognitive psychology in the activity theory was made by V. Zinchenko (1972). A significant impact on the development of applied activity theory was made by a number of scientists. Among them are Pushkin (1965), Zarakovsky (1966), Kotik (1978), Konopkin (1980), Ponomarenko, Zavalova (1981), Bedny (1987) and some others. Currently, a number of original scientific books were published in the area of systemic-structural activity theory: Bedny and Meister, 1997; Bedny and Karwowski, 2007; Bedny, 2015; Bedny, Karwowski, and I. Bedny, 2015. Collection of works in applied and SSAT were presented in the book under the edition of Chebykin, et al., 2008. From systemic-structural perspectives, activity can be defined as a goal-directed system, in which cognition, behavior, and motivation are integrated and organized by a mechanism of self-regulation toward achieving a conscious goal. In cognitive psychology cognition is a process. According to SSAT, cognition is not simply a process. As it is in physics, where light has both waves and particle characteristics, in the systemic-structural activity theory cognition is understood both as a process and as a system of actions or other functional information processing units. Thus, cognition incorporates both the process and the structure and therefore should be studied as a system that unfolds as a process.

In this work, we pay attention to general activity theory and present critical analysis of how it is used in the West. General applied and systemic-structural activity theories are interdependent. However, their interdependence should not be construed as their identity. The study of human work cannot be restricted by general activity

theory. Major role in this area of study belongs to applied and systemic-structural activity theories. We emphasize on the shortcomings of general activity theory when applying it to the study of human work. We also consider some difficulties that Western scientists experience in the process of adaptation of this theory.

2. The goal concept in activity theory and in the interpretation of Western psychologists

Below we consider some basic concepts of general activity theory. In order to understand activity as a goal-directed system it is essential to understand the goal of activity. Currently, most of the works within activity theory in the West are restricted to the sociocultural approach

to activity study. Write instead: The so-called triangular model of activity developed by Engestrom (1999) is a very popular one. It is based on the three-component linear scheme “*Subject* → *Tool* → *Object*” which is used in activity theory he developed his basic triangle scheme. In this model of activity goal is mixed with object. Engestrom and others who worked under the restriction of sociocultural approach of activity, have interpreted the term “object” in this schema as synonymous with “objectives”. To emphasize our point, the notion of “objectives” relates to the goal, rather than to object of activity. The object of activity refers to an object that has been modified by subject according to the goal of activity.

In the West, in such psychology fields like cognitive psychology and social and personal psychology, and in the field of motivation goal is considered as a combination of cognitive and motivational components. Among professionals in these areas of psychology there is also a general consensus that goal can be conscious and unconscious (see Austin, Vancouver, 1996; Pervin, 1989; Locke, Latham, 1990). In contrast to such approach where goal has both cognitive and motivational features, in activity theory goal is a cognitive mechanism connected with motives. Data analysis demonstrates that in activity theory concept of goal has significantly different characteristics and meaning. The main differences are: the concept of goal is related only to human behavior or activity; the goal always includes conscious components; the goal is a cognitive representation of a future result of subject's own activity, goal connected with motive and creates a vector “*motives* → *goal*”.

In contrast, such representatives of I/O Psychology as Austin and Vancouver (1996) give the following definition of goal: “Goal is an internal representation of desired state of the system”. In activity theory the term goal is used only for analysis of human activity. The desired future state can be applied not just to a human goal. It may be the result of events not directly related to human activity. The desired future result becomes a goal only if it directs human activity and goal can be achieved as a consequence of such activity. Human goal and system goal are not the same. Vancouver operates with the most important categories of psychology in a very confident and the same time irresponsible way. He insists that there

are two types of goal (Vancouver, 2005, p.329). The first type is a goal for perceptual unit of behavior and the second one is for internal unit of behavior. For internal unit goal is simply desired level of errors. In this case, the author's arguments are contrary to all existing data in psychology. Goal cannot be considered as desired level of errors. There are no external perceptual and internal goals. Perceptual activity cannot be strictly isolated from other kind of mental activity and from emotionally-motivational process. Moreover, external behavior is closely linked with mental and emotional-motivational processes.

With great self-confidence Vancouver also introduced another type of goals. Trying to link the goal with self-regulation he introduced attainment goal and maintenance goal. The notion of "maintenance goal" from his point of view helps to connect the concept of goal with the concept of self-regulation. The author misinterprets the concept of self-regulation of human activity by reducing the process of self-regulation to elimination of deviations from a so called "maintenance goal". Understanding of self-regulation as a process of elimination from "maintenance goal" is a homeostatic principle of self-regulation. However, human activity is not limited to the elimination of errors that deviate from the standard. Such simple tasks are usually accomplished by technical systems. Typically, if situation deviates from acceptable limits, the performer formulates a new goal and therefore new task which help to eliminate deviation. At the next stage he/she performs a logical system of actions aimed to achieve this new goal. Thus, the introduction of "maintenance goal" is totally unfounded. Moreover, self-regulation cannot be reduced to elimination of errors. According to Vancouver (2005) if a subject makes an error, it gives him/her an opportunity to eliminate it. Then another error is made and corrected. Human behavior cannot be reduced to a process of error elimination or moving from one error to another. In ergonomics and in SSAT there are such notions as error, mistake, failure, range of tolerance, acceptable level of deviation, and so on. Vancouver demonstrates his complete misunderstanding of the concept of error in psychology. He reduces self-regulation to errors elimination or another word to homeostatic principles of self-regulation.

Self-regulation cannot be considered as elimination of the so-called disturbance and errors. Self-regulation process in a conscious activity and, first of all, goal-directed process that allows not only correction of errors but also prediction and prevention of them. Self-regulation takes place even when there is no disturbance and errors as it is considered in the above described example. Vancouver reduces self-regulative process to elimination of errors which is the result of disturbances. Our activity is a self-regulative system. Self-regulation is a complex process that regulates the entire activity and, thus, the term "maintenance goal" is not an accurate one. Disturbances include danger, unanticipated events, emergencies, etc. Subjects have to improvise and adapt to the contingency of such disturbances. Because of the distur-

ances, self-regulation process becomes more complex and strategies of task performance change. There are strategies utilized in normal work conditions, in dangerous situations or other disturbances, and transitory strategies, when a subject transfer from existing strategy to a new one. Foundation for all these strategies is the process of self-regulation that involves goal-formation. Analysis of Vancouver's publications is only one example demonstrating that there is currently no clear understanding of goal, task, self-regulation and other important concepts that are necessary for task analysis (Bedny, 2015). Industrial/Organizational psychologists who study human work cannot apply such primitive theoretical data into practice.

It should be noted that in activity theory the goal of a future desired result of performance can be presented as a combination of an imaginative and verbally-logical representation. The goal also has various levels of specificity or precision and can be clarified and becomes more precise and specific in the course of activity. However, if the goal is completely changed, an achievement of this new goal will mean that the subject was involved in a new activity. The image or mental representation of the future result becomes the goal of the task only during interaction with motives of activity, which determines directness of the activity to achieve the goal. Depending on the motives, with which goal is connected, acquires a different personal sense. Goal acts as a cognitive, and motivation as energetic components of activity. In activity theory, the concept of goals is closely linked to the concept of task. The goal of the task is the major determinant of the logical organization of actions during task performance. The goals of individual actions during the task performance are of a particular importance in the analysis of individual actions and in the formation of the task performance program.

In cognitive psychology, in social psychology and in motivational theories goal is not considered in the context of the tasks performance. Moreover, terms such as activity and actions are often not distinguished. All of this makes the notion of goal as very amorphous, and undetermined. The goal emerges as a motive, as a cognitive entity, and as a characteristic of personality. This makes it virtually impossible to use this concept in the task analysis. Awareness of the goal of task as one of its most important characteristics is ignored. All these drawbacks are eliminated by goal interpretation in systemic-structural activity theory (Bedny, Karwowski, 2007). It is also important to consider the relationship between the goal and consciousness. In various areas of psychology, the goal is seen either as a conscious or unconscious element of human behavior or activity. For example, Austin and Vancouver (2005) wrote that goals are not limited to a conscious level. Indeed, if we are talking about low level goals, which are specific to biological systems, these goals can be unconscious. As an example, Tolman (1932) in his theory instead of goal utilized the term purpose. However, in the theory of activity human goal is always conscious to some degree.

Goals of actions are often formed involuntarily. They can be conscious within a short period of time and quickly forgotten. The goal of the task can be formulated more consciously and stored in memory for a longer time. There are proximate and distal goals. The proximate goals can be achieved in a relatively short period of time. The distal goals are removed in time. The progress toward a distal goal presupposes the existence of a number of intermediate goals. An involuntary goal formation process is more typical for the formation of the goals of separate and especially to habitual actions. If we are talking about a task's goal, such a goal is often formed voluntarily. Voluntary goal formation process is particularly important to the study of human work.

The subject may or may not accept the goal formulated by the instruction. Moreover, in response to the presented goal a subject can formulate her/his own goal or modify the goal, which is given by the instruction, and which contradicts to the objectively presented by the instruction goal.

In activity theory goal is always associated with motives and creates the vector *motives* → *goal*. This vector defines the direction of activity. This vector is directed at the achievement of the required goal.

Leont'ev (1977/1978) wrote that in some cases the motive can move to the goal. However, the vector representation between the motives and the goal is eliminated in such situation. The vector turns into a point and the goal-directed features of activity disappears. In addition, the integration of the goal as a cognitive mechanism with an energetic motivational mechanism leads to the fact that the same task can have multiple goals. This is explained by the fact that our activity poly-motivated. Hence, not very accurate description of relationship between motives and goal described by Leontiev leads to a multiple incorrect interpretation of the concept of goal.

A lack of clear understanding of goal leads to the situation when some authors propose to eliminate the concept of goal in the task analysis entirely (see, for example, J. Karat, C-M. Karat, Vergo, 2004, *etc*). This is partially due to the fact that in cognitive and social psychology, and in theories of motivation goal has both cognitive and motivational features. In other words, the goal and motives in task performance are not distinguished. In most cases our behavior is poly-motivated. According to the above-mentioned scientists, one task has multiple goals of task which is impossible, because one task can have only one general goal of task. We consider only some examples of analysis of the concept of goal which were conducted in the framework of SSAT.

3. Psychological characteristics of actions

Let us present brief analysis of the concept of action, from the SSAT perspective. Leading experts in the theory of activity in the West Nardi (1997) and Suchman, (1987) based their analysis on some basic works of Vygotsky and Leont'iev. They came up to the conclusion, that human actions cannot be utilized as units of analysis of work activity. In their view, actions are always included in the

context of activity and therefore unit of analysis is activity. However, anyone who is familiar with activity theory in the former Soviet Union knows that action is a basic unit of activity analysis but activity is the object of study. One of the reasons why these authors interpreted it in incorrect way is an unclear description of the basic characteristics of the action in Leont'iev psychological school. According to Leontiev, activity is a dynamic system, and stressing on the dynamism of activity and its elements, he is not sufficiently justified an explanation of this problem. For example, he asserts that some simple actions can be combined into more complex ones. However, this process is limited by the capacity of working memory. Analyzing the relationship between the action and the operation, Leontiev gives the following example.

You can physically dismember a material object with different tools, each of which determines the way this action is performed. In some conditions, the cutting operation will be more adequate, and in others -the sawing operation is more adequate; while it is assumed that a worker knows how to use the appropriate tools - a knife, or a saw, etc. (Leontiev, 1977, p. 107).

The above example is the evidence of Leont'iev confusing the technical operation of cutting a metal with a hacksaw with a psychological operation as a component of a man's motor action. Metal cutting with a hacksaw is a production operation. Production operation can be very time consuming. It includes various perceptual and physical actions which required sufficiently significant efforts and coordination of these actions under visual control. For example, if the metal work piece is fixed in a vice and the hacksaw lies on the workbench to the right, a worker can do the following: move right hand to the right and grasp hacksaw (the first motor action); move hacksaw in the exact position above the work piece in the exact position (the second motor action); move left hand forward and grasp hacksaw (the third motor action); and start to perform a sequence of motor actions by moving hacksaw forward and backward, under motor and visual control (quantity of movements instrument depends on specificity of cutting of metal work piece). Motions as components of motor actions should be considered as psychological operations.

For example, when a worker performs the motor action "move right hand to the right and grasp the hacksaw" (the first motor action); he performs motion "move the hand to the required position" (the first motion or psychological operation) and grasp the hacksaw (the second motion or a psychological operation). Real psychological operations are motions which are included in content of motor actions and these motions are integrated into motor actions by the goal of action. The description of cognitive or motor actions in a such a way is described in SSAT (see for example Bedny, Karwowski, 2007; Bedny, 2015).

It is not accidental that representatives of Leontiev's theory of activity confuse actions and production operations, and actions with tasks. For example, in the collection of works in the book "Psychological basis of profes-

sional activity”, Strelkov (2007, p. 810) wrote that purely mental actions cannot be considered as units of activity analysis. They can be considered as an action when motor components are presented in their content. In other words, he rejects the concept of mental or cognitive actions. In his other publication in the same volume in description of the psychological content of pilot’s activity during the flight (Strelkov, 2007, p. 265), he wrote that one action ensuring the reduction of the aircraft height lasted 20 minutes. However, reducing the aircraft height during 20 minutes is a difficult task performed by the pilot, but not a separate action of the pilot. Such a task is performed by various cognitive and motor actions. We can bring more examples analyzing the work of specialists from Moscow University.

In spite of the endless theoretical discussions about activity theory, similar theoretical mistakes are made by specialists in the West. Being unfamiliar with the data in the field of applied and particularly in systemic-structural activity theories, they cannot effectively use activity theory in the study of human work. For example, Kuutti (1997, p. 25) wrote that activity is a basic unit of analysis, however as we emphasized above, activity is not a basic unit of analysis but the object of study. On page 33 of his writing, Kuutti presented the following example of human action and human activity. He writes, that “Building a house is an example of activity whereas “fixing the roof” is an example of action. However, both examples are a part of the production process that includes various tasks and various actions which farther can be broken down into psychological operations.

An *action* is defined as a discrete element of activity that has a purpose of achievement an intermediate conscious goal of activity. Performance of all actions required by the task leads to the achievement of the goal of the task. The structure of activity during the task performance is formed by a logically organized system of motor and mental actions; action emerges as the primary unit for the morphological analysis of activity. Actions can be further divided into sufficiently conscious or even unconscious operations, the actual nature of which is determined by specific conditions under which activity takes place. In activity theory, cognition is considered not only as the storage of images, concepts or propositions, but also as the system of mental actions and operations carried out with and upon them. All actions have a temporal dimension. The initiation of a conscious goal of an action constitutes the starting point of the action; it concludes when the actual result of the action is evaluated in relation to the goal of action. This understanding allows to present continual flow of activity as a process that is divided into individual units. Actions can be described in terms of a recursive loop structure, with multiple forward and backward interconnections.

Action may be formulated in terms of the object of action, the tools and the subject of action. Actions are the result of the social-historical development. They are socially mandated prior to the subjective realization.

Subjects are taught to perform basic socially required actions. Each object has specific associated actions, governed by social norms and values. Actions are facilitated by tools that similarly possess historical and cultural context. Actions imply an existence of the object of action. They are not isolated but are typically related to a class of similar actions. Individuals can extract principles of performance of particular actions from these classes because actions from the same class share general functions and purposes.

There is a certain similarity between actions and words. Actions possess semantic, syntactic and pragmatic features analogous to words. Syntactic features of actions are determined by their rules of organization into a system. Semantic features of action may be discovered through the relationship of an action to its object or to other actions. Pragmatic features of actions can be determined by their role for the subject and particularly in their relation to motivation. Verbal activity may also be presented as a system of actions possessing syntactical, semantic and pragmatic features. Verbal actions may be considered as a coherent organization of words around conscious goals integrated into a unified expression (Bedny, Karwowski, 2007). Verbal actions are more often used as a tool for communication that may also be used as a tool for self-regulation in a dialogic process. Non-verbal actions are typically object actions, or may be mental actions involved with the manipulation of mental signs and images.

We can outline two methods of action description. One method is based on the description of changes with objects that are performed by actions. Typically, the names of action and changes performed are formulated as instructions analogous to software code. For example, “turn on the engine.”, “move the lever”, “read display”, etc. These kinds of actions are conveyed by instruction, and are classified according to particular specific features of an object. However, actions may also be classified according to their psychological characteristics, i.e., by psychological processes and mechanisms implicated in their performance. For example, “memorize”, “detect” “move arm”, etc. Based on these criteria we can infer two methods of the description of actions. The first consists of actions classified as typical elements of a task, based on technological principals or the nature of modifying the object. The second method is based on psychological principals that involve the description of typical elements of activity (Bedny, 2005). Usually, at the first stage, actions are described according to technological principles and then are transformed into typical elements of activity. For example, an action” move a lever into a particular position” is a technological description of the action. At the second stage the same actions may be described as “move arm with object into exact position with force of two pounds and a distance of 30 centimeters.” The last one is much more precise. Later on, exact descriptions of the actions, unrelated to technological aspects of the situation, were developed. From these

descriptions one can infer that this is a motor action that requires a high level attention (third level of complexity) and performed over a distance of 30 cm. with musculature effort which equal 2 pounds. This gives us precise picture of motor action even without knowledge of the specifics of equipment and technology which was used.

Since action is organized as a self-regulated system, the starting point of any action is the moment when the goal for the action is formulated or accepted. The terminus of an action occurs when the result is evaluated, thereby engendering a continuous flow of activity, divided into individual units, delimited by intermediate and terminal goals subject to the evaluation of the outcomes of the action.

According to Leontiev (1977/1978), actions performed repetitively during training become automated and unconscious. During training, these actions are then abbreviated and become elements of more complex actions anchored in conscious goals. Leontiev called these unconscious actions embedded in more complex ones operations. Operations that are included in the particular actions determine the method for performing actions. The notion of operation in the psychological meaning should be distinguished from the production operation. Dividing actions into small units is a part of the consensual paradigm of activity theory. In the case of motor actions instead of notions of operations, they consist of motions; in the case of mental actions these may be seen as comprised of psychic acts. Psychic acts are cognitive actions automated during the training of cognitive action. They lose their quality of consciousness of goal and, are thereby, assimilated to more complex cognitive actions.

According to Leontiev, mental and motor operations always begin consciously, and then, during automatization they are becoming unconscious operations. We contend, however, that some other motor and mental operations are never conscious, but are acquired unconsciously and remain as unconscious elements of activity (Bedny, Karwowski, 2007). In order for these elements to become conscious, special methods of training and teaching are required. Frequently special training is called for to elevate these operations to consciousness and transform them into consciously regulated actions.

There are different levels of the regulation of activity that are a function of the extent to which an activity is voluntary and conscious. The more complicated levels of self-regulation of activity calls for orientation to the situation, development of goals, and deliberate planning etc. Highly automated activity entails goals involuntarily triggered by stimuli, which, in turn, guide subsequent cognitive operations and actions. Planning and the evaluation of results are extremely abridged. The lowest levels of activity regulation guide reactive behavior. In some cases, activity can start from unconscious, automatized operations, that can be raised to consciously performed actions at subsequent stages. This process was elucidated in the study of activity of pilots during emergencies (Ponomarenko, Bedny, 2011). Thus, we respectfully

disagree with Suchman (1987) that plans or goals have more to do with reasoning about the action after it has already taken place. Suchman ignores the notions of levels of regulation of activity and fails adequately to distinguish activity from reactive behavior. For example, in the rule-based behavior, according to the Rasmussen's (1983) terminology, there are always components of activity associated with preliminary planning which combined with mechanisms of situational adjustment and constructions. At the same time, thinking or creative activity (knowledge based behavior) in general by definition cannot be fully anticipated or planned, but develops as a process requiring direction and shaping in accordance to information from obtained results (Brushlinsky, 1987). Suchman (1987) introduced the concept of the situated action that emphasize the dependence of action from a situation. However according to SSAT, activity and its constituent parts - actions - are always situated because they are developed according to the principle of self-regulation (Bedny, G., Karwowski, I. Bedny, 2015). Actions and activity in general are constructed or adapted to situation according to the mechanism of self-regulation. However, some components of preliminary planning also can be fined. Planning is an important anticipatory mechanism of activity. A plan cannot be considered as "retrospective reconstruction" as it is stated by Suchman. A plan always precedes activity. A plan includes conscious and unconscious components. Their relationship during planning depends on the level of self-regulation. As a result of self-regulation, the same task may be performed in various ways. In response to the external conditions and the internal state of the operator, goal directness, anticipation, and planning combine with flexible reconstruction of strategies of activity. The plan which can be adapted or changed depending on the situation we call strategy. This understanding of activity, on the one hand, contradicts the construal of activity as a rigid, pre-planned sequence of actions. On the other hand, the theory of self-regulation of activity contradicts the concept of situated action insofar as the theory of activity assumes flexible regulation of activity in accordance with a voluntary goal in response to varying situational requirements.

Delineation of the basic components of activity and units of analysis empowers the design of man-machine and human-computer systems informed by the alignment and coordination of external and internal means and conditions of activity. External means of activity includes components of equipment and external tools with which a subject interacts during the process of work. External tools of activity refer to presentational controls, displays, screens, instructions, diagrams and other media for conveying information to an operator. Internal tools of activity are conceptual models, images of external world, skills, knowledge, etc. used by an operator during activity. These interactions must be, of course, responsive to external conditions and constraints. Effective alignment of external and internal tools of activity allows for the transformation of the object of work into a required product or

result with maximum psychological and physiological efficiency. In this frame, individuals are not construed as a reactive organism, but as a subject whose actions are guided by voluntary, established goals. Therefore, the man-machine interface, or a human-computer interaction is treated as an interaction of the subject, tools and objects.

4. The translation factor and the specific meaning of terminology in activity theory

Analysis of Activity Theory (AT) and possibility of its application in the West (maybe: in the Western psychology) has practical and theoretical meaning. Fundamental difficulty for adapting general AT in English speaking countries is associated with cultural, philosophical, historical and psychological roots from which this theory derived. Many translations from Russian to English fail to capture the original meaning of Activity Theory's key terms.

There are language issues in translation activity theory terminology. Complex concept in activity theory sometimes not clearly defined. Moreover, the words utilized in Russian language do not often have exact translation in English language. Accepted meaning of different words in considered languages are not the same. Let us consider some examples when we encountered difficulties translating from Russian to English, for example English word "purpose." Analysis of this concept was important for soviet psychologists when they tried to examine this word with basic concept in activity theory as a goal. According to activity theory such concepts as *purpose* and *goal* carry clearly different meanings within activity-theoretical psychology. The *goal* in Russian language is *tcel* which can be translated as goal, but *purpose* or *intention* should be translated into Russian as *namerenie*. Soviet activity theorists made enormous efforts clarifying the differences and similarities between these definitions, and, in particular, distinguishing *tcelesoobraznost* - *purposefulness*, purposeful behavior – *telenapravlennost*, and "the intention to reach the conscious goal." These are examples when special comparison of meanings of various terms is required. Scientist conduct analysis in what specific context these terminology is used in different scientific communities. Thus, for adapting high generality theory in various countries with significantly different languages and social environment comparison of different theoretical approaches should be conducted. The limitations of terminology impose a limitation on the application of the theory and also demonstrates its level of development.

It should be noted that in the general activity theory where not only its own psychological concepts are important, but also the philosophical worldview terminology is utilized. The later is not clearly developed in general activity theory.

Major purpose of translating scientific terminology is correct interpretation of its meaning. This process cannot be reduced to association of words from different languages and corresponding referent. For example, the term *deyatelnost* in Russian language does not exist in Eng-

lish. It is translated as *activity*. The word *activity* in Russian language can be associated with such meanings as active, passive, activation. In English the term activity can have various meanings which does not have any relationship to Russian word *deyatelnost*. Only careful scientific analysis of meaning of the word *deyatelnost* can help scientists in the West to correctly interpret the meaning of this word. In the general theory of activity, terminology is not always clearly worked out. This make it more complex to correctly interpret its terminology in translation. As we already demonstrated above, Leontiev (1978), who presented interesting data in the study of such concepts as meaning and sense, nevertheless presented incorrect examples of actions in particular practical situation. At the same time the major difficulty in interpretation of activity theory terminology is sociocultural differences in considered countries. The sociocultural differences give a scientific terminology different way of its interpretation. How correctly scientists in the differently speaking countries with different culture can conduct analysis of existing theory determine success in interpretation of this theory. Thus, we emphasize on the role of correct interpretation of activity theory in the West but not simply on the translation of it.

Ignoring Rubinstein's work, analyzing a comparative analysis of his work with the works of Leontiev and Vygotsky, and concentrating only on the data obtained only from the Moscow University studies in addition to the lack of translations lead to the incorrect interpretation of the activity theory in the West.

Conclusion

Activity theory has a long history of development in the former Soviet Union. This theory is attracting great attention of professionals in the West. In this brief article, we outlined two basic aspects of adapting this theory in the West: translation and interpretation. Translation of activity theory terminology presents significant problem for understanding of activity theory in the West. There are no precise words in English language for correct translation of Russian language terminology into English terminology. The words utilized for translation have different meanings for those in the West. Translation problem between different cultures is complex process that require theoretical analysis of existing terminology in Russian language and its comparison with terminology which utilized in psychology in the West. Based on such scientific analysis it is possible to provide not only adequate translation basic terminology, but also developed more advanced one and eventually provide development activity theory which makes it more applicable in various fields of psychology.

The attempts made to interpret activity theory in English speaking countries by specialists, who identify themselves as sociocultural activity scientists, suffers from certain limitations attributable not only to the problem of translation terminology, but also to activity theory itself immersing from the diverse, conflicting schools of thoughts. Activity theory cannot be reduced to either

Vygotsky's sociocultural theory of mind or Leontiev's version of activity theory. Practitioners in the West, who study human work confront a number of difficulties in the translation and interpretation of different concepts and principles of activity theory. Object of study get confused with units of analyses or objectives, actions get confused with activity, body organs get confused with tools. Object in some scientists' work becomes synonymous of objectives, or goal erroneously integrated with motives. This is not the problem of translation, this is the problem of interpretation of data that was obtained activity theory. Another important shortcoming of some representatives of sociocultural activity theory is the attempt to develop low-productivity methods of analyzing work activity ignoring the achievement in applied and systemic-structural activity theories, which is accompanied by serious mistakes that are generally not permissible in scientific research at all.

We began our discussion by considering general activity theory. This theory has been used to examine a

number of different practical problems in such domains as education and performance. At the same time this theory does not provide the exact method and principles and methodology for the study of human work. General Activity Theory is only the philosophical framework for studying human performance. In the framework of applied and systemic-structural activity theories not only important data that have applied meaning were obtained, but also data that has general theoretical meaning for psychology. In conclusion, we also want to turn readers' attention to the fact that in present systemic-structural activity theory receives more and more recognition in the West.

In this short article, is impossible to cover all questions which have to do with the analysis and interpretation of activity theory in the West. We were able to present only brief analysis of this problem. A more detailed analysis of the described issues can be found in SSAT.

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Григорій Бедний,

доктор психологічних наук, професор,

Коледж Ессекс,

Університетський проспект, 303, Ньюарк, США

ТЕОРІЯ АКТИВНОСТІ НА ЗАХОДІ ЯК ПОТЕНЦІЙНИЙ ПІДХІД ДЛЯ ПРИКЛАДНИХ ДОСЛІДЖЕНЬ

Теорію активності було розроблено в колишньому Радянському Союзі. Вона також отримала визнання на Заході, і особливо в США. У статті розглянуто основні поняття теорії активності та проаналізовано деякі труднощі, які західні вчені відчувають у їх тлумаченні та застосуванні теорії в науці та практиці. Переклад термінології теорії активності представляє значну проблему для її розуміння на Заході. В англійській мові немає відповідних лексем для передачі деяких понять з російської мови в рамках цієї теорії. Слова, що використовуються при перекладі, мають інше значення для англомовних людей. Практикуючі науковці на Заході стикаються з низкою труднощів при перекладі та тлумаченні різних понять та принципів теорії активності. Об'єкт дослідження плутають із цілями, дії плутають з діяльністю, органи тіла плутають з інструментами. Проблема перекладу між різними культурами є складним процесом, який вимагає теоретичного аналізу існуючої термінології та її порівняння з термінологією, яка використовується в психології на Заході. Спроби інтерпретувати теорію активності в англомовних країнах фахівцями у сфері соціокультурної діяльності мають певні обмеження, пов'язані не лише з проблемою перекладу термінології, а й самою теорією активності, яка сама по собі виходить з різних, суперечливих наукових шкіл. Теорія активності не може бути зведена ані до теорії розвитку вищих психічних функцій Л. Виготського, ані до теорії діяльності О. Леонтьєва.

Ключові слова: загальні, прикладні та системно-структурні теорії діяльності, концепція мети в психології, когнітивні та рухові дії, саморегуляція.

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