

A.N. LEONTIEV

## Lecture 36. Thinking and Activity

Comrades, we have a special situation today. During the previous lecture I received several notes with extremely relevant questions, so I decided (and I believe this is the right thing to do) to devote our time today to answering those questions.

You see, all the notes were important and I got the impression that they demand an extensive response, and perhaps there will even be some additional questions that will call for answers. We have to pause briefly and make sense of the material that I introduced. I made this decision primarily out of pedagogical concerns, so permit me to start today's class with answers to those questions.

I have organized the questions that I received into a certain system. One of the notes says, "You gave the following definition of thinking: thinking is a process with the help of which we can, through mediation, judge that which is hidden from our sensory perception. Doesn't this definition contain," the comrade asks, "a sort of vicious circle? 'To think' and 'to judge' are terms defined using one another. Isn't there a formal logical error in this definition: defining an unknown through an unknown?"

It is a very important question. It is important in itself as a question

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on the definition of thinking. It is also important as a question about definitions in general.

The definition that was given by me and that I quoted from the note is one of the possible definitions of thinking. When we are talking about definitions in general it must be kept in mind that any definition—whatever is being defined—contains a certain assertion that cannot completely capture the essence of what is being defined. From this perspective such definitions as the following are just: “thinking is a special kind of activity” (correct?) or “thinking is a function of the brain of a subject.” Correct? Correct. “Thinking is (now for a cognitive definition) the process of the transition from not knowing to knowing.” Correct? Correct.

I am formulating a simple, generally known thinking: a definition cannot completely exhaust the essence of an object. And it makes sense (I would add, from my own point of view) only in relation to a certain problem being solved. What problem did the definition provided solve—the one I quoted from the note? This definition corresponds to an explicit problem: to specify, that is, to indicate the special feature of this class of processes for reflecting reality. The question of thinking as reflection was formulated from the very beginning. Consequently, it is necessary to specify this kind or class of reflective processes as distinct from another, very broad class of processes of psychic reflection, specifically from the processes of sensory perception—as you recall, the thing I started from. When we talk about psychic reflection, we are primarily dealing with direct sensory reflection. And this form does not exhaust all forms of reflection. There arises yet another form of reflection that we usually refer to as thinking reflection, cognitive reflection or simply thinking—alongside the processes of perception. In some way, they differ from the processes of sensory reflection, from the processes of feeling and perception, which we dealt with in the previous section of the course. Naturally, it was necessary to find that which is specific to thinking—where necessary to distinguish thinking from perception. And then we have the answer: thinking is distinguished by its mediated character as opposed to the immediacy of sensory reflection. So, here we do not have a logical circle—defining the unknown through the unknown. Here we have an indication of the special feature of this form of psychic reflection. It is expressed in the definition that corresponds to the problem now: to distinguish perception, this form, from thinking. This is why I talked in detail: you can use as criteria the contribution of linguistic meanings—this is not a criterion because I refract what I see as if

through a prism of meaning, that is, before me is not, for example, something black or elongated, but what? A microphone, correct? A sheet of white paper? A paper clip? The assignment of meaning is the essential moment of perception, at least human perception. So that is not it. Generalization? Incorrect. I cannot take generalization as a criterion for the simple reason that the images themselves can be generalized, at least along the lines of Galton's photography, if you follow the old, naive idea of sensory generalization: superimposing the similar to bring out the common, the essential—of that which is the same in different impressions. True, this is a very naive idea, Galton's idea. I bring it up as an illustration, an example. Of course, no generalization will occur. This is how a family photograph is put together according to Galton, that is, if you photograph many, many relatives on one plate, each time photographing them without a complete exposure, so that the total exposure will incorporate both the sensitivity of the material and the lighting of the subject, then you will wind up with a sort of generic image—a family photograph—and you will see that something will be preserved in the photograph, something common in the facial features, configuration (of course, everything must be photographed on the same scale). And what is individual will be erased. Of course, Galton's idea is more than naive and does not withstand any criticism. We could do that, but that is not how generalization occurs—not through the elimination of what is rarely represented and the emphasis of what is often represented. True? That is truly some sort of generic image, but such a very idiosyncratic level of generalization, in relation to which one could even formulate the question as: does it even exist, did Galton just make it up with the help of the image of the camera that photographed with a partial exposure?

So, it is not generalization, not refraction through the prism of meaning. You can still find some criteria that can be used. Yes! Here is something else that I said: the image, that is, the sensory perception is the image of the thing, and thinking is the relationships between things. First, the relationship between things is a characterization of things. It is interesting that even in the early stages of development, apprehending an object and forming an image of an object, we will always form, study this object in its relations; what kinds of relations—that is another question—but spatial, for example, definitely, temporal, definitely. When we talk about perception in general, we are dealing with an objective reality of at least four dimensions. I am talking about objective reality, real-objective reality. Because the world exists only in three-dimensional space,

space is the form of its existence and without it there are no objects, no things, no objective material, no material objects. And it exists in the same way in time, and somewhat the same in movement. And so together we have come up with four dimensions: three spatial and add to that time, if you want, call it movement.

And imagine the situation of some animal (not to mention a person), even one not very smart. In what kind of a world does it exist? In an immobile or a mobile world? A mobile world would involve changes over time, true? Because such is the objective form of existence of objective things. Does it deal with a world of shades or three-dimensional objects? With a world of three-dimensional objects. And when psychologists began to develop their research in the area of perception, then of course two-dimensional representation, representation on a plane, began to be favored in research. It is something rather difficult and secondary in relation to the perception of representation in three dimensions, it is a well-known abstraction. Just think, the three-dimensional world represented on a plane! That is a sophisticated representation! I will point to a small study (I am returning now to man), it has been published, but, unfortunately, I believe it is in Ukrainian, and not in a widely circulated publication. It is engaging. There they took very small children and gave them illustrations from books for children of the same age and then discussed with these youngsters what was shown, through their questions directing the attention of the child (speaking in everyday language) to the spatial orientation of objects. They discovered amazing things: things relatively farther from me are higher, things closer to me are lower. This study was conducted a long time ago in connection with one practical problem, a social problem. A problem had arisen in connection with the illustration of books for small children. They took pictures from existing books published during those years by the current publishing houses. This was in approximately 1932. We discovered a very simple thing: for small children there is a definite need to clearly indicate spatial placement in pictures; for instance, you cannot just draw a frog without grass—it will not mean anything to the child. You have to show the ground, the grass in the picture, you have to introduce the conventions in the same way that conventions are established through formal education, that at the top of a geographical map is the north. This is something absolutely conditional.

In short, we are dealing with this world, and, therefore, it is here that we must find a special criterion. It is the mediated character of thinking

that is this criterion, this distinction, specification. But, again, I repeat what I said (I will put it together from memory): when we say “mediated,” we always have to indicate, reveal from the start, what constitutes this mediated character, because absolutely everything is mediated. To talk about a “mediated process” is the same as saying nothing. We immediately run into the question: what about an immediate process? Might I not find its mediated character? We are constantly dealing with complexly mediated processes. So, what constitutes mediated character? I illustrated how you can get an idea of an object’s hardness—using one object to scratch another. So, you have to bring one object with a property that is inaccessible to immediate perception into interaction with another. And if it turns out that this object changes the image I perceive, then I can judge by that which I perceived about something inaccessible to perception either qualitatively or quantitatively. It makes no difference. Let us say that a quantitative evaluation dealing with a hardness scale is not immediately accessible to me, or that a qualitative analysis is not immediately accessible in the case of an x-ray. Either the bounds of my sensory perception are limited by the number of my receptors, or by their sensitivity, their thresholds, the range within which the receptors operate. As soon as we have fixed these limitations, then a whole multitude of inaccessible things immediately changes. The process of thinking is the process of transforming what is immediately inaccessible, that is, incapable of immediately impacting our receptors into something accessible through that which is accessible. Here is the double play. Is this idea clear or not? Then the matter of definition is settled. Here, “mediation” is meant “in comparison to the immediacy of sensory perception.” Although it is mediated through meaning, this is something different. Therefore, we can regard my definition as correct (I will remind you of it once more): a process with the help of which we can, through mediation, judge that which is hidden from our sensory perception

Here, we can substitute the word “judge” with the words “move from the perceived to that which is hidden from perception, feeling.” Here, the emphasis is not on the word “to judge,” but on “mediation.” As far as the unknown character of perception is concerned, the question is eliminated. Why? Because if you ask: are the processes of perception known and is the process of perception fully known? I will give the same answer as if you asked about any other thing or about any other process: no, it is completely, of course, unknown, and probably this goes on without end, true? We know something, after all, we determined something

in advance. The question is something else: is it true or untrue? We have knowledge about perception, and, juxtaposing this knowledge we clarify one of the special features of thinking. Which one? The one that reveals thinking when juxtaposed with perception. And no other.

The second note is very difficult. Or, not very, no—the difficult comes later. The question: “Would you be able to give a categorical characterization of the concept ‘thinking’ within the framework of activity theory?”

This question is somewhat harder than the previous one for the following reason: this question is not very clear, or rather, it can be understood in various senses. I will nonetheless try to answer this question, taking the written note in its simplest meaning.

The simplest meaning would be to provide certain characteristics of thinking within the framework of activity theory. Consequently, I will set aside for now the concept used by the note’s author, “categorical characterization.” And in passing over this, I will talk now about a characterization of thinking as the usual thinking process appears within the system of the general conception of human activity. From this perspective, we must first of all establish the fact that thinking is a human activity, and not something added to activity or its separate side.

First of all, this type of activity must be given some sort of designation in order that we will then be able to use that label to identify this activity, to indicate it, and have it in mind. Naturally, everyone understands this, and in this is the essence of the matter, but it is necessary to simply and terminologically introduce the idea that thinking is an activity, a special activity, specifically it is an activity that we will call “cognitive.” Now we have to see what it is we are calling cognitive activity? What is it that makes thinking a cognitive activity?

When we say “cognitive activity,” we mean that this activity is in response to some cognitive motive. This cognitive motive endows a given activity, that is, a thinking activity, a certain sense for the subject, a “personal sense,” as I sometimes say. So, this activity, just like other types of human activity, is complexly regulated, in particular, it is also regulated (specifically because it is motivated) by, we will say, “subjective regulators.” This is a very conditional naming, and I will explain what I mean in everyday terms.

For instance, unlike some other activity, it is still emotionally, affectively regulated. This gives thinking, from the perspective of a psychologist, the character of an activity, and not a chain of objectively characterized processes. This is very serious. We always talk about think-

ing as the activity of a subject maintaining his life, that is, of a living being. And, I am not going to endlessly pronounce repetitious aphorisms: “without imagination (or without emotion) there cannot be a search for truth,” you understand? There is an infinite multitude of such assertions by philosophers. But most important, they have been stated by scholars and by professional “thinkers.” And if you like to read literature about the processes of scientific creativity, about the history of scientific discovery, then you have probably noticed that these descriptions are constantly interspersed with references to some emotional components of this activity of highly developed thinking. This is, of course, a doubtless fact, and without this fact it is impossible to understand not only the specific dynamic of the process, but even those fundamental transformations that these processes of cognitive activity undergo.

Thus, what characterizes thinking as a human activity? First of all, it is cognitive motivation: for the sake of what does that activity unfold? When I say “motivation,” I always have in mind the need behind the motive, the need that finds its development, its content, and conceptual character through the motive.

You probably know what meaning Pavlov assigned to the orienting reflex and what meaning in general is assigned in contemporary psychology to orienting-investigatory activity in animals. Pavlov wrote that all of science has grown out of this orientation reflex.

What does this mean? Orientation, orienting-investigatory activity (something new had appeared, I have to find out what is new—to roll it over, bring it closer, smell it, try it, tear it, move it, do something else), is selfless, said Pavlov. What does that mean? There is no sexual, nutritional, or any other need. It, this activity, has another motivation. It has a cognitive motivation.

Do you understand? It is preparation, familiarization with a field of possible actions. What has appeared? It was just found along the way, and what is it? I have to get to know it better, and to get to know it better, I have to do something. I have to manifest some activity, and this activity is called “orienting.” Will it be represented in elementary form, or rather in elemental form: in the form of an orienting reflex, will it be represented in the form of what Pavlov called “investigatory-orienting form,” or even if it is called something else, it exists, and it is a reality of life, a reality of living organisms? But it, this reality, develops qualitatively, takes on new features, develops cognitive motives that in turn are capable of developing and the development of which engenders the de-

velopment of special cognitive behaviors, one of which is thinking.

You can say to me that here, probably, there is no difference between perception and thinking. I will say that here there is no difference in class, in terms of the general type of cognitive motivation. But there are certain features that, over the course of the development of cognitive motives, lead to the development of thinking.

So, I now say, "which, over the course of generation of thinking, leads to features of this motivation and to the transformation of these motives." Thinking, a mediated cognition, first appears not in the form of activity, but in the form of an action. That is, it is not the cognitive motive that appears first—it is there somewhere in a diffused form, it might exist somewhere—but it is the cognitive goal that appears first. The genesis of thinking is the genesis of goals, of goal formation—but what kind of goals? Cognitive ones. And only in a second step can this goal, and, consequently, the action corresponding to the goal, be moved, so to speak, up the hierarchical ladder, and turn into a motive. The goal begins to take on a motivating function. At first, the activity is practical; within it forms a certain preliminary, nonexecutive part, a component, a moment, it is better to say, because overall activity is a nonadditive formation in principle. A moment that can and must become a certain cognitive goal embedded within some other activity, a practical one, for instance.

And so a cognitive goal emerges, is generated. At first, thinking is generated as an action, as a goal-oriented process and from within the depths of practical action. And then the motive and the goal come together, perhaps through irradiation and fixation of affect, which directs activity overall in keeping with this goal (that is most likely how it happens, and there is extensive clinical evidence for this), and from this new movement the transformation of action into independent activity becomes possible: and with its own motive, which can hold a very high position in the overall hierarchy of motives in human life, and sometimes the first position, the preeminent position, one of the eminent positions, correct? These are all the people who devote themselves to selfless knowledge, to selfless science. Although there is no such thing as selfless science; it would not be science then. The selfishness of scientific activity consists in its demand of essential conditions for it, including not only conditions in the sense of laboratory equipment, but the arrangement of a peaceful life for oneself, right? But for the sake of what? For the sake of a life endeavor that in this case is a scientific endeavor

(not always and not for everyone, but for a certain person). Otherwise, this scientific activity, with a purely cognitive motivation, disappears and there occurs—this has been clinically demonstrated—a decline in the substance of cognitive activity. Is this understood? It is again transformed. It becomes utilitarian, a way of living. And for this reason its potency is terribly diminished. Finally, in activity, in the analysis of activity, there is one more very curious movement, transformation, again falling under the general laws of transformation observed over the course of development, formation, or decline of activity. There occurs a transformation of actions not only “upward,” when action is transformed into activity, at times into a central one for the person, that is, to what is most important. And, there is transformation “downward,” a lowering of rank. Action (and cognitive action) is capable of, according to the overall law, being transformed into operation, that is, into a means of carrying out another action—one that may also be cognitive or one that is practical. An action is practical, and what are the methods? Well, we will say they are theoretical; former cognitive action, developed, automatized, which has received the rank of a means of action, and not an action itself. For you and me, for our contemporaries, to turn to a slide rule to solve a problem signifies what? To carry out an action or use a method? To use a method. I can be good at this or not. It can be developed or less well developed.

I will never forget something I saw involving a slide rule. A land surveyor is working in a field and I walk by and observe the following: on the one hand, he is absorbed in flirting with the girl holding the measuring rod, and, on the other hand, he is quickly moving the cursor and making notes, so that is he is doing something that I cannot do, and, probably, something a good mathematician also cannot do because it must already be down cold, practiced to the point of being an operation; you would have to spend a lifetime moving the slide rule to transform this into an ironclad, solid, automatic skill, as easy as writing a letter. This is not an action, for you it is the act of writing down, and the act of writing letters is the method of carrying out the action of writing something down. You have the feel of it, it goes very smoothly for you. Your orthography is the real thing—just like Buslaev. Incidentally, do you know what Buslaev (he was a renowned scholar overall) said about writing correctly? He wrote something about Russian grammar that says, “Whom should we consider literate? No, not a person who can write correctly. Someone who is literate is someone who cannot write incor-

rectly, because essentially we cannot think, it must turn into a method, an operation. Considerations about writing must not occupy our thoughts, it should happen on its own." So, you see, an action can be reduced to the rank of an operation, an operation of practical action (this is the most interesting), and it is here that the quality of its executive element is introduced. You see, it is as if thinking is no longer there, right?

Just think, genetically, formally, it in no way differs from thinking. Nobody feels that thinking is a great creation when we turn these days to higher mathematics at its most elementary level, if one can talk about an elementary level of higher mathematics. But at times, when the first steps were being made, this was a problem, a discovery, a creation. And now where is it, the discovery, the creativity? At the start of learning, and then? And then there is an instantaneous lowering in rank. And that lowering in rank can thus go on infinitely.

What kind of an operation is this, the kind that we call cognitive operations? In the broad sense of the word logical operations, and they are also mathematical operations, right? We do not need to make a distinction between mathematical and logical operations—they are cognitive operations in all cases. They are logical operations, they are a means of carrying out a cognitive action.

Look what transformations of thinking take place and how thinking appears through the prism of this activity. When we talk about thinking as an operation, then it is one system of tasks and problems that are included here; when we talk about investigatory actions, this is a different series of questions that are placed before us. But when we talk about the activity of thinking, there is a completely different range of problems. Now we will call this range of problems "problems of creativity." And here is the difficulty of the problem. If we lose this direction, we cannot say anything. We will look for it in actions and we will not find it, we will look for it in operations and we will not find it here either. So, there is nothing for us to look for there, we have to look for it in activity. And then we will see both the role of motivation and the role of emotions, and others as well will open up before us within the problem of creative thinking.

This is why it is important to understand, to refract this thinking through the prism of human life, to incorporate the conceptual apparatus of activity; otherwise thinking will not get anything in its actual development. You see, I am starting to defend my activity theory, once again, for the hundredth time, to prove the heuristic quality of this theory for the study of such complex processes as thinking.

But the monotony (everywhere we have activity, action, operation, and, finally realizing-functions) breaks down into the following: the special features of the cognitive action consist in the fact that it takes place under incomplete conditions. For me, not all conditions are evident. This is a very typical feature of cognitive activity.

In the action of thinking, as with cognitive activity overall, there exists a very interesting situation that you and I are going to take a look at, that specifies and breaks the monotony to which I just referred: the action—realization of an operation. . . . There are some unexpected things in store for us here, and we will try to sort through these unexpected things, and I thinking up this section specially. This is why I do not want to rush through thinking, I want to make thinking psychological, and not physiological, and not logical, and not philosophical. Here, the crux of the matter is that there are two solutions to cognitive problems: one solution is discovering the conditions, the other is using them and carrying out the solution.

This very complex dynamic clearly distinguishes cognitive activity, breaks the monotony. Here, there are a mass of things that come back, there are two solutions and they repeat at different levels: on the super-level of cognitive activity, the activity of thinking, on the level of cognitive acts, actions. Only on the level of operations can they not be repeated. I will illustrate what I want to say. You probably know that there is the task of programming. I want to direct your attention to the fact that in composing a program there are two different programmings: one—we can go ahead and call it that—programming for programmers; and the other is programming for machines by the programmer. Do you understand the difference? The second program—is it about thinking or about operations? About operations. And only the first program is cognitive. The program for the programmer does not look like a program. It is not in the form of a program for a machine. This is one illustration, but I could give dozens of such illustrations. I just want to say in this connection—what does a thinking machine do? On what level of cognitive process is a thinking, logical machine performing? Logical—they are computational, they are computers, and the like. Well, what do logical machines do? Do they think or not? You probably know that these arguments and discussions have been going on for fifteen or twenty years—from the time of the first logical machines. These are terminological discussions, they are empty and ridiculous. If science was regulated by the rules of a game that have been strictly set, then I would introduce one rule: that all dis-

cussion be ended about whether or not machines think. Build a machine and do not argue about whether or not it thinks.

Theoreticians of machines ages ago—ten years ago—established a very precise formula. And it cannot be invalidated by any heuristic programs, by other subsequent steps in the development of computers. You are always dealing with the performing of operations. Of operations. That is all. And if you think now about any other programs, these are programs of operations, and machines perform them. When you give a program the task of retrieving an operation, that is also an “operation in retrieving an operation.” This is a continuous process. Where do these programs come from? Operations can be externalized, externally expressed. In this external form they are given to machines. You know, of course, that machines are not telepathic? They cannot read your thoughts, they are outside parapsychology, poor machines cannot do this. So they can be given something only in an external form. It is not important in what form.

And then everything is interiorized. You do not see anything, do you? External and internal machine processes—there is always first a transformation into an operation, and then a transferal. And here—I know—certain mathematicians, logicians are very aggressive toward the idea of operation and they themselves use this term, unequivocally defining and applying it.

Then an obvious conversation starts: what is it that we, in doing this, are giving the machine? All its executive, so-called operational part, the part that it manages better than our mind, because we have a slower process, and all kinds of endless garbage. It also tells lies, but less. It equips us. But the point is that, to the extent that it equips us, it frees thinking and thinking begins to progress in order to generate new operations. And this transferal will go on continually. These machines will continue to become smarter. And because they will always be improved, we will also continue to become smarter and compose new problems and methods for solving these problems. This is the trend.

And do you think this is a new trend? Discovered in the epoch of logical machines? No. This trend has always existed, but, of course, without this technology, and, therefore, on a different level.

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