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Editor's Introduction

Aleksei Novokhat′ko, the compiler of the articles translated in this issue, refers to the role of Evald Ilyenkov (1924–1979) in the development of philosophy. The articles reveal that Ilyenkov was not just a narrow specialist—his creative interests ranged from logic to pedagogy, aesthetics, and psychology. He was reacting to the problems of Soviet education and psychology, but his critical thoughts are fresh and relevant in education in the Western world as well. His significant contribution was not properly understood and evaluated in Soviet times and this is a future challenge to our Western education.

Ilyenkov's pedagogical writings are aimed at a broad public and are often a reaction to ongoing discussion. Their argumentation is clear, but the significance is easier to grasp if we look at two experiments inspired by Ilyenkov's ideas. The first one is the "Meshcheriakov experiment" (Meshcheriakov 1979). In this experiment, four deaf and blind people were educated to the level of university exams. One of these is now a professor of psychology (Suvorov). Ilyenkov provided the theoretical underpinning of this unique experiment on the formation of the psyche in deaf and blind children. The miracle of Helen Keller happens every day in the special schools for deaf and blind children originating from this experiment.

What makes this experiment so important? The point is not to demonstrate what can be achieved with these children, but to make visible the cultural nature of psychological development. When deaf and blind children are born with this impairment they lack the most dominant sense channels and thus exist in a very limited cultural environment. Cultural environment and psyche must be formed using mainly tactile senses. From the point of view of psychological experiment the use of one main channel makes interaction and cultural development visible. With "normal" children it is impossible to follow what happens on all sense channels simultaneously. While it may sound ridiculous

to us when Ilyenkov writes about the spoon as the first cultural tool and first step on the path of cultural development, it very clearly demonstrates the idea of cultural mediation in psychological development.

Another line of experimental work based on Ilyenkov's ideas is that of Elkonin and Davydov on school education. We can even argue that Elkonin and Davydov's theory of learning activity might not exist without the basic philosophical tenets proposed by Ilyenkov. Some Russian writings cite Davydov as the main follower of Ilyenkov. They were close friends and shared many philosophical points of view.

We can describe the relationship between Ilyenkov's suggestion "school must teach how to think" and Davydov's (1972, 1986, 1996) elaboration of "the types of generalization" as follows. Real concepts are needed in order to be able to think, but most school subjects do not have these concepts or they are just names or words. What we need is to sketch the process, which leads children to real concepts. For this purpose it is necessary to repeat in a condensed form the process of the birth of central concepts in each subject domain. Experimental work on finding central, system-forming concepts in school subjects and learning processes leading children to theoretical generalizations started at the end of 1950s.

The model of developmental teaching and learning radically changes the approach to schoolwork. Real concepts as theoretical generalizations are understood as primary tools of thinking, which must be formed during the elementary grades. Organizing children's learning activity following Davydov's model of six steps (learning actions) can produce these tools. The approach changes the principles of teaching. It is quite usual in many school systems to begin teaching using elementary concepts in elementary grades. If real concepts are taught at all they are the material of higher grades. Davydov argues that children need thinking tools from the beginning of school life and that later it is too late to teach thinking. Teaching the concept of mathematical number through algebra may be the best-known example of developmental teaching and learning following the Elkonin–Davydov system (Davydov 1990).

Ilyenkov's texts on education may not be the main domain of his theoretical creativity, but as we can see from the Elkonin–Davydov system and experimental work with deaf and blind people, his ideas form a springboard for a new approach to schoolwork and human development in general. If the articles in this issue of the *Journal of Russian and East European Psychology* stimulate our readers' interest in Ilyenkov's philosophical texts, most of them are available on the Internet in English translation (www.marxists.org/archive/ilyenkov/), and there are several good books and articles on his ideas (Bakhurst 1991, 1995a, 1995b, 2001; Bakhurst and Padden 1991).

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A. Novokhat′ko

The Training of the Mind

From the Compiler

It is well known that all people are talented, some more and some less. But there are people with a *spiritual* guarantee, people who are capable of enduring and sustaining the tension of the contradiction of their epoch.

Almost two decades have already passed since the life of the outstanding philosopher Evald Vasilievich Ilyenkov came to an abrupt and tragic end on March 21, 1979. During these years his most important writings—books, articles, letters—have been published and republished. Research and reminiscences about him have appeared in Russia and abroad. The state in which Ilyenkov lived and thought no longer exists, but interest in him and in his work does not flag.

The pieces collected in the present volume, devoted mainly to problems of pedagogy and theoretical psychology, were written by Ilyenkov between 1964 and 1979.

What can philosophy contribute to solving the problems that face our educational system? Ilyenkov's approach to this question is indicative: before helping pedagogy, psychology, or didactics, philosophy must first honestly examine its own baggage—that is, acquire a clear awareness of what it can and cannot contribute. This is an essential condition of truly businesslike

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Translated by Stephen D. Shenfield.

cooperation. Ilyenkov establishes an altogether depressing fact (both in the 1960s and today, in the 1990s): apart from a small group of investigations (V.V. Davydov, M.N. Skatkin, A.I. Meshcheriakov, and others), the bulk of textbooks on and guides to didactics are, from the point of view of methodology, at such a primitive level that they do not even merit serious critical analysis. Questions of the nature of thinking, of the foundations of personal development, and so on remain at best at the level of [Jan Amos] Komensky (Comenius) and [John] Locke. Clearly, the authors of these textbooks have never in their lives grappled with the logic and theory of knowledge of [Immanuel] Kant, [Johann Gottlieb] Fichte, or [G.W.F.] Hegel. But they presume to teach others *how to form thinking.*

Hence, it is understandable that the writings of Davydov and Meshcheriakov should have met with such a positive, even rapturous, response. The theoretical and experimental work of these scholars is based on an idea rooted in the classical philosophical tradition: the program for teaching any school subject (and, accordingly, the program by which the student masters this subject) must be constructed in such a way that the process of teaching and mastering should not simply load the memory but at the same time train the mind, the ability to think. Nowadays the school student masters the foundations of contemporary science, and we must take care that the program for mastering them should be constructed in accordance with the general logical norms of *contemporary* scientific thinking (including 2,500 years' experience of philosophical cognition of these norms). And throughout the process of teaching the student the foundations of contemporary science, we must convey each new concept (generalization) in such a way that it should be completely clear and obvious to the child how this generalization is obtained from the raw, not yet "generalized" factual material—how the transition is made from concept to concept through the generalization of facts that are *new* to him.

There is another aspect of pedagogy where, according to Ilyenkov, the role of the philosopher is indispensable. This is the question of the status of universal, equal, polytechnical, working education as a coherent system directly woven into the canvas of all public life, and of the replacement of this system by another system in which schools have to be divided into two types, one for the "gifted" and one for the "ungifted," and further into special schools in accordance with the chance demands of the momentary social division of labor. This apparently unattractive "pedagogical" view finds its *sole theoretical justification* in that eclectic, unprincipled position according to which all higher human abilities are by some miracle preprogrammed into the neurophysiology and morphology of the brain.

In practice this means that if a student is doing badly in, say, mathematics, then the reasons for this must be sought not in muddleheaded understanding

and teaching of the subject, but in the peculiar arrangement of the unfortunate student's brain. And here a milder version of the same eclectic schema comes to the rescue of the untalented pedagogue: there is no need for extremes; both the "biological" and the "social" matter.

Only an orientation toward broad general education will safeguard us from errors that may be the source of personal and social dramas and tragedies connected with the moral obsolescence of knowledge and skills, which now age rapidly and radically. The school is obliged, in Ilyenkov's opinion, to inculcate precisely the universal, substantial foundations of culture and not its particularities.

The entire system of education—from secondary school through higher education all the way to graduate studies!—must be constructed on the same principles. That is why the school must also preserve within itself a tendency to *rational conservatism*—a conservatism that takes into account not only the successes and achievements of mankind but also its bitter mistakes and defeats in the agonizing and heroic struggle with the demonic forces in history that it has itself called to life.

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E.V. Ilyenkov

Our Schools Must Teach How to Think!

It would appear that no one doubts this. But would everyone be able to give a direct answer to the directly posed question: what does this mean? What does it mean "to think" and what is "thinking?" A far from simple question and in a certain sense a tricky one. It is worth digging a little deeper to see how this comes to light.

Very often—much more often, perhaps, than it seems—we mix up two very different things here, especially in practice: the development of the ability to think and the process of the formal mastering of the knowledge specified in curricula. By no means do these two processes automatically coincide, although one without the other is also impossible. "Much knowledge does not train the mind," although "lovers of wisdom must know much"—these words, spoken over 2,000 years ago by Heraclitus of Ephes, are not out of date even today.

Truly, "much knowledge" in itself does not train the mind—or the ability (or skill) to think. What then does train the mind? And can it be trained (or train itself) at all?

On this score, there exists a far from groundless opinion according to which the mind (the ability to think, "talent," or simply "ability") is "from God" or, in more enlightened terminology, "from nature," from a person's

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Translated by Stephen D. Shenfield.

parents. Indeed, is it possible to inculcate "mind" into a person in the form of a system of precisely and rigorously formulated "rules" or operational schemas—in short, in the form of a "logic?" We have to conclude that it is not possible. This conclusion is the fruit of experience that finds graphic expression in the international parable of the fool who, encountering a funeral procession, wants "to join you, not steal from you."* It is well known that the best rules and formulas, when drummed into a stupid head, do not make that head cleverer but are themselves transformed into amusing absurdities. This, alas, is only too well known. Hardly anyone will dispute the fact that the teaching of formal logic, introduced into our schools some time ago "on the personal instructions of Comrade Stalin," did not increase the number of "clever" people or reduce the number of "stupid" people among secondary school graduates.

It is not empirically indisputable experience alone that supports the aforementioned opinion. The most precise and rigorous "rules" that constitute "logic" do not and cannot teach the so-called "power of judgment"—that is, the ability to judge whether a given case or given fact falls under given rules. As Immanuel Kant wrote in his *Critique of Pure Reason*, "the school can only proffer to, and as it were graft upon, a limited understanding of an abundance of rules borrowed from the insight of others, but the power of rightly employing them must belong to the learner himself; and in the absence of such a natural gift no rule that may be prescribed to him for this purpose can ensure against misuse. . . . Deficiency in judgment is just what is ordinarily called stupidity, and for such a failing there is no remedy."** This seems to be true. And here is the opinion of another thinker—cited with great sympathy by Lenin as "sharp-witted"—concerning the "prejudice" that "logic teaches how to think": "This is like saying that only by studying anatomy and physiology do we first learn how to digest food and move" (Hegel, *Soch*., vol. 5, p. 2 [retranslated from Russian]; compare also Lenin, *Soch*., vol. 38, p. 75). This is, indeed, a naive prejudice. That is why the introduction of "logic" into the secondary school curriculum could not justify the hopes that some people placed on it.

Evidently, everything remains as it was. Anyone, even "an obtuse or narrow-minded person," can "be trained through study, even to the extent of becoming learned. But as such people are commonly still lacking in judgment, it is not unusual to meet learned men who in the application of their scientific

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**Taskat′ vam, ne peretaskat′* is a customary greeting at a wedding. Having learned the expression in this context, the fool does not understand that it is inappropriate at a funeral and gets beaten.—Trans.

**The author's quotations are from Kant's *Critique*, with minor syntactical adjustment to the Russian text, in the form given in the 1929 Norman Kemp Smith translation, available at www.hkbu.edu.hk/~ppp/cpr/.—Trans.

knowledge betray that original want, which can never be made good." So Kant sadly sums up his argument. And with this too we have to agree.

But in that case what about the appeal that forms the title of this article? Have I myself not proven, by reference to highly respected authorities, that this slogan cannot be realized and that intelligence is a "natural gift" and not an acquired skill?

Fortunately, this is not so. It is true that the ability (or skill) to think cannot be "grafted" into the brain in the form of a collection of "rules," formulas, and—as people like to say nowadays—"algorithms." A human being is still a human being, much as some would like to turn him into a "machine." In the form of "algorithms" you can "insert" into the skull only a mechanical, that is, a very stupid "mind"—the mind of a cashier, but not the mind of a mathematician.

However, the arguments cited above by no means exhaust the position even of Kant, let alone that of a materialist. First, it is not true that intelligence is a "natural" gift. For his mind, or his ability to think, man owes just as little to Mother Nature as he does to God the Father. To nature he owes only his brain—the organ of thinking. As for his ability to think with the aid of this brain, it not only "develops" (in the sense of "improves") but also first *emerges* only together with his attachment to social-human culture, to knowledge. The same goes for his ability to walk upright, which man likewise does not get "from nature." This is the same kind of "skill" as all the other human abilities. True, while any mother easily teaches her child how to use his rear limbs to walk upright, far from every professional pedagogue is able to teach him how to use his brain for thinking. But a reasonably intelligent and attentive mother does this much better, as a rule, than any other kind of pedagogue. She will never shrug off the difficult effort associated with training the "mind" of her young child on the pretext—so convenient for the mentally lazy "educator"—that the child in question is "naturally" or "congenitally" incapable. The young child is taught "thinking" by all life around him—by his family, by games, by the courtyard, and by other young children like himself, whether they are older or even younger. Caring for his little brother also requires as well as develops "intelligence."

The idea of the "congenital" or "natural" origin of the ability (or "inability") to think is merely a veil that conceals from the mentally lazy pedagogue those real (very complex and individually variable) conditions and circumstances that in fact stimulate and form the "mind," the ability to "think independently." This idea usually serves merely to justify our lack of understanding of these conditions and lazy reluctance to examine them and take on the hard work of organizing them. By shifting the blame onto "nature," we preserve a clear conscience and keep up scientific appearances.

Theoretically, such a position is incompetent; morally, it is vile, because it is extremely antidemocratic. Nor is it in accord with the Marxist-Leninist understanding of the problem of "thinking," or with the communist attitude to man. In terms of natural endowment we are all equal—in the sense that 99 percent of people enter life in this world with a biologically normal brain capable in principle—with a little less or a little more difficulty—of mastering all of the "abilities" developed by their predecessors. And it ill behooves us to dump onto nature the sins of society, which until now has been less just and democratic than nature in distributing its "gifts." It is necessary to open up each person's access to the conditions of human development, including the conditions for the development of the ability to "think independently" as one of the chief components of human culture. And the school is obliged to do this. Intelligence is not a "natural" gift. It is society's gift to a person. It is, incidentally, a gift that he will later repay a hundredfold—from the point of view of a developed society, the most "profitable" of "capital investments." An intelligently organized—that is, a communist—society can be constituted only by intelligent people. And never for a minute must we forget that it is precisely the people of the communist future who are sitting behind school desks today.

The mind, the ability to think independently, takes form and develops only in the course of individual assimilation of the intellectual culture of the epoch. Properly speaking, the mind is none other than this intellectual culture, transformed into a personal possession and legacy, into the principle of a person's activity. "Mind" is made up of nothing else but this. To use the high-flown language of philosophy, it is the individualized spiritual wealth of society.

And this, to put it simply, means that mind (intelligence, talent, ability, etc.) is the natural state of man, the norm and not the exception, the normal result of the development of a biologically normal brain under normal—human—conditions.

Conversely, the "stupid" person, the person with an incorrigible deficiency of "powers of judgment," is above all a maimed person, a person with a crippled brain. And this "crippling" of the organ of thinking is always the consequence of "abnormal" and "unnatural" (from the point of view of the true criteria of human culture) conditions, the result of crudely coercive "pedagogical" influences on this tender organ (especially at an early age).

The organ of thinking is much more easily crippled than any other organ of the human body. And it is very difficult—after a certain age, quite impossible—to mend. To cripple it is simple—by means of a system of "unnatural" "exercises." And one of the most reliable methods of such crippling of the brain and intellect is the *formal memorization of knowledge*. It is precisely by this method that "stupid"

people are produced—that is, people with an atrophied power of judgment. People who are unable competently to relate the general knowledge they have mastered to reality and who therefore make a mess of things.

"Cramming," backed up by endless "repetition" (which should be called not the mother but rather the stepmother of learning), cripples the brain and intellect. Paradoxically enough, the truer and "cleverer" the truths inculcated by cramming the more crippling the effect. The point is that a stupid and nonsensical idea from the child's own head will soon be dispelled by experience: when such an idea clashes with facts the child will be forced to doubt, to compare, to ask why, and—in general—to "rack his brains." An "absolute" truth, by contrast, will never give him occasion to do those things. "Brain-racking" of any sort is counterindicative of absolutes: they are motionless and crave only more and more "confirmations" of their infallibility. It is for this reason that an "absolute truth" crammed without understanding becomes for the brain something like a track for a train or blinkers for a workhorse. The brain grows accustomed to move only along beaten (by other brains) tracks. Anything that lies to the right or left of those tracks is no longer of interest to it. It simply no longer pays attention to other things, regarding them as "inessential" and "uninteresting." This is what the prominent German writer B. Brecht had in mind when he said: "A person to whom it is self-evident that two times two makes four will never be a great mathematician" [retranslated from Russian].

Everyone knows what an agonizing experience this crudely coercive operation on the brain—"cramming" and "grafting"—is for any lively child. Only very unpleasant childhood memories could inspire adults to invent these poetically expressive terms. It is not by chance or by caprice that the child experiences "grafting" as violence. The point is that nature has arranged our brain so cleverly and so well that it has no need of any "repetition" or special "memorization" to learn anything that it finds directly "understandable," "interesting," and "useful." So it is necessary to graft only what is incomprehensible, uninteresting, and useless—what has no resonance or counterpart in, and does not "flow" from, the individual's direct life experience.

As numerous experiments have proved, man's "memory" stores everything that has been of concern to its possessor throughout his life. However, some knowledge is stored in the brain, so to speak, in an active state, "within easy reach," and in case of need can always be called into the light of consciousness by an effort of the will. This is knowledge that is closely connected with the sense- and object-oriented life activity of man. This "active" memory is reminiscent of a well-organized workspace in which the craftsman takes hold of the object, instrument, or material he needs without a glance and without specially "recalling" which muscle he has to move for this purpose. It is

quite another matter with knowledge that the brain has absorbed in complete isolation from its main activity and placed, so to speak, "in reserve." French psychologists, for example, applied special techniques to the brain of an old semiliterate woman to force her to declaim for hours on end ancient Greek verses of which she understood neither the content nor the meaning and that she "recalled" only because once, many years before, some diligent gymnasium student had memorized these verses aloud in her presence. In the same way, a stonemason "recalled" and accurately drew on paper the fantastically intricate twists and bends of a crack in a wall that he had once had to repair. In order to "recall" things of this kind, a person has to make agonizing exertions and these very rarely succeed. The problem is that the brain submerges an enormous mass of unneeded, useless, and "nonoperational" information in special "dark storerooms" below the threshold of consciousness. Everything that a person has seen or heard at least once is stored there. In special—abnormal—cases, all the junk that has accumulated in these storerooms over many years breaks through to the surface of the higher regions of the cerebral cortex, into the light of consciousness. Then the person suddenly recalls a mass of trivial details that had apparently been long and finally "forgotten." But this occurs precisely when the brain is in a state of passivity, usually that of a hypnotic trance, as in the experiments of the French psychologists. The point is that "forgetting" is not a defect. Quite the reverse: "forgetting" is produced by special wise mechanisms of the brain that protect the organ of thinking (the regions of active brain function) from drowning in unneeded "information." It is the natural defensive reaction of the cortex to the threat of meaningless and stupid overload. Should the strong locks of oblivion break open one fine day in the dark storerooms of memory, all the trash accumulated there would gush forth into the higher regions of the cortex and make it incapable of "thinking"—of selecting, comparing, speculating, and "judging."

The fact that "forgetting" is not a minus, not a defect of our mind, but quite the reverse, an advantage, pointing to a redundant "mechanism" that specially and purposively produces it, was graphically demonstrated by the well-known Soviet psychologist A.N. Leontiev at a séance with the no less well-known possessor of "absolute memory" Sh—skii. The test subject was able to "memorize" at one go a list of 100, 200, or 1,000 words and reproduce it at any time thereafter and in any order. After a demonstration of this astonishing ability, he was asked an innocent question. Could he recall among the words imprinted on his memory the three-letter name of a highly infectious disease? There was a hitch. Then the experimenter appealed to the audience for help. And right away it turned out that *dozens* of "normal" people *remembered* what the man with the "absolute memory" could not remember. The word *tif* (typhus) flashed by on the list, and dozens of people

with a "relative" memory—quite involuntarily—recorded this word in their memory. The "normal" memory "hid" this little word, like all of the other 999 little words, away in a dark storeroom, "in reserve." But thereby the higher regions of the cortex, which are in charge of "thinking," remained "free" for their special work—including that of purposive "remembering" by tracing chains of logical connections.

It proved just as difficult for a brain with "absolute memory" to function as for a stomach packed full with stones.

This experiment is very instructive. An "absolute"—mechanical—memory is not advantageous but, on the contrary, detrimental to one of the most important and intricate mechanisms of our brain and mind. This is the mechanism that *actively* "forgets" everything that is not of direct use to the performance of the higher mental functions, everything that is not connected to the logical flow of our thoughts. The brain tries to "forget" what is useless, what is not connected with active thinking, to sink it to the bottom of the subconscious, in order to leave the conscious "free" and ready for the higher forms of activity.

It is this "natural" brain mechanism, which protects the higher regions of the cortex from aggression, from flooding by a chaotic mass of incoherent information, that "cramming" destroys and cripples. The brain is violently forced to "remember" all that it actively tries to "forget," to place under lock and key, so that it should not get in the way of "thinking." Raw, unprocessed, and undigested (by thinking) material is "grafted" into the brain, breaking its stubborn resistance.

Marvelously subtle mechanisms created by nature are thereby spoiled and crippled by crude and barbaric interference. And many years later some wise educator dumps the blame on "nature."

With all its might, the "natural" brain of the child resists being crammed with undigested knowledge. It tries to rid itself of the food that it has not chewed over, to sink it to the lower regions of the cortex, to "forget"—and over and over again it is schooled by "repetition," coerced and broken, using both the stick and the carrot. Eventually the schooling succeeds. But at what a price! At the price of the *ability to think*.

How can we not recall here the surgeons from *The Man Who Laughs*? The pedagogue-comprachicos impose a permanent fixed "grin" on thinking and make it capable of functioning only in accordance with a rigidly "grafted" schema.* And this is the most widespread method of producing "stupid" people.

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*This refers to Victor Hugo's novel, *L'homme qui rit* (1869). The "man who laughs" wore a fixed grin on his face because he had been abducted as a child by comprachicos (a Spanish neologism for "child buyers")—"surgeons" who make a living by deforming their victims into freaks and then selling them as beggars or for exhibition at carnivals.—Trans.

It is good if the student does not take the scholastic wisdom crammed into him very seriously, if he just "serves out his time." Then they do not manage to cripple him completely, and the real life surrounding the school saves him. Life is always cleverer than a stupid pedagogue.

The hopeless blockheads grow precisely out of the most obedient and diligent "crammers." This confirms that both "obedience" and "diligence" are the same kind of dialectically cunning virtues as all other "absolutes" that at a certain point and under certain conditions turn into their opposites, into defects, some of them incorrigible.

And it has to be said that any lively child (and this *is* "from nature") possesses a very precise indicator that distinguishes "natural" pedagogical influences on his brain from violent, crippling ones. He either absorbs "knowledge" with greedy and lively interest or displays obtuse incomprehension and stubborn resistance to violence. He either easily—at one go—"gets the point," showing pleasure as he does so, or, on the contrary, fidgets, plays up, and just cannot "remember" apparently simple things.

The morally sensitive pedagogue always pays attention to these "natural" feedback signals, as accurate as the pain that accompanies "unnatural" exercise of the organs of physical activity. The morally obtuse and mentally lazy pedagogue insists, compels, and eventually "gets his own way." The cries of the child's soul are for him empty whims. He simply continues training the child; whether he uses the carrot or the stick makes no difference.

And from this follows a simple conclusion that is as old as the world. It is impossible to teach a child—or, indeed, an adult—anything, including the ability (skill) to think independently, without adopting an attitude of the closest attention to his *individuality*. The old philosophy and pedagogy used to call such an attitude "love." This little word may also be used. It is not so very imprecise, although some admirers of rigorously mathematical thinking will consider such a definition "qualitative" and therefore "unscientific."

Of course, it is also necessary to adopt an intelligent attitude to indications of the child's "inner feeling." It may be that he is fidgeting not because he is bored but because he ate unripe plums the day before. Well, after all, "individuality" is a capricious and mathematically indefinable thing.

But all these are, so to say, ethical and esthetic preliminaries. How then are we to *teach how to think*? Here, of course, love and attention to individuality are not much to go on, although we cannot do without them.

In broad outline, the answer is as follows. We have to organize the process of the mastery of knowledge, the process of the assimilation of intellectual culture in the same way as the best teacher—life—has organized it for thousands of years. Namely, in such a way that in the course of this process the child should be forced constantly to train not only (and even not so much) the

"memory" but also the ability independently to solve *tasks* that require thinking in the proper and precise sense of the word—the "powers of judgment," the ability to judge whether or not a given case fits previously mastered "rules" and if not—then what?

Solving tasks is by no means a privilege of mathematics. The whole of the human search for knowledge is none other than an unending process of posing and solving new tasks—questions, problems, difficulties.

And it is self-evident that a person "understands" scientific formulas and propositions only if he sees in them not simply material that he has to cram but, above all, arduously acquired *answers* to quite definite *questions*—to questions that emerge naturally from the midst of life and urgently demand answers.

It is equally clear that a person who has found in a theoretical formula a clear answer to a question, problem, or difficulty that has been troubling him (in which he has been interested) will not forget this theoretical formula. He will not have to "cram" it. He will remember it easily and naturally. And if he does "forget" it, that is no calamity. He will always *derive* it himself when he again encounters a situation-task with the same set of conditions. And that is the meaning of "intelligence."

So it is necessary to "teach how to think" first of all by developing the ability to pose (ask) questions correctly. Science itself began and begins each time with this—with posing a question to nature, with formulating a problem—that is, a task that is insoluble with the aid of already known methods of action, by following known—beaten and trampled—tracks. Each newcomer to the realm of science, child or adult, must start his journey with this, with the sharp formulation of a *difficulty* that is insuperable with the aid of prescientific means, with the precise and sharp expression of a *problem situation*.

What would we say of a mathematics that forced its students to memorize the answers to exercises printed at the back of the book, showing them neither the exercises themselves nor methods for solving them?

However, we often teach children geography, botany, chemistry, physics, and history in just such an absurd fashion. We tell them the answers found by mankind, often without even trying to explain exactly to which questions these answers were given, found, or guessed.

Textbooks and the teachers who follow them too often, alas, start off immediately with quasi-scientific "definitions." But the real people who created science never started with this. They *finished* with definitions. For some reason, however, the child is "led" into science from the opposite end. And then people are surprised that he is unable to "master" general theoretical propositions, and that having "mastered" (in the sense of crammed) them he is unable to relate them to reality, to "life." In this way the pseudo-scientist grows up, the

pedant—the person who sometimes knows the entire literature in his field of specialization by rote but *does not understand* it.

Karl Marx gave a good description of this phenomenon a hundred years ago, with reference to the vulgar bourgeois political economist W. Roscher:

> I shall reserve this fellow for a *note.* Such professorial schoolboys have no place in the *text.* Roscher undoubtedly has a considerable—and often quite useless—knowledge of literature, although even here I seem to discern the Göttingen alumnus rummaging uneasily through literary treasures and familiar only with what might be called official, *respectable* literature. But that is not all. For what avails me a fellow who, even though he knows the whole of mathematical literature, yet understands nothing of mathematics?

If only such a professorial schoolboy, by nature totally incapable of ever doing more than learning his lesson and teaching it, of ever reaching the stage of teaching himself, if only such a Wagner were, at least, honest and conscientious, he could be of some use to his pupils. If only he did not indulge in spurious evasions and said frankly: 'Here we have a contradiction. Some say this, others that. The nature of the thing precludes my having an opinion. Now see if you can work it out for yourselves!' In this way his pupils would, on the one hand, be given something to go on and, on the other, be induced to work on their own account. But, admittedly, the challenge I have thrown out here is incompatible with the nature of the professorial schoolboy. An inability to understand the *questions* themselves is essentially part and parcel of him, which is why his eclecticism merely goes snuffling round amidst the wealth of set *answers*" (letter to Ferdinand Lassalle of June 16, 1862; see K. Marks [Marx] and F. Engel′s [Engels], *Soch.,* vol. 25, p. 404 [English translation from www.marxists.org/archive/marx/works/1862/letters/62_06_16.htm]).

This analysis of the "mind" of the pedant is very instructive for pedagogy, for the art of *teaching how to think.*

Science—both in its historical development and in the course of its assimilation by the individual—in general begins with a *question*, whether it is addressed to nature or to people.

But any real question that arises from the midst of life and is insoluble with the aid of predetermined, customary, stereotyped, routine methods is always formulated for the consciousness as a formally insoluble *contradiction*.

Or, to be even more precise, as a "logical" contradiction that is insoluble by purely logical means—that is, by a series of purely mechanical, machine-like operations on previously memorized "concepts" (or, to be even more precise, on "terms").

Philosophy has long made clear that a real "question" that can be solved

only through a further investigation of facts always appears as a "logical contradiction," as a "paradox."

Thus, it is only at the place in the corpus of knowledge where there suddenly appears a "contradiction" (some say this, others say that) that, properly speaking, there arise the need and the necessity *more deeply to investigate the object itself*. It is an indicator that the knowledge recorded in generally accepted propositions is excessively general, abstract, and one-sided.

It is precisely for this reason that the mind that has been trained to stereotyped action in accordance with the set prescription of a "typical solution" and that is at a loss when required to find an independent (creative) solution "does not like" contradictions. It tries to avoid or fudge them, returning over and over again to the beaten track of routine. And when in the final reckoning it fails to avoid or fudge a contradiction, when the "contradiction" stubbornly keeps on appearing, such a "mind" collapses into hysteria, just at the point where it is necessary to "think."

For this reason the attitude of a mind to contradiction is a very accurate criterion of its culture—even, properly speaking, an indicator of its presence as intelligence.

Researchers in the laboratory of I.P. Pavlov once performed a very unpleasant experiment on a dog (unpleasant for the dog, of course).

They assiduously induced and developed in the dog a positive salivary reflex to a circle and a negative reflex to an ellipse. The dog was very good at distinguishing these two "different" shapes. Then one fine day they began to rotate the circle within the dog's field of vision in such a way that it gradually "turned" into an ellipse. The dog became agitated and at a certain point collapsed into hysteria. Two rigorously developed and directly opposed conditioned-reflex mechanisms were activated simultaneously and clashed in conflict, "error," or antinomy. For the dog this was unbearable. The point at which "A" turns into "not-A," the point at which "opposites meet" is exactly that point at which the fundamental difference between human thinking and the reflex activity of the animal sharply and clearly manifests itself.

At this point the animal (and also the mind deprived of true "logical" culture) collapses into hysteria, starts to rush about, and falls captive to chance circumstances.

For the mind equipped with true logical culture the appearance of a contradiction is a signal of the emergence of a *problem* that is insoluble with the aid of strictly stereotyped intellectual actions, a signal to activate "thinking"—the independent examination of the "thing" in the expression of which the antinomy has arisen.

It is therefore necessary to train the "mind" from the very start in such a

way that a "contradiction" should give it not cause for hysteria but an impulse to independent work, to independent examination of the thing itself—and not only of what other people have said about this thing.

This is an elementary requirement of dialectics. And dialectics is by no means a mysterious art only for mature and select minds. It is the real logic of real thinking—a synonym for concrete thinking. People must be trained in it from childhood.

I cannot but recall here the wise words spoken not long ago by one old mathematician. Deliberating on the causes of the inadequate culture of mathematical (and not only mathematical) thinking among secondary school graduates over recent years, he gave the following extraordinarily accurate characterization of these causes: curricula contain "too much that is finally established," too many "absolute truths." This is precisely why students, grown accustomed to "swallowing the roast grouse of absolute science," are then unable to find their way to objective truth, to the "thing" itself.

This too sounds, as it were, "paradoxical." However, the mathematician's words are as simple as they are true:

> I recall my own schooldays. We were taught literature by a very erudite follower of Belinsky. And we grew accustomed to looking at Pushkin through his eyes—that is, through Belinsky's eyes. Regarding all the teacher told us about Pushkin as beyond doubt, we too saw in Pushkin only what he told us—and nothing more. . . . So it remained until by chance I happened to come across an article by Pisarev. It threw me into confusion. What is this? Everything was turned upside down and still convincing. What was I to do? And only then did I turn my attention to *Pushkin himself*. Only then did I *myself* discover his true beauty and profundity. And only then did I understand—for real and not in scholastic fashion—both Belinsky and Pisarev.

And this, of course, applies not only to Pushkin. How many people have left school for adult life having memorized "indubitable" propositions about Pushkin from textbooks and contenting themselves with that! Naturally, a person who has swallowed his fill of "the roast grouse of absolute science" no longer wants to look at live grouse flying in the sky. After all, it is no secret that very many people had any desire to read Pushkin knocked out of them precisely during literature lessons at secondary school—and not only Pushkin.

It may be objected that our schools are obliged to teach students the "indubitable" and "firmly established foundations" of modern science and not to sow doubts, contradictions, and skepticism in their immature brains. True. But at the same time it should not be forgotten that all these "firmly established

foundations" are themselves none other than the results of a difficult search, none other than laboriously acquired *answers* to *questions* that once arose (and are still comprehensible)—none other than *resolved contradictions*.

And not "absolute truths" that fell from the sky into the heads of geniuses. After all, someone must have caught and roasted the roast grouse. And what must be learned in science is how to do this, not how to swallow gruel already masticated by others' teeth. And it must be learned from the very first step—because later on it will be too late.

"The naked result without the road that leads to it is a corpse" [retranslated from Russian], dead bones, the skeleton of truth, incapable of independent movement—thus did the great dialectician Hegel splendidly express himself in his *Phenomenology of Mind*. A set scientific truth recorded in verbal terminology and divorced from the route by which it was acquired turns into a verbal husk even as it retains all the external signs of "truth." And then the dead seizes hold of the living and does not allow it to go forward along the road of science, along the road of truth. Dead truth becomes the enemy of living, developing truth. This is how we get the dogmatic and ossified intellect who at the graduation examinations is awarded a "five" but whom life gives a "two" or even lower.*

Such a person does not like contradictions because he does not like unsolved questions. He likes only set answers. He does not like independent mental labor, preferring to take advantage of the fruits of the mental labor of others. He is a parasitical consumer, not a creative producer. Our schools, alas, have already manufactured many such.

And this is inculcated from childhood, from the first grade. And by those "pedagogues" who like to dump the blame for "lack of ability" on blameless "nature." It is time to drive this vile fable, so convenient for lazy teachers, out of our pedagogical milieu as mercilessly as we drive out the stupid fables of religion.

To teach specifically human thinking means to teach dialectics—the ability rigorously to formulate a "contradiction" and then find its real resolution through the concrete examination of the thing, of reality, and not by means of formal verbal manipulations that fudge "contradictions" instead of resolving them.

Here lies the whole secret. Here lies the difference between dialectical and formal logic, between human thinking and the psyche of any mammal or the actions of a computer. A computer also enters a state of "self-arousal" that very

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*In the Soviet Union and Russia students were and are graded on a five-point scale, five being the highest mark.—Trans.

precisely "models" the dog's hysteria in Pavlov's experiments when two mutually exclusive commands—a "contradiction"—are input simultaneously.

For a human being, by contrast, the appearance of a contradiction is a signal to activate "thinking" and not hysteria. This must be taught from childhood, from a person's first steps in science. Here lies the sole key to the transformation of "didactics" on the basis of dialectical materialism, on the basis of dialectics as the materialist logic and theory of knowledge. Otherwise all talk of such a "transformation" will remain a pious wish, an empty phrase. For the "core" of dialectics, without which there is no dialectics, is precisely "contradiction"—the "motor" and "mainspring" of developing thinking.

There is nothing especially "new" here. Any reasonably intelligent and experienced pedagogue does and has always done this. Namely, he always tactfully guides the child into a "problem situation," as it is called in psychology—that is, a situation that is insoluble with the aid of methods of action already developed by the child, with the aid of "knowledge" already mastered by him, but a situation that is at the same time well within his capabilities, given his (precisely assessed) existing knowledge. A situation that, on the one hand, requires the active use of all his previously accumulated intellectual baggage, and, on the other hand, does not "yield" completely to him but demands "a little extra"—an argument of his own, an elementary creative device, a drop of "independence" of action.

If after a process of trial and error a person finds a "way out" of such a situation without direct prompting or coaching, he takes a real step along the path of mental development, of the development of "intelligence." And such a step is worth more than a thousand truths mastered in the set form of others' words.

For it is only and precisely thus that a person develops the ability to perform actions that require him to go beyond the *given conditions* of a task.

In this sense, a dialectic exists wherever a person goes beyond that set of given conditions within which the task remains *solved and unsolved* (and therefore has the appearance of a "logical contradiction" between the "goal" and the "means" for attaining it) into that broader set of conditions within which it is really—concretely, in relation to objects, and therefore "obviously"—*solved*.

Such a dialectic is realized even in the case of solving a simple geometrical task requiring a transformation of the conditions given by the initial diagram—even should this transformation consist only in drawing the one and only "extra" line that joins two other (given) lines that were previously unjoined, unconnected, or—the term used in logic—"unmediated." The line that accomplishes the *connection*—the transition, the conversion—and

therefore incorporates the characteristics of the two lines that it connects, both "A" and "not-A."

In this way we resolve, in object-oriented action and in contemplation, the situation that brought the dog to a state of hysteria. The situation of transition or conversion of one clearly defined form to another—of a circle to an ellipse, of a polygon to a circle, of a straight line to a curve, of an area to a volume, and so on and so forth—in general, of "A" to "not-A."

Any task that requires such a transition from the given or known to the unknown always entails the conversion of fixed opposites.

If "A" is known to us (its qualitative or quantitative characteristics or "parameters" are given) and we need to find "B"—that is, express "B" through the characteristics of "A"—and do not as yet know this 'B," then this means that for the time being we can say only that it is "not-A." But what is it apart from being "not-A"?

It is for this that we need to find a *transition* or "bridge." The transition from one thing to a second—from "A" to "not-A"—can in general be accomplished only through a "mediating link," through a "middle term of the deduction," or—as it is called in logic—through "a third."

Finding such a middle term is always the chief difficulty of a task. It is here that the presence or absence of "sharp-wittedness," "resourcefulness," and other qualities of the "intelligent mind" comes to light.

This unknown "third" always possesses clearly marked dialectical properties. Namely, it must incorporate simultaneously the characteristics of "A" and the characteristics of "B" (that is, "not-A").

For "A" it must represent "B" and for "B" it must be an image of "A."

In the same way, a diplomat in a foreign country "represents" not himself but his country. In country "A" he is a representative of "not-A." He must speak in two languages, in the languages of both countries—in that of the country *that* he represents and in that of the country *in which* he is a representative.

In other words, the "middle term" must directly combine within itself the characteristics of the sides of the contradiction that it "mediates"—both "A" and "not-A." It is a direct unity of opposites—the point at which they *turn* into one another.

For so long as the "sides of the contradiction" are not mediated—that is, there is "A" and, alongside it, "not-A"—we have a *logical contradiction*. A logical contradiction is an unmediated, unresolved contradiction. In this sense—in the sense that it expresses an *unsolved* question—it is something "intolerable."

To solve a question means to find that "third" by means of which the initial sides of the contradiction, "A" and "not-A," are joined, connected, and are

expressed through one another—that is, *turn* (in thinking) into one another. This is the same situation that they created for the dog in Pavlov's laboratory by "turning" a circle into an ellipse.

But what significance does this have for the movement of thought, for training the ability to "think?" Enormous significance.

Above all, if we have clearly registered the conditions of a task as a "contradiction," then our thinking is aimed at seeking out that fact (line, event, action, etc.) solely by means of which the initial contradiction can be resolved.

For the time being we do not know what this third is. This is what we must seek and find.

But at the same time we do already know something extraordinarily important about it. Namely, it must simultaneously fit the characteristics of "A" and the characteristics of "B" (that is, of "not-A"). The search for the "middle term" of the deduction is therefore *goal directed*. It must be a real fact that, expressed through the terms of the initial conditions of the task, will look like "A" and like "not-A" simultaneously and in the "same relation"—as a "contradiction."

From the point of view of purely formal thinking, such a fact seems something quite impossible and unthinkable. Yes, it is "unthinkable" in the sense that it is not as yet present in our thinking and in the field of our contemplation—*in the given conditions of the task*. But, after all, in the final analysis all progress in our knowledge comes down to bringing what was previously "unthinkable" within the ambit of our thought: we find, see, and comprehend. And thereby we resolve a previously unresolved task, question, or contradiction.

Dialectics consists in formulating a "contradiction," bringing it to the fullest sharpness and clarity of expression, and then finding a real, concrete, object-related, and therefore obvious, resolution of it. And this is always accomplished by discovering a new fact in the context of which the "contradiction" previously exposed by us is simultaneously *realized* and *concretely resolved*.

A sharply formulated contradiction creates a "tension of thought" that is not released until the fact solely by means of which it is resolved is found.

This occurs in both the most complicated cases of intellectual development and in the simplest. It was precisely dialectics that enabled Karl Marx to solve a problem over which bourgeois economists had racked their brains in vain—the problem of the emergence of capital from the exchange of commodities. First of all, a sharp contradiction was registered here. The trouble is that the supreme law of market relations is the exchange of equivalents, of equal values. If I have an object worth 5 rubles, I can exchange it for other commodities that are also worth 5 rubles. I cannot by means of exchange—by means of a series of sales and purchases—turn 5 rubles into 20 (if, of course, we exclude speculation and deception). But how then are profit, surplus value,

and capital possible? The law of capital is ceaseless "self-expansion." And hence there arises the question:

> Our friend, Moneybags, who as yet is only an embryo capitalist, must buy his commodities at their value, must sell them at their value, and yet at the end of the process must withdraw more value from circulation than he threw into it at starting. His development into a full-grown capitalist must take place, both within the sphere of circulation and without it. These are the conditions of the problem. *Hic Rhodus, hic salta!* [Here is Rhodes, leap here!]. (K. Marks [Marx], *Kapital* [Capital], vol. 1, pp. 172–73 [English translation from www.econlib.org/library/YPDBooks/Marx/mrxCpA5.html])

So how then—without any deception, that is, without violating the supreme law of the world of commodities—does "capital" suddenly make its appearance—a phenomenon the characteristics of which directly contradict the law of the exchange of equivalents?

The task is posed sharply and clearly. Its solution, Marx continues, is possible only on the condition that "our friend, Moneybags" should "be so lucky as to find, within the sphere of circulation, in the market, a commodity, whose use-value possesses the peculiar property of being a source of value, whose actual consumption, therefore, is itself an embodiment of labor, and, consequently, a creation of value" (Marks, *Kapital,* vol. 1, p. 173 [English translation from www.econlib.org/library/YPDBooks/Marx/mrxCpA6.html]).

A commodity whose *consumption* is a *creation*! A thing that appears to be impossible, "unthinkable"—because it is "logically contradictory."

But if our friend, Moneybags, has nonetheless turned himself into a capitalist, then he has indeed solved the problem that is insoluble from the point of view of the supreme law of the world of commodities. He has exchanged kopeck for kopeck in the most honest fashion, never swindling a single soul, and still ended up with a ruble. And this means that he has found and bought in the market that unthinkably marvelous object—a commodity-value the consumption (destruction) of which is identical to the production (creation) of value.

And for the theorist to resolve the theoretical (logical) contradiction he then has only to investigate where Moneybags contrived to buy such a highly original commodity with the aid of which the unthinkable becomes "thinkable." And what is this magical object that accomplishes the unthinkable without violating in the slightest the strict law of the world of commodities? The author of *Capital* follows him and discovers that "the possessor of money finds on the market such a special commodity in capacity for labor or labor power" (Marks, *Kapital,* vol. 1, p. 173).

This is the sole commodity in the market that enables us to resolve the

contradiction that no trick with terminology is capable of resolving. This is the sole object that is strictly subordinate to all laws of the "commodity" and strictly fits all theoretical definitions of "commodity" and "value" (those same definitions and laws from the point of view of which the birth of capital is an "unlawful" act) and that at the same time, in the strictest accordance with law, gives birth to this "unlawful" offspring—surplus value and capital, that is, phenomena that directly contradict the laws of the world of commodities. This is just such an object in the very existence of which the conversion of "A" to "not-A"—of use value to exchange value—is accomplished. A "conversion" that is just as natural—and at the same time just as "unbearable" for nondialectical thinking—as the conversion of the circle to the ellipse, to the noncircle.

The required fact has been found—the directly real, concrete, and obvious fact—and the "logical contradiction" that is otherwise *insoluble* has been resolved.

And here we can see very clearly that it is precisely the "logical contradiction" exposed within the initial conditions of the task and within those conditions unresolved and insoluble that provides thinking with those conditions to which the "unknown"—the "X" or missing link that we have to find to rigorously solve the task—must correspond.

And the more sharply the "contradiction" is formulated, the more precisely indicated the "signs" to which this "unknown" must correspond, the criteria in accordance with which the search must be guided and attention directed. In this case a person's thinking does not wander here and there in the hope of stumbling across a new fact, but *purposefully seeks out that fact*—the unique fact that will enable him to close the chain of reasoning.

Figuratively we can picture this mechanism of dialectical thinking as follows. It brings to mind a severed electric wire. At one end of the wire a positive charge has accumulated, at the other a negative charge. The tension between the two opposed charges can be released only by using some object to close the circuit. What kind of object? Let us experiment. We connect the ends of the wire with a piece of glass. Current does not flow; the tension remains. We try wood. The result is the same. But as soon as we place a piece of metal in the gap between the poles current flows and the tension is released.

The "tension of contradiction" in thinking is released in a similar fashion—by inserting a new fact into the chain of reasoning that has been "severed" by the contradiction. Not, of course, just any fact that happens to come to hand, but only the unique fact that "fits" the conditions of the task and connects or "mediates" the previously "unmediated" sides of the contradiction. It must be a fact that simultaneously "fits" the characteristics (lawful requirements) of both sides of the contradiction.

For side "A" it must be a "representative" of side "B" (that is, "not-A"), while for side "B" it must be a representative image of side "A" (which is, of course, "not-B"). Otherwise it could not be a "conductor" or "intermediary" between them, just as an interpreter between two people who speak different languages can only be a third person who speaks both languages. It must possess within itself, as parts of its "specific" character, the indicators of both "A" and "B"—that is, it must be a direct combination (unity) of different and opposite attributes.

Once we have found such a fact, the "contradiction" ceases to be "unmediated" and unresolved. For so long as we have not found it, the contradiction remains an unresolved "logical" contradiction and creates the very "tension of thought" that gives us no rest until the task is solved.

To acquire the culture of thinking means, therefore, to learn to "bear the tension of contradiction" and not try to avoid or fudge it and if that fails collapse into hysteria, rage, and irritation. On the contrary, we must always tackle a contradiction head on and try to reveal it in its "pure form" in order then to find its concrete, object-related, and obvious resolution in facts.

Dialectics consists in bringing to light in facts, in the set of facts that constitute the system of conditions of the unsolved task, their own contradiction, in lending this contradiction the utmost clarity and purity of expression, and then in finding its "resolution" again in facts—in the unique fact that is not yet in the field of view and that needs to be found. The contradiction itself compels us to seek out such a fact. In this case, the contradiction in thinking (i.e., the "logical contradiction") is resolved in the same way that reality, the movement of the "thing itself" resolves real contradictions.

And not by means of purely terminological manipulations, not by "clarifying concepts" and their definitions.

(Of course, no objection can be made against the striving to "clarify concepts." By checking and rechecking the preceding course of reasoning that has led to the "logical contradiction" we very often discover that this contradiction is merely a consequence of simple carelessness, ambiguity in terms, or some similar cause, and therefore does not express any real object-related problem. Contradictions of this kind are resolved by purely formal means—namely, by "clarifying concepts"—and require no search for new facts.

However, dialectics requires formally impeccable thinking. What is said above applies only to those "logical contradictions" which emerge in reasoning as a result of the most rigorous and formally impeccable thinking, of thinking that gives logical expression to the real conditions of the task. This must be borne in mind.)

It is for this reason that the highest culture of thinking, the ability to bear the "tension of contradiction" without irritation or hysteria, the ability to

resolve a contradiction in reality and not in words always finds expression in knowing how to argue with oneself. What distinguishes a person who thinks dialectically from a person who thinks undialectically? The ability to weigh up all the "pros" and all the "cons" on your own, without the presence of an "external opponent," without waiting until an adversary with malicious joy shoves those "cons" in front of your nose.

A person with cultured thinking is therefore always very well prepared for disputes. He has foreseen and weighed up all the "cons" and has his counterarguments ready.

The person who in preparing for a dispute confines himself to collecting with diligent partiality "pros" and "confirmations" of a noncontradictory thesis is always beaten. He is beaten from angles that he has not anticipated. And the more diligently he has sought out "confirmations," the more diligently he has closed his eyes to the real "sides" of a thing that may provide grounds for an opposing view, the more such angles there are.

In other words, the more one-sided (the more abstract and general) the, for him, "indubitable" thesis that for some reason he prefers, the more "indubitable" and "absolute" the truth that he has memorized and mastered as an internally "noncontradictory" thesis.

It is here that all the cunning of "absolute truths" manifests itself. For the more "absolute" and "certain" a truth, the closer it approaches the fateful point of transformation into its own opposite, the easier for an opponent to turn it against itself, the more facts and evidence can be cited against it.

Two times two is four?

Where did you see that? In very rare cases, artificial and exceptional cases. In cases involving only solid, mutually impenetrable bodies. Two drops of water "added" together will yield only one drop, or perhaps twenty-one. Two liters of water "added" to two liters of alcohol will never give you four liters of vodka, but always a little less. And in general "two times two is four" would be absolutely infallible only if the universe consisted solely of "absolutely solid bodies." But do such bodies really exist, at least by way of exception? Or do they, perhaps, exist only in our own heads, in idealizing fantasy? Not an easy question. Atoms and electrons, in any case, are not such bodies.

It is precisely for this reason that those mathematicians who are convinced that their statements (mathematical truths) possess "absolutely indubitable" universality are inclined toward the idea that these statements do not and cannot reflect anything in the real objective world and that the whole of mathematics from start to finish is merely an artificial subjective construction, the fruit of the "free" creativity of our own spirit and nothing more. And then the fact that these statements are in general applicable to empirical facts and "work"

splendidly in the course of their analysis, in the course of the investigation of reality becomes a mystical enigma.

And there you are! Philosophical idealists—as always in such cases.

And that is your punishment for blind faith in an apparently obvious absolute thesis like "two times two is four."

Absolutes are in general not only static but also extremely cunning. He who blindly places his faith in any absolute as something "indubitable" will sooner or later be vilely betrayed by it. Like that dog who was trained thoughtlessly to salivate at the sight of a circle.

So is it really appropriate to inculcate in the young child a blind trust in such patent traitors? Is this not deliberately to prepare him as a burnt offering, as a sacrifice to "absolute truths"—instead of educating him to mastery over them?

A person brought up to regard "two times two is four" as an indubitable truth over which it is impermissible even to ponder will never even become simply a mathematician, let alone a *great* mathematician. He will not know how to conduct himself in the sphere of mathematics as a human being.

In this field he will always remain merely a guinea pig whom the teacher will constantly present with highly unpleasant and incomprehensible surprises like the conversion of a circle into an ellipse, of a polygon into a circle, of a curve into a straight line and back again, of the finite into the infinite, and so on and so forth. He will perceive all these tricks as black magic, as the mysterious art of mathematical gods whom it is necessary only to adore and worship blindly.

But life will show him not only how two times two turns into five, but also how it turns into a wax candle. Life is full of change and transformation at every turn. Little in it is absolutely static. Science for him will be only an object of blind worship, while life will abound in occasions for hysteria. The connection between science and life will always remain for him mystically incomprehensible, beyond his grasp and reach. Life will always appear to him as a quite "unscientific" and even "irrational" thing, and science as a vision that soars over life and bears no resemblance to it.

The "grafting of absolutes" onto the brain of the young child can have no other outcome. The stronger and blinder the faith that a person places in their infallibility as a child, the more cruelly life will punish him with disillusionment in science, lack of faith, and skepticism.

For in any case he will not evade contradiction—the conflict between a general idea or abstract truth and the diversity of living facts that it does not accommodate. Sooner or later he will be drawn into such a conflict—and will be compelled to *resolve* the contradiction. And if you have not taught

him how to do this, if you have convinced him that the truths impressed upon him are so absolute and indubitable that he will never come across a fact that "contradicts" them, then he will see that you have deceived him. And then he will cease to believe both in you and in the truths that you have drummed into him.

Philosophy and psychology established long ago that the "skeptic" is always a disillusioned "dogmatist," that "skepticism" is the reverse side of "dogmatism." These are two mutually reinforcing positions, two dead millstones between which a stupid education grinds the living mind.

The training of a dogmatist consists in teaching a person to look at the world around him only as a reservoir of "examples" that illustrate the correctness of one or another abstract general truth. At the same time he is carefully shielded from contact with facts that favor the opposing view, and above all he is prevented from reading works that defend this opposing view. It is self-evident that only a mind quite incapable of a critical attitude toward itself can be trained in this fashion. It is equally obvious that such a hothouse-grown mind can survive only under a bell-glass, in sterile conditioned air, and that spiritual health thus preserved is just as fragile as the physical health of a child kept indoors out of fear that he will catch a cold. Even the slightest breeze will ruin such health. The same thing happens to a mind that is carefully shielded from encounters with the contradictions of life, a mind that fears works that question the dogmas it has memorized.

It is of much greater benefit to "the good cause"—Kant writes in the *Critique of Pure Reason*—to study counterarguments than it is to read works that demonstrate what you already know. "The reply of the *dogmatic* defender of the good cause," he continues, "I should not read at all. I know beforehand that he will attack the sophistical arguments of his opponent simply in order to gain acceptance for his own; and I also know that a quite familiar line of false argument does not yield so much material for new observations as one that is novel and ingeniously elaborated. . . .

But must not the young, at least, when entrusted to our academical teaching, be warned against such writings, and preserved from a premature knowledge of such dangerous propositions, until their faculty of judgment is mature, or rather until the doctrine that we seek to instill into them has taken such firm root, that they are able effectively to withstand all persuasion to contrary views, from whatever quarter it may come?"

This seems reasonable, Kant says. But . . .

"But when, later, either curiosity or the fashion of the age brings such writings under their notice, will their youthful conviction then stand the test?"

Doubtful. For the person who is accustomed only to the dogmatic cast of mind and does not know how to develop the dialectic hidden in his own soul

no less than in the soul of his adversary, the opposing conviction will possess "the advantage of novelty," while the familiar conviction, learned with "the credulity of youth," has already lost this advantage.

"And accordingly he comes to believe that there can be no better way of showing that he has outgrown childish discipline than by casting aside these well-meant warnings; and accustomed as he is to dogmatism, he drinks deep draughts of the poison, which destroys his principles by a counter-dogmatism."

All this, of course, remains true even today. This is a psychological law that has its prototype in the logic of things.

It is precisely for this reason that Hegel considered "skepticism" a higher level of development of the spirit than "dogmatism"—the natural form of the overcoming of naive dogmatism.

For while the dogmatist stubbornly defends "half of the truth" against the other "half of the truth," not knowing how to find the "synthesis of opposites" or "concrete truth," the skeptic—who also does not know how to accomplish this concrete synthesis—at least *sees both halves,* understanding that there are grounds for both, and wavers between them.

The skeptic therefore has a chance of seeing the "thing" on which dogmatists break their lance as a "unity of opposites"—as that unknown "third" that appears to one dogmatist as "A" and to another as "not-A."

And two dogmatists—like two rams on a bridge—are doomed to eternal strife. They will butt one another until they both fall into the cold water of skepticism.

And only after bathing in its sobering stream will they become cleverer—if, of course, they do not choke or drown.

Dialectical thinking, according to Hegel, incorporates "skepticism" as its "inner" organically inherent element. But as such it is no longer "skepticism" but simply rational self-criticism.

A living, dialectically thinking mind cannot be constituted from two equally dead halves—from "dogmatism" and "skepticism." It is, once again, not simply a mechanical combination of two opposite poles but some "third." This third is a combination of rational (and therefore firm) conviction with equally rational (and therefore sharp) self-criticism.

In the eyes of a dogmatist this "third" always looks like "skepticism"; in the eyes of a skeptic it always looks like "dogmatism."

In actual fact, this is *dialectics*—the dialectics of a mind capable of reflecting the dialectics of reality, a logic of thinking in accord with the logic of things.

It is only by keeping all this in view that it is possible to construct a didactics aimed at training a true mind.

And if you want to bring a person up as a consummate skeptic and doubter,

then there is no more reliable method of doing this than to inculcate in him a blind trust in "the absolute truths of science"—in the best and truest truths, in those truths that would never deceive him had he learned them not blindly and thoughtlessly *but with intelligence*.

And, conversely, if you want to bring up a person who will not only be firmly convinced of the might of knowledge but will also know how to apply its might to the resolution of the contradictions of life, then measure out for the "undoubter" a dose of "doubt" that will do him no harm—a dose of *skepsis,* as the ancient Greeks called it. Do as physicians have long done, when they inoculate a newborn baby with a weakened vaccine of the most terrible (even for an adult!) diseases. Make him catch these diseases in a weakened, safe form—the form that a person and his mind need. Train him independently to *check* each general truth in eyeball-to-eyeball confrontation with facts that directly contradict it. Help him to resolve the conflict between general truth and specific fact *in favor of authentic, concrete truth*—that is, to the joint benefit of science and fact.

And not to the benefit of "fact" and the detriment of "science," as often happens with dogmatists who have despaired of resolving this conflict rationally and therefore become disillusioned with science and betray it on the pretext that it "no longer corresponds to life."

Then the terrible microbe of disillusionment and skepticism will not lie in wait to poison your student as he crosses the school threshold. Well and truly immunized, he will know how to uphold the honor of scientific knowledge in the event that it comes into conflict with "facts" and "factoids" that "contradict" it. He will know how to interpret these facts scientifically and not by means of the philistine "adaptation" of science to them, not by betraying scientific truths "for the sake of the facts," "for the sake of life," but in reality for the sake of the philistine principle of "such is life."

Only thus is it possible to develop in a person the ability to think, to think *concretely*.

For it is only possible to think *concretely*. Because truth itself is always concrete, because "abstract truth does not exist" (Lenin).

This wise truth, which the greatest minds of humanity—Spinoza, Hegel, Marx, Engels, Plekhanov, Lenin—have not tired of repeating over the centuries, is still, unfortunately, far from becoming a leading principle of our didactics and pedagogy.

True, we very often—too often, perhaps—pay lip service with the word "concrete," squandering this precious concept on trifles to which it has no relation.

Do we not too often confuse "concreteness" with "obviousness"? After

all, these are very different things—at least in Marxist-Leninist philosophy, in the logic and theory of knowledge of materialism.

In scientific philosophy "concrete" is by no means understood to mean "obvious." Marx, Engels, and Lenin categorically repudiated the equating of these two concepts as a very bad legacy of medieval scholastic philosophy. For Marx, Engels, and Lenin "concrete" is a synonym of "unity in diversity." That is, the word "concrete" is reserved for a lawfully connected aggregate of real facts, or system of determining facts, understood in their interconnection and interaction.

Where there is no such system, where there is merely a heap or conglomeration of all sorts of "obvious" facts and examples confirming some meager and abstract "truth," there can be no question of any "concrete knowledge" from the point of view of philosophy.

On the contrary, in this case "obviousness" is merely a masquerade costume under which is hidden from people the most cunning and most repulsive enemy of "concrete thinking"—*abstract* knowledge in the worst and most precise sense of the word, in the sense of empty, isolated from life, from reality, from practice.

True, you often hear the following "justification." Up in the higher realms of philosophical wisdom, "concrete" may mean some very complicated things. But didactics is a simpler science. It does not concern itself with the heights of dialectics, and it is thus permitted all that is not permitted to higher philosophy. Therefore, it is not so terrible if we understand by "concreteness" precisely "obviousness" and do not go into excessively fine distinctions.

At first glance this seems right. So what if in pedagogy the term "concrete" is not distinguished very clearly from the term "obvious"? Is it really a matter of terminology? "A rose by any other name smells as sweet." If it were merely a matter of terminology, we could agree with all this. But the trouble is that it is not.

The point is that while it may all begin with confusion over terms, the confusion to which this leads is no joking matter.

In the final analysis, "obviousness" (the principle in itself is neither good nor bad) is not the ally and friend of true (= concrete) thinking that the didacticians think it must be, but something quite the reverse. It is precisely that masquerade costume under which is hidden the most abstract—in the worst sense—thinking and knowledge.

Combined with true *concreteness*, "obviousness" is a mighty means of developing a thinking mind.

But combined with *abstractness*, the same "obviousness" becomes a reliable means of crippling and perverting the child's mind.

In the one case it is a great blessing, in the other an equally great evil—just as rain may benefit the harvest in one case and harm it in another.

And when teachers forget this, when they start to see "obviousness" as an absolute and unconditional "blessing," as a panacea for all evils, and above all for bad "abstractness," for the formal verbal assimilation of knowledge, it is then that they unknowingly render the greatest service to the enemy—the "abstract." They hospitably throw open to him all the doors and windows of the school, provided that he has the wit to appear there in the masquerade costume of "obviousness," under a cloak decorated with little pictures, "graphic textbooks," and the other attributes that make up his "concrete" camouflage.

And that is terrible. An open enemy is much to be preferred over an enemy who passes as a friend.

That is where the confusion leads.

First let me tell a wise parable made up 150 years ago by a very clever man. This parable is titled: "Who thinks abstractly?" Here is the first part.

> A murderer is being led to execution. For the crowd of onlookers he is a murderer and nothing more. It may so happen that ladies who are present observe, among other things, that he is a fine figure of a man, even a handsome man. The crowd finds this a reprehensible remark: "What? The murderer is handsome? How can you think such a terrible thing? How can you call a murderer handsome? You yourselves, I dare say, are no better!" And perhaps a priest, in the habit of looking deep into things and into human hearts, adds: "This is a sign of the moral corruption that reigns in the highest circles of society."
>
> The connoisseur of people takes a different approach. He traces the course of events that shaped the criminal and discovers in the story of his life and upbringing the influence of parental discord in his family. He sees that once this person was punished with excessive severity for a trifling offense; this has embittered him, inclined him against the legal order, and aroused his resistance, placing him outside society, so that eventually crime has become his sole means of self-affirmation.
>
> The crowd, were they to hear this, would surely be indignant: "He wants to justify a murderer!"
>
> I recall how in the days of my youth there was a mayor who complained that writers had sunk so low as to undermine the foundations of Christianity and the legal order: one of them, heaven forbid, even defended suicide!
>
> Further explanation by the shocked mayor made it clear that he was speaking of [Goethe's] *The Sufferings of Young Werther*.

This is what is called *thinking abstractly*—seeing nothing in a murderer beyond the abstraction that he is a murderer, and by means of this simple

quality extinguishing all other qualities of the human being in the criminal.

But let us proceed to the second part of the parable.

> "Hey, old woman, you're selling rotten eggs," the shopper says to the trader. "What?" the trader bursts out. "My eggs are rotten? You're rotten yourself! You dare to tell me such a thing about my wares? And who are you? Your dad was eaten alive by lice and your mum had affairs with Frenchmen! You, whose grandma snuffed it in an almshouse! Look, you've twisted a whole bedsheet into your shawl! Never fear, everyone knows where all this stuff came from! If it weren't for the officers, you and your kind wouldn't be parading around in finery! Decent women take better care of their homes, but the place for you and your kind is in jail! You'd be better off darning the holes in your stockings!" In short, she cannot make allowance for the tiniest drop of good in the woman who has insulted her. [retranslated from Russian; exact source not given in original]

She too is *thinking abstractly*, summing up everything, starting with the shawl and ending with the stockings, from head to toe, and throwing in the shopper's dad and other relatives for good measure, exclusively in the light of her crime in saying that the trader's eggs were not fresh. She views everything through the prism of these rotten eggs, whereas those officers to whom she refers—if, of course, they have anything to do with the matter at hand, which is very doubtful—would prefer to notice quite other things in a woman.

This parable does not seem to need lengthy commentary. Its author—the great dialectician Hegel—uses it to illustrate a very simple and deeply true, albeit at first glance paradoxical, proposition: "Who thinks abstractly? The uneducated person, and by no means the educated one."

The person of intellectual culture never thinks abstractly because that is too easy, by reason of "the inner emptiness and pointlessness of this pastime." He is never contented with a meager verbal definition ("murderer," etc.), but always tries to examine the thing itself in all its "mediations," connections, and relations, and, moreover, in development causally conditioned by the entire world of phenomena that has produced this thing.

It is thinking of this kind—cultured, competent, and flexible *object-oriented* thinking—that philosophy calls "concrete thinking." Such thinking is always guided by its own "logic of things" and not by any narrowly selfish (subjective) interest, prejudice, or aversion. It focuses on the objective characteristics of a phenomenon, aiming to reveal their necessity—that is, the law that governs them, and not on trivial details that happen to catch the eye, be they a hundred times more "obvious."

Abstract thinking is guided by general words, by memorized terms and phrases, and therefore sees very little of the wealth of real phenomena. It sees

only what "confirms" or provides "graphic, obvious proof" of a dogma or general conception that is stuck in the head or, in many cases, simply what conforms to a narrow egoistic "interest."

"Abstract thinking" is no merit, as people sometimes think it is, associating the term with the idea of "higher science" as a system of ultra-incomprehensible "abstractions" that hold sway somewhere up above the clouds. This idea of science is held only by those whose sole experience of science is secondhand, who know the terminological surface of the scientific process but have not penetrated to its essence.

Science—if it really is science and not a system of quasi-scientific terms and phrases—is always an expression (reflection) of real *facts*, understood in their interconnection. A "concept"—unlike a term, which requires simply to be memorized—is a synonym for an *understanding* of the essence of facts. A concept in this sense is always concrete, in the sense of object-related. It grows out of facts, and only in facts and through facts does it have sense, "meaning," or content.

Such too is the thinking of the mathematician, which is unintentionally insulted by those who wish to praise it by calling it "abstract." Only the terminological attire of "concepts," only the language of mathematics is "abstract" in mathematical thinking. And if out of the whole of mathematics a person has mastered only its "language," this means that he has mastered it abstractly. In other words, not understanding and not seeing its real object and not knowing how to move independently in accordance with its strict logic—*not seeing reality* from the specifically mathematical point of view, but seeing only the signs that designate it. Perhaps he has also learned some "obvious examples" that illustrate the "application" of these signs.

The real mathematician—like the physicist, like the biologist, like the historian—thinks in fully concrete fashion. He too focuses not on abstract flourishes but on reality itself; only he does so from the special angle or aspect that is specific to mathematics. It is this skill of seeing the surrounding world from the point of view of quantity that constitutes the special feature of the mathematician's thinking.

The person who does not know how to do this is not a mathematician but merely an enumerator and calculator who performs standardized auxiliary operations but is not engaged in the development of mathematical science.

And knowing how to train a mathematician—that is, a person capable of *thinking* in the field of mathematics—is far from the same thing as knowing how to teach a person to count, calculate, and solve "typical tasks." Our schools, alas, are more often oriented toward the latter. Because that is "easier." And then we ourselves start to bemoan the fact that people "capable" of mathematical thinking are such a rarity—one or two in forty. Then, astonished at

their "natural talent," we start to "select" them artificially, isolate them from the "untalented masses," and inculcate in them a repulsive self-conceit, the pride and arrogance of the "select" few.

Mathematics as a science, however, is not a whit more complicated and difficult than the other sciences, which do not seem so mysteriously abstract. In a certain sense, mathematical thinking is even simpler and easier. This is evident if only from the fact that mathematical "talents" and even "geniuses" develop at an early age—an age by which it is impossible in other sciences even just to reach the forefront. Mathematics requires *less* and simpler "experience" of the surrounding world than do political economy, biology, or nuclear physics. That is why we do not encounter fifteen-year-old "geniuses" in these fields of knowledge.

If until now we have obtained from our schools a relatively small proportion of people "capable" of mathematical thinking, that is not because Mother Nature is so niggardly in giving out mathematical abilities but for quite another reason.

It is, above all, because we often lead the young child into the sphere of mathematical thinking "upside down" or "back to front." From his very first days at school, we drum into his head "ideas" of mathematical concepts that do not help but, on the contrary, hinder him from *seeing*, from looking correctly at the world around him from the strictly mathematical point of view, which is unfamiliar to him.

The few children who turn out to be "capable" are those who by a fortunate combination of chance circumstances contrive to look out the "window" boarded up by the planks of false ideas. In some places "chinks" remain between these planks, and the curious child sometimes peers through these chinks. And turns out to be "capable."

And these false ideas of elementary mathematical concepts are organically connected with those antiquated philosophical-epistemological ideas about concepts in general and about the relations between these concepts and reality outside thinking, which scientific philosophy abandoned long ago.

Philosophical-logical analysis of the first pages of the arithmetic textbook that introduces the first grader to the realm of mathematical concepts demonstrates this fact beyond dispute. It inculcates in the child an absolutely false (from the point of view of mathematics itself) idea of *number*.

How does the textbook convey to the child the "concept" of number, this fundamental and most general foundation for all his subsequent steps in the field of mathematical thinking?

On the first page there are drawings, very natural and graphic, of a ball and next to it a little girl, an apple (or cherry), a thick stroke (or point), and, finally, the figure "1."

On the second page we find two dolls, two little boys, two melons, two points, and the figure "2." And so on—right up to ten, the "limit" set for the first grader by didactics in accordance with his age-related ("natural") capabilities.

It is assumed that by "mastering" these ten pages the child "masters" the skill of counting and, at the same time, "the concept of number."

In this way he does, indeed, learn how to count. But as for "the concept of number," without realizing it the child swallows instead a quite *false idea* of number—an idea of this most important concept that is even worse than those philistine prescientific ideas with which he comes to school. And a little later this false idea will greatly hinder him in mastering more difficult steps on the path of mathematical thinking.

After mastering the aforementioned pages, the first grader, were he to possess the necessary analytical ability, would answer the question: "What is number?" roughly as follows.

Number is a name that expresses the general abstract property that *all single things* share. The first figure of the series of natural integers is the *name of a single* thing, the figure "2" is the name of "two" single things, and so forth. A single thing is a thing that I see in space as sharply and distinctly demarcated, "cut off" by its contour from all the rest of the world surrounding it—whether the contour is that of a ball, an escalator, a little girl, or a bowl of soup. It is not for nothing that in order to check whether or not the child has mastered this wisdom the teacher shows him an object (it does not matter what kind of object) and asks "how many?" in the hope of hearing "one" in reply. And similarly for two, three, and so on.

But it is self-evident that anyone with the least competence in mathematics will laugh to hear such an explanation of "number" and rightly regard it as childishly naive and false.

In fact, this is merely a *special case* of the numerical expression of reality. And the child is forced to master it as the *most general* case, as an idea of "number in general."

As a result, his very first steps in the realm of mathematical thinking, which he hesitantly takes under the teacher's supervision, already lead him into confusion, into a dead end. It soon turns out that the single object that he is shown is not necessarily called by the word "one": it may be "two" (two halves) or "three" or "eight" or something else. It turns out that the number "1" is anything you like except the name of a single "thing" perceived by the senses. So what is it? What kind of reality do numerical signs designate?

Now even the child who possesses the subtlest and most brilliant analytical abilities will be unable to tell you this. And he will be unable to tell you because two mutually exclusive ideas of number have been deposited in his

head and he is unable to relate or "mediate" them. They simply lie "alongside" one another, like two stereotypes, in his "second signal system."

This is very easy to demonstrate by bringing them into open contradiction, into "error."

Show him a toy train consisting of three carriages and a steam locomotive. How many?

One (train)? Four (component parts of the train)? Three and one (the carriages and the locomotive)? Sixteen (wheels)? Six hundred and fifty-four (grams)? Three fifty (the price of the toy in the store)? Half (of the complete set)?

Here we see all the cunning in the abstract question "how many?" to which he has been trained to give a thoughtlessly abstract answer without clarifying "how many what?" And he is even trained to renounce such a wish to clarify, if he had it, as a wish that it is necessary to leave outside the entrance to the temple of mathematical thinking, where in contrast to the world of his direct experience both a tasty candy and a revolting spoonful of castor oil mean "the same"—namely, "one."

The child is "coached" toward this abstraction by the first pages of the "counting" book, which train him completely to divert his attention from any qualitative properties of "single things," to accept that in mathematics lessons "quality" in general has to be forgotten for the sake of pure quantity, for the sake of number, although this is beyond the reach of the child's *understanding*. He can only take it on faith: such, apparently, is the custom in mathematics, in contrast to real life, where he continues to distinguish between candy and castor oil.

Let us suppose that the child has firmly "mastered" the idea of "number" and "counting" explained above and accepts that three melons are "the same" as three pairs of booties—"three" without further clarification.

But now he is let in on a new mystery. Three arshins cannot be compared with three poods:* they are "not the same." Before you can "compare" things—place them on the same numerical scale—you have to make sure that you are dealing with things of the *same name* (same quality). Only "nameless numbers" can be thoughtlessly added and subtracted. A new stereotype, directly opposed to the old one. But which of them should be "applied" or "activated" *in a given case*?

Why is it possible and necessary to "compare" two boys and two cherries in one case, while in another it is not necessary and not permitted? Why in one

*Arshin: an old measure of length, equivalent to about 28 inches or 71 centimeters; pood: an old measure of weight, equivalent to about 36 pounds or 16.4 kilograms.—Trans.

case is this "the same"—namely, single sensually perceptible things without further clarification, while in another "not the same"—*differently named*, *unlike* (though also single) things?

Indeed, why?

The teacher does not explain. He simply shows, using "obvious examples," that in one case you have to do it this way while in the other you have to do it that way. The child is thereby given two highly abstract set ideas of "number" but is not given a concrete *concept*—that is, an *understanding*—of it.

This is very reminiscent of the didactic principles for "learning some sense" that are ridiculed in a wise folktale.

> "Simpleton, oh simpleton, instead of lying on the bed* why don't you go hang around people and learn some sense?"
>
> Catching sight of some peasants hauling sacks of wheat, the obedient and diligent simpleton goes and hangs around one of them, then another. . . .
>
> "Simpleton, you simpleton, you should have said—'I want to join you, not steal from you!'"
>
> The simpleton obediently follows this precious instruction as well.

Here too, the teacher supposes that "concretely"—with the aid of the very obvious expression "hang around"—he has explained to the child how the child can "learn some sense."

But the child, like the simpleton in the tale, does not understand the wise allegories of the adults. He understands them literally, comprehending in their words and explanations only what is familiar and understandable to him from his own life experience. And as his experience is much poorer than the experience of adults and the words that express this experience, he catches only part of the meaning embodied in these words, understanding them literally, *abstractly*—that is, in a one-sided, very general fashion. As a result, instead of acquiring a concrete understanding (and under guise of such an understanding) he learns and takes as his guide an extremely abstract and general (and therefore cunningly ambiguous) prescription. The same is true with regard to "number."

First it is explained to the student that number (one, two, three, etc.) is a verbal or graphical sign that expresses the common property shared by all single things perceived by the senses, no matter what they may be—little boys or apples, iron weights (poods), or wood laths (arshins).

But when he diligently sets about acting on the basis of this abstract idea of number (here as elsewhere, "abstract" does not mean "not obvious"; on the contrary, it is extremely obvious; "abstract" here means poor, meager, one-sided, undeveloped, too general, as "general" as the expression "hang

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*Literally, *pechka*—the heated sleeping platform in a peasant hut.—Trans.

around") and starts to compare poods with arshins, he is reproached: "You are incapable! Here you should have checked first whether these are identically named things."

The diligent and obedient student is prepared to compare only identically named things. But that was not the case here. In the very first task he encounters not just "boys" and not just "apples," but boys mixed up with apples, not to mention pernicious girls each of whom wants to obtain more for an apple than each boy.

It turns out that it is not just possible but even necessary to add, subtract, multiply, and divide numbers that express differently named things—to divide apples by boys, add boys to girls, divide kilograms by meters, and multiply meters by minutes.

Numbers that are identically named in one case and in one sense turn out to be differently named in a second and third case or sense. In one case one stereotype must be activated, in another the directly opposed stereotype. Which of the two should be applied in a given case? Which of the memorized rules has to be recalled? And there are more and more "rules" as you proceed. And they are all contradictory.

And the confused child starts to act by the method of "trial and error," bustling about here and there. When this highly vaunted and unproductive method finally leads him into a dead end and refuses to yield answers coinciding with those printed at the end of the book, the child starts to get nervous, cries, and eventually collapses either into hysteria or into the state of torpid gloom and quiet despair known as the ultraparadoxical phase.

Every one of us, alas, has observed and observes this picture every evening in almost every apartment. Have you really counted the bitter tears shed by young children over their arithmetic homework? But then it is well known that many children experience arithmetic lessons as hard labor or even as a cruel torment, thereby acquiring a lifelong aversion to the subject. In any case, such children outnumber those fortunate individuals—the "able, talented, gifted"—who find in arithmetic an interesting pastime, a field for the exercise of their creative powers, inventiveness, and resourcefulness.

And nature bears not the slightest blame for this situation.

Didactics is to blame. The blame lies with those ideas about the relation of "the abstract to the concrete," of "the general to the single," of "quality to quantity," and of thinking to the world perceived by the senses that to this day, alas, lie at the foundation of many didactical programs.

Elementary analysis of the first pages of the arithmetic textbook described above shows that ideas about all of these logical categories remain at the level of development of logic as a science that this esteemed science had reached at the time of Jan Amos Komensky [Comenius] and John Locke.

The idea of the "concrete" as what is obvious to the senses—an idea that leads in practice to the child having the "abstract" drummed into his head under the guise of the "concrete." The idea of "quantity" (number) as something that is obtained by completely abstracting from any and all "qualitative" characteristics of things, by equating boys with poods and apples with arshins and not, as the science of logic demonstrated over 150 years ago, by analyzing a clearly manifested quality. The idea of a concept as a word or term that expresses the general abstract essence that exists "in all things" of a given kind—a superficial idea that leads to the child mastering merely an *abstract verbal conception* instead of (and under the guise of) a *concrete concept*. The idea of a "contradiction" as something "bad" and "intolerable," as merely an indicator of slovenly and inexact thinking, as something that must be eliminated as fast as possible by means of verbal "clarification" and terminological manipulation.

These are all ideas that today, from the point of view of contemporary logic, from the point of view of dialectics as the logic and theory of knowledge of contemporary materialism, must be evaluated as superficial, archaic, naive, and—let us not beat about the bush—reactionary.

In order that our schools should be capable of teaching how to think and in order that they should actually teach how to think, we must resolutely reconstruct the whole of didactics on the basis of the contemporary—Marxist-Leninist—understanding of all logical categories—that is, of concepts that express the true nature of developing thinking. Otherwise all talk of improving didactics will remain merely a pious wish, and the teaching process based on this didactics will continue to produce "capable minds" only as an exception to the rule. Otherwise we shall continue to place all our hopes concerning the "gifted" on the favors of Mother Nature. We shall wait for these rare favors instead of grasping them.

And a gleam of hope in this regard is already visible.

In the laboratory of the Institute of Psychology of the Academy of Pedagogical Sciences of the RSFSR, research has started under the leadership of D.B. Elkonin and V.V. Davydov specially aimed at laying under the pedagogical process a firm foundation of contemporary philosophical-logical ideas about "thinking" and its connection with "contemplation" (with "obviousness"), the connection between the "universal" and the "single," between the "abstract" and the "concrete," between the "logical" and the "historical," and so on.[1]

In this research an attempt is being made to organize the individual assimilation of scientific knowledge in such a way that it should reproduce in compressed and abridged form the real process of generation and development of this knowledge. Here the child is from the very start not a consumer

of set results embodied in abstract definitions, axioms, and postulates but, so to speak, a "co-participant" in the creative process.

By no means, of course, does this mean that each child is forced independently to "invent" all those formulas that people of past generations have already invented for him over the centuries and millennia. But he must retrace the logic of the road traveled. Then he will master these formulas not as abstract magical prescriptions but as real, quite concrete general principles for solving real concrete tasks.

"Concrete general principles"—this sounds rather paradoxical to a person accustomed to thinking (more correctly, to saying) that "general" means "abstract" and that "concrete" means "single" and obvious to the senses.

However, from the point of view of the concepts of dialectics, this is by no means a paradox, by no means an unexpected combination of mutually exclusive terms. From the point of view of dialectics, a concept is precisely "concrete-universal," in contrast to the "abstract-general" term that expresses a one-sided, albeit highly obvious, idea about things.

Thus, researchers at the laboratory of Elkonin and Davydov are convinced that the accepted methodology of teaching how to count (as described above) gives children not the concept of number but merely two abstract and mutually contradictory ideas of number, two special cases of the numerical expression of real things instead of a truly general principle. Moreover, this methodology presents one of these special cases as "general" and the other as more complex, as "concrete."

In one case number expresses the quantity of *single things,* in the other case the quantity of their *component parts*.

Having grasped this, the researchers concluded that the sequence of the accepted methodology must be reversed. First, children should have the truly general nature of number explained to them, and only then should they be shown the two "special cases" of application of the concept.

But clearly you cannot convey to a child the "concept of number" purified of all traces of "obviousness," of connection with any one "special case." So it is necessary to seek and find a "special" (and therefore obvious, sense- and object-related) case in which number and the need for actions with number appear to the child *in general form*. We have to look for a "special" characteristic that expresses only the "general" nature of number and does not again palm off as general something that is merely "special."

Trying to solve this partly psychological, partly logical and mathematical problem, the researchers concluded that it is wrong to start teaching children mathematics with "number"—that is, with counting and computing operations, whether on "single things" or on their "component parts."[2]

There is every reason to suppose that the actions with "numbers" that make up traditional "arithmetic" are far from the simplest and easiest to learn, and that arithmetic does *not* constitute the "bottom floor" of mathematical thinking. The bottom floor rather consists of certain concepts that are usually considered part of "algebra."

Another paradox, for according to long-established tradition "algebra" is a more complex and difficult thing than "arithmetic": only when children reach the sixth grade are they capable of tackling it, and in "the history of mathematics" it came later than arithmetic.

Analysis shows that in the history of knowledge "algebra" must have arisen no later than "arithmetic." Of course, I am talking about the *real* history of people's mathematical development, and not about the history of mathematical treatises, which reflected true history only in retrospect and therefore upside down.

As research demonstrates, man became aware of the very simple quantitative relationships that "algebra" describes before he "invented" number and counting. Indeed, people of necessity must have used such words as "more," "less," "farther," "nearer," "then," "previously," "equal," and "unequal" before they invented number, counting, and the addition, subtraction, multiplication, and division of numbers. It was precisely in these "words" that *general* quantitative (spatial-temporal) relationships between things, phenomena, and events found their expression.

But, naturally, this stage in the development of mathematical thinking was not recorded in special treatises on mathematics. And if the real history of the development of mathematical thinking began before the appearance of the first theoretical treatises on mathematics, then the "logical" sequence for teaching mathematics—that is, for developing mathematical ability—must also start from the real "beginning."

It must start by orienting the child correctly on the quantitative plane of reality, and *not by teaching him number,* which is merely a late (and therefore *more complex*) *form of the expression of quantity,* merely a *special case* of "quantity."

Therefore, it is necessary to start with actions that *mark out* for the child this "quantitative" plane of the reality he sees around him, in order to approach "number" at the next stage as the developed *form of expression* of "quantity," as a later and more complex intellectual abstraction.

The principle of the coincidence of the "logical" with the "historical" is a great principle of dialectical logic. But, once again, its application hangs on one dialectically cunning detail—namely, the logic must correspond to the real history of the object, and not to the history of theoretical ideas about this history.

Analyzing the history of political economy, Karl Marx noted a circumstance that is of great importance from the point of view of dialectics. "The historical development of *all sciences* leads to their *true point of departure* only through a multitude of roundabout and intersecting paths. Unlike other architects, science not only draws castles in the air but erects some stories of the building *before laying its foundation*" (*Contribution to the Critique of Political Economy*, p. 46 [retranslated from Russian]).

Yes, science "discovers" in its object the true "logical foundation" upon which the upper stories rest only in retrospect.

Until then, this "foundation" is *presupposed* by the "upper stories," but is not clearly understood, demonstrated, and analyzed. It is presupposed in a confused, indistinctly formulated fashion, often in the form of "mystical" ideas. This is what happened, for instance, in the case of differentiation. Newton and Leibnitz "discovered" differentiation and taught people how to use it, but themselves could not understand on what real foundations its entire complex construction rests—that is, which "simpler" concepts and actions it really presupposes. This was established only later, by Lagrange, Euler, and other theorists.

Number and counting really presupposed and presuppose as real preconditions a number of ideas that mathematics (like "all sciences") was to come to understand only in retrospect. I speak here of the general preconditions of both number and counting, of the concepts that must be developed (and mastered) before number and counting because they are more general in character and therefore logically simpler.

The mathematical "signs" with the aid of which these simplest and most general concepts are recorded are not figures but rather signs that have long been used by algebra.

They are the signs for equality (=) and inequality (≠) for "more" (<) and for "less" (<). And all of these signs designate *relations between magnitudes*. Precisely between "magnitudes"—that is, between *any* magnitudes, of whatever kind, whether expressed in terms of number or not, whether spatial-geometric or temporal. Relations between *magnitudes in general*.

It is self-evident that the idea of "magnitude" arose in the history of people's thinking before the ability to measure these magnitudes precisely by one means or another and to express them in terms of "number."

The ability specially to mark out from the entire diversity of qualities of things that are perceived by the senses just one quality—namely, their "magnitude." And then the ability to compare these "magnitudes" or to compare things *only as magnitudes*. To judge whether they are *equal* or not. To judge which of them is "bigger" or "closer" and which "smaller" or "farther"—in space or in time.

And then, when it was discovered that judgments of this kind are too "general," too incomplete (= "abstract") to act in the world on their basis, the question began to arise: "bigger" or "smaller" *by how much*? And only at this point did the need for and practice of "number" and "counting" arise.

Because without them, without these more concrete (complex, developed) concepts of quantity it would have been impossible to solve more complex and concrete object-oriented practical tasks connected with reflection of the quantitative determinacy of the surrounding world.

Man "invented" number *not* by "abstracting" from all and any "qualities," not by learning "not to pay attention" to the difference between a stone and a piece of meat, between a stick and a fire. Just the reverse: in "number" and "counting" he found a means for the deeper and more concrete expression precisely of qualitative (the most important and the first) determinacy.

Man's "need" of number arose when and only when life placed him before the necessity of saying to someone else (or to himself) not simply "more" or "less" but *how much* "more" or "less."

This presupposed a higher and more developed way of relating to the things of the surrounding world than that on the basis of which he had learned to distinguish "magnitudes" only approximately—abstractly.

Number presupposes *measure* as a category more complex than "quality" and "quantity"—a category that makes it possible to reflect the quantitative aspect of the quality marked out *more precisely* (more concretely) than before. And to record this more concrete idea precisely with the aid of figures and not simply by means of the words "more," "less," "equal," and "unequal."

From a general, diffuse, and undifferentiated idea of "quantity" man moved toward and arrived at a more perfect and precise—that is, concrete—idea of quantity—namely, "number."

And therefore "number" had a quite concrete—that is, object-related and practical—meaning and significance for man from the very start. And it was a true *concept* of number, even though it had not yet been analyzed theoretically by a single professional mathematician. This did not happen until much later, when not just mathematical thinking but its theoretical "self-consciousness" had come into existence. Initially this self-consciousness took distorted mystical form, as among the Pythagoreans. And it would be many millennia before mathematics reached a true theoretical understanding of number.

It is, evidently, from this true beginning and in this true historical sequence, which mathematics as a science was to discover only in retrospect, that the logical development of the child's mind in the field of mathematics should proceed.

First the child must be taught to orient himself in the most general and abstract fashion on the quantitative plane, to master the most general and abstract

relations among things as "magnitudes," and to record these relations on paper with the aid of the signs for "more," "less," "equal," and "unequal."

Here, however, the child learns to orient himself on the plane of quantity *not* by means of "abstract reasoning" but from real situations that are understandable to him—by "evening out" sticks and "matching" nuts with screws, boxes with pencils, and so on. For the child, this is understandable and interesting.

For the child's mind, this is training in the skill of *independently marking out the quantitative-mathematical aspect of real things* in the world of diverse qualities that surrounds him.

And not training in the skill of repeating in parrot-like fashion the word "one" when a single sensually perceived "thing" is shoved in front of his nose, or the word "two" when two such things are shoved there.

Thanks to this, the child, when he is shown one (two, three, etc.) single sensually perceived thing, will no longer reply thoughtlessly to the provocative and abstract question "how many?" with the word "one" ("two," "three," etc.). He will first ask: "How many what?"

And this indicates that he is already—in the case of number—thinking *concretely*. And not like the market trader who thoughtlessly hangs the label of a verbally embodied abstraction upon a concrete thing and thinks that her "understanding" of this thing is thereby complete.

If to his legitimate question the child receives the answer: "I am asking how many things there are here," he will reply with confidence and precision: "One."

If it is explained to him: "I am asking how many centimeters," he will reply: "two," "about two," or say: "It has to be measured." He understands that expression in terms of a number (a figure) requires measurement, measure.

Two important elements of "intelligence" are trained here simultaneously. First, the ability to relate correctly to a question ("how many?") and to ask a question oneself to clarify the task in terms sufficiently concrete to make possible a precise and unambiguous answer ("how many *what*?"). And second, the ability correctly to correlate a numerical sign *with reality* in its mathematical aspect.

The child's mind proceeds here not from obvious particulars to the abstractly general, because this is a quite unnatural and fruitless path in science, but from the truly universal (abstract) to the diversity of particulars within his grasp (i.e., to the concrete).[3]

For this is how science itself develops, assimilating more and more "particulars" in the light of initial principles. And not the other way round, not departing from "particulars" into the lofty heights of empty abstraction.

Here thinking moves constantly within sense- and object-related (and

therefore also "obvious") material, moves in accordance with facts, never for a moment severing connection with them.

In this way the child masters the actual *sense- and object-related reality of mathematical concepts,* and not a poor ersatz substitute for that reality, not "obvious examples" of set abstractions that are incomprehensible to him. Mathematical thinking develops within him. There is no need to cram into him heaps of abstract words, prescriptions, stereotyped schemas, and "typical solutions" that he is then quite unable to "apply." Therefore, he does not then face the supremely absurd task of somehow "applying" the general knowledge he has acquired (i.e., crammed) to life, to reality. For him this general knowledge is, from the very start, none other than reality itself, reflected in its essential features—that is, in concepts. In concepts he masters precisely the *reality* that they reflect. And not "abstractions" that he is then quite incapable of correlating with "reality."

The reader-pedagogue who hoped to find in this article a detailed set prescription in answer to the question "How should I teach how to think?" will probably be disappointed. All this is too general, he will say, even if it is true.

Quite right. Philosophy is incapable of offering the pedagogue any set prescriptions or "algorithms" on this score. A great deal more effort must be expended in order to bring the principles I have enunciated to such a degree of concreteness as would make them directly applicable to daily pedagogical practice. This will require collaborative efforts on the part of philosophers and logicians, psychologists, specialists in mathematics and in history, and, of course, pedagogues themselves.

Anyone who wants to teach others how to think must himself know how to think. You cannot teach someone else to do what you do not know how to do yourself.

No didactics will teach a pedagogue how to teach thinking if that pedagogue is an indifferent machine-like person accustomed to working in accordance with stereotype, to following a rigidly programmed algorithm in his head. Each pedagogue must be able to apply general theoretical—and, in particular, general philosophical—principles to his own concrete subject. He should not wait for someone else to do this for him and bring him a collection of set prescriptions that relieve him of the burden of intellectual labor, of the need above all to do his own thinking. Even the best and most elaborately developed didactics will not free the pedagogue of this necessity. However concrete and detailed it may be, between its general propositions and unique pedagogical situations there will remain a gap. And only the pedagogue who thinks dialectically, only the person with a developed "power of judgment" will be able to overcome this gap (between the "universal" and the "single").

Our schools must teach how to think. This means that each pedagogue must teach how to think. To think at the level of contemporary logic—that is, at the level of dialectics as the logic and theory of knowledge of the materialism of Marx, Engels, and Lenin. Without this all our efforts will come to naught, and didactics will remain at the level of John Locke and Jan Amos Komensky.

Notes

1. See V.V. Davydov, "Sviaz′ teorii obobshcheniia s programmirovaniem obucheniia," in *Issledovaniia myshleniia v sovetskoi psikhologii* (Moscow: Nauka, 1966).

2. For a detailed analysis of this problem, see the book *Vozrastnye vozmozhnosti usvoeniia znanii (mladshie klassy shkoly)*, ed. D.B. El′konin [Elkonin] and V.V. Davydov (Moscow: Prosveshchenie, 1966).

3. For a more detailed treatment see, for example, my book *Dialektika abstraktnogo i konkretnogo v "Kapitale" K. Marksa* (Moscow: Izd-vo AN SSSR, 1960).

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E.V. Ilyenkov

A Contribution to the Discussion on School Education

In recent years the general and specialized scientific press has carried an unending stream of articles, responses, résumés, and the like—all devoted to a single theme: what to do about our children, what and how to teach them, how to bring them up. The school, of course, is a vitally important social institution, but that is hardly the sole reason for spilling so much printer's ink, nor does it explain why so many scholars who have no direct link with the schools are giving them advice, recommendations, and instructions. An explosion of opinions, a flood of good intentions. I have looked over many of them. It is hard not to agree with many of them right off. Cramming is harmful? Of course it is harmful; of course we should push children more to think independently, to make use of their stocks of knowledge. But, another asks, surely we cannot forget the need for them to build up these stocks of knowledge in their heads? Of course we cannot, of course they have to store up knowledge for recall, even if that means cramming. And this too is absolutely true. We must do all we can to encourage the child's self-activity, his initiative, his interests. But—the opponent objects—at the same time we must not undercut the role of the teacher, his authority. The system of compulsory timetables is poorly adapted to the encouragement of intellectual self-activity. They have experimented and ruined the schools.

You cannot banish Pushkin from the schools. A textbook can hardly con-

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English translation © 2007 M.E. Sharpe, Inc., from the Russian text "K diskussii o shkol′nom obrazovanii," in E.V. Ilyenkov, *Shkola dolzhna uchit′ myslit′* (Moscow and Voronezh: Moskovskii psikhologo-sotsial′nyi institute and Izdatel′stvo IPO MODEK, 2002), pp. 56–61. Published with the permission of Elena Evaldovna Illiesh.

Translated by Stephen D. Shenfield.

vey the beauty and meaning of his poetry. There is no need for textbooks. It is necessary to read Pushkin himself. However, Pushkin can be read at home—why spend lesson time on him? Better to use it for the study of serious sciences—mathematics, physics, chemistry!

"Allow me!" the honored academician replies. "Our ideal is not the *Realschüle** but the school that provides general education and produces well-rounded, fully developed people. It is very dangerous to yield to the pressure of the technological age! It will prove damaging to physics, mathematics, and chemistry themselves!" "No it will not," the mathematician retorts. "Mathematics itself incorporates moral and esthetic values."

I do not present a list indicating sources. I think that this is superfluous, and everyone will recognize in the above a more or less detailed recapitulation of the mass of opinions expressed in just the last few months.

So the wheel turns. I could give in to the desire to put another spoke in the wheel. But stop!

Is it not time to try to understand what brought about this eruption of thinking about the schools and how it can be that everyone is right? Does the rough and ready truth not lie in avoiding "extremes" and combining them in a sober, rational, and harmonious fashion?

This is what the "résumés" usually say. Recognizing the "relative truth" of each thesis and antithesis, the author of the résumé establishes a synthesis within which the "rational kernel" of every opinion is preserved and "exaggeration" beyond the limits of the reasonable and permissible is eliminated.

I do not want to compose a résumé, especially in accordance with this recipe. I think that only life itself will find a final synthesis. I shall merely make a few points concerning how real life problems compel dozens of people to express dozens of different opinions.

It is only by proceeding from these problems that we can determine who is right and who is wrong without laying claim to the wisdom of Solomon.

Let us start with what is "generally known." Fundamental shifts are occurring in the mode of people's life activity. Automation, computerization, and the mathematization of science and technology are taking place. The requirements on man as a component of production are changing. Some skills and abilities are being displaced by machines, which do the same thing better and faster than man. Others, conversely, are turning out to be insufficiently developed and demand special care—for instance, the ability to exercise rational control over a vastly expanded machine technology. This is already true today. Tomorrow all tendencies will impose the same requirements in even more acute form.

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*A type of science-oriented high school in German-speaking countries.—Trans.

And the schools shape the people who will live tomorrow. In the realm of theory the question of today's school can be solved correctly only from tomorrow's positions, not from today's. Such are the conditions of our task, of our problem.

We cannot try to imagine the "model" of this tomorrow in detail. We can envision only the general contours, which are visible even today in the form of basic tendencies. It is especially important to imagine as clearly as possible all the real tendencies of development today and tomorrow (all and not just some of them).

Is the role of mathematics growing? That is quite obvious. Must tomorrow's person know mathematics? He must, better than he knows it today. Is man's moral responsibility for the consequences of technological innovations that are equally capable of benefiting man and bringing him innumerable misfortunes growing? Yes. It suffices to recall the problems that have already arisen in connection with nuclear energy. Is the role of the social sciences growing in this connection? Immeasurably. Will tomorrow's person have to understand social problems better than he does today? Yes, he will. Otherwise things will be very bad indeed for him, so bad that no mathematics will save him.

Is the individual becoming more specialized? Yes, he is. Is there a growing need in this connection for a counterweight in the form of general culture? Yes, there is.

But here, it seems, I am again falling into the same antithetics over which I waxed ironic. He must this, he must that, he must the other. . . . This must surely scare a person, especially an eight-year-old. So what is the way out?

Do we imagine tomorrow's person as an encyclopedist, as a walking encyclopedia of any and all knowledge and skills?

Surely infeasible.

Do we proceed further along the path of specialization, turning each person into a narrow—and becoming narrower from day to day—specialist, comforting ourselves with the thought that it is only all people "together" who make up Man with a capital letter? That they will compensate for one another's defects?

That millions of specialized cretins [from the German *Fachidioten*—Trans.] will together constitute a person of brilliant all-round development?

And this is only a current problem projected into the future.

A fact is a fact: today's acute and direct requirements for the "insertion" of man into production of the material and spiritual life of society demand his "fragmentation"—the splitting of his abilities. This is a fact. A fact fully realized by those who want to subject schools to the same process, so that

one school should train mathematicians, another school machine operators, a third salespeople, and a fourth English-language interpreters.

But this too, alas, is infeasible. Why?

Because the same process is taking place within each of these occupations.

Because an education that you call "mathematical" today will seem so "general" tomorrow that its products will be regarded as old-fashioned eccentrics who seek to encompass what cannot be encompassed. Tomorrow, today's "mathematicians" will be denounced as "humanistic utopians"; it will be said that more specialized schools should have been built earlier—schools for the training of topologists, set theorists, mathematical logicians, and so on—and that in the 1960s "topologists" were taught a great deal of superfluous material, including for some reason "numbers" and "arithmetic."

And what if tomorrow that narrow subfield of mathematics for which a person has been trained disappears altogether? He will have to be retired on pension. Retrain him? At the age of forty, or even twenty, it is already too late to retrain a "narrow specialist." And if you do retrain him it will cost so much that with the same money you could have trained five new, even narrower specialists.

Can even the most farsighted mathematician say which parts of currently taught knowledge will still be needed by a person in the 1980s, which will retain the name of "science," and which will be relegated to the archive or museum?

The real contradiction that you are obliged to resolve not only within "mathematical" education but in its general form is that of the relationship between "general" and "special" knowledge and, in the final analysis, between the "general" and the "special" person, between the generalist and the specialist.

It is this contradiction between the general and the special or particular that underlies the problem of "general and special education." It is not a new problem. The novelty consists only in the fact that this problem is now being solved not just on paper, not by means of operations with terms, but on *living people.* On paper you can make a mistake. To make a mistake on living people is a tragedy.

That makes it all the more important that we foresee the possibility of mistakes first on paper and try to solve the problem correctly on paper before we start to experiment on the living soul.

And it is to this that we are now witnesses.

The discussion on school education, in the final analysis, boils down to this fateful point. Today the discussion is theoretical in character. Tomorrow it will be a question of life and death for the individual. For each and every individual.

The general and the particular or specialized. How are we to understand this?

Here there is an immediate clash between two different and irreconcilable logics, between two philosophies.

Two understandings of the "general" and the "particular" that cannot be reconciled in an eclectically synthetic judgment—"both are important," both "general" and "specialized" education.

Having chosen one of these logics, we do not have the right to reason in this way and are obliged to state clearly which of the two we prefer.

Not prevaricating before science, logic, and my own conscience, I am obliged to say that if I am forced to choose between the "general" and the "special" I am categorically in favor of the *general*. I am in favor of the broad and comprehensive development of *general education.* And I am categorically against "specialized education" if it is turned into the antithesis of "general education."

What is the "general"—both in man himself and in each system of knowledge, skill, and ability?

It is not chatter about this, about that, and in general about nothing. It is not knowledge about many things. It is a special method of mastering the "special." It is the ability to see in the "special" itself the "embryo" of all other "special" features and characteristics within the framework of a solution to this general problem.

And a theoretical solution to the question of school education presupposes a clear solution to this central question of the day.

Either you consider the deepening of occupational specialization and "vocational education" a lasting and dominant tendency of world culture that is rooted in the requirements of "technology" *or* you consider it a tendency associated with the transient commodity-capitalist mode of the division of labor and abilities between individuals, classes, and categories of individuals.

In the first case, you will demand that the "specialization" of education be intensified. First you will plan special "mathematical" schools, later to be joined by special "political" schools, the mission of which will be to train a caste of "administrators."

In the second case, you will uphold the principle of the *general*—of the most genuine, broadest, and deepest *general* education for all. And on this basis you will plan some "special" schools not only for large and small categories of people but also for each *individual*.

Either "specialization" on the basis of the broadest general education—that is, first of all in the sciences devoted to *man*, to his mutual relations and his "nature" *or* you will regard "general" education as an appendage to "special" education.

In the second case, the most consistently devised and practically elaborated system of school education is the *English,* which even some moderate conservatives denounce as antidemocratic. It would be better if you do not pursue this principle.*

But if you want a really *general* education as the basis and condition for improvement in the field of "narrow" occupational specialization for the individual, then you must take care to create a new type of general education.

To date, no models of such an education exist either in Britain or the United States. Here we are compelled—like it or not—to be pioneers both in theory and in practice, creators and not imitators.

*The original version of this article (published in 1964) was written before the reform of state secondary education in England and Wales. The old system was based on a tripartite division into grammar, secondary modern, and secondary technical schools. In the late 1960s and early 1970s most of these schools were replaced by comprehensive schools.—Trans.

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E.V. Ilyenkov

On the Nature of Ability

It is understandable that the nature of ability in its general form should attract attention. This is perhaps the central problem of social pedagogy in our time. In this connection, the polemic that has arisen between S.L. Rubinshtein[1] and A.N. Leontiev is of enormous interest.[2]

On a first reading it is not so easy to discover the true crux of the dispute. Both authors recognize the same initial propositions and decisive facts; neither denies the importance of facts emphasized by his opponent. Apparently, the dispute is merely over a certain difference in the placing of emphases.

Both authors proceed from the following account of the situation. Developed human ability is a product of the individual's development within the humanly organized world, a product of the exercise of his organs on objects created by man for man. In no case is it inherited biologically together with the individual's anatomical and physiological organization; it is inherited only through the mastery of modes of human activity objectively embodied ("deposited") in the structure of the humanly transformed world, through the anatomy and physiology of the "inorganic body of man." At the same time, of course, neither author denies the role played by the natural preconditions of specifically human development and directly by the anatomical and physiological organization of the individual's body. The latter is beyond dispute: you will not train any specifically human abilities in a dog or monkey, however much you may exercise their organs on objects created by man for man.

Translated by Stephen D. Shenfield.

On the other hand, it is equally clear that "ability" in its fully developed form inheres in the structure of the organs of the human individual as little as the form of a statue inheres in a slab of marble or lump of clay.

"The abilities of people take shape not only in the process of the appropriation of products created by man in the process of historical development, but also in the process of their creation. The process of man's creation of the world of objects is at the same time the process by means of which he develops his own nature" (Rubinshtein). At the same time, it is quite clear that "biologically inherited properties (predispositions) constitute in man only one of the conditions for the formation of his mental functions and abilities—a condition that, of course, plays an important role" (Leontiev).

So the dispute must be over a subtler point. Let us try to bring it to light.

In his article, Leontiev places a categorical emphasis on the circumstance that all human mental functions without exception (including abilities) are wholly a product of the exercise of the organs on objects created by man for man. As such, they have their material substratum in noncongenital systems of reflexes. "Of course, all normal people have morphological predispositions that enable them, for instance, to master a language. Formed during the period of emergence as a human being, they are one of the essential biological peculiarities of the species Homo sapiens. However, neither language itself nor those concrete mechanisms that activate the processes of speech in one or another language are contained in these predispositions; they are not 'inscribed' in the brain. To put it another way, in ontogenesis they do not 'manifest themselves,' they take shape."

In other words, the entirety of an "ability" is given to the individual "from without"—by the world of objects and people, and the ability is developed (shaped) through the individual's "assimilation" of the experience of other people, of those modes of changing the surrounding world that created the body of civilization, the objects that surround a person from childhood.

To what does Rubinshtein object?

He sees in this framing of the question a one-sided overestimation of "external determination" in the development of the mind and, correspondingly, an underestimation of the "internal conditions" and "preconditions" that mediate the specificity of external influences upon the system of mental acts.

"In the theory of internalization, a correct view of the socially conditioned nature of human thinking and human abilities is overshadowed by a mechanistic understanding of their social determination that severs any interconnection or reciprocal influence between the external and the internal and eliminates any dialectic of the external and the internal, of the social and the natural in man."

This reproach, which is addressed not directly to Leontiev but to

P.Ia. Galperin as a consistent advocate of the theory of "internalization," has in Rubinshtein a philosophical-logical premise that he carefully develops: any external influence on a system is mediated (refracted) through the internal nature of the system. Failure to take this circumstance into account, according to Rubinshtein, inevitably leads to a mechanistic interpretation of the "causal" conditioning of the mind by the external world, to the idea that man is merely a passive and receptive object and not a subject, an active party to his relations with the objective environment.

This reproach cannot be shrugged off, especially as Rubinshtein backs it up with a whole series of further arguments. His main argument is the following. If abilities are wholly "given" to the individual "from without," being "deposited" in the forms of the world of objects and people, in conformity with which the individual trains his organs, making them "capable" of a certain type of action, then the process of developing an ability boils down simply to "mastering historically developed operations."

But when the question is framed in this way what is extinguished is none other than the *subject* himself. Or, to be more precise, the individual from the very start is not regarded as a *subject* but only as an *object* of external influences, only as something that is shaped but not as something that shapes.

Ability here is reduced to "the functioning in set form of given operations, activated by indicators given in advance."

> To organize mental activity as an aggregate of well-perfected operations, activated by indicators given in advance, means, of course, to simplify the teaching task to an extraordinary degree and ensure faster and easier attainment of the direct, strictly delimited scholastic result. But at what price? At the price of eliminating thinking as such from so-called mental activity. By this route, without a doubt, it is possible (there is nothing strange about it) to achieve in each individual case a certain effect. But what will the final general result be like? The transformation of the student into a creature of the pedagogue, into a person who knows how to live only by his cribs and accomplish only those things that the teacher has "programmed" into him. He will be able to reproduce what has been instilled into him, but expect no more from him!

A very weighty point is made here. What is called "ability" in the precise sense of the word cannot, indeed, be "decomposed" analytically into series of operations (skills) and indicators for their activation without extinguishing one of the most important components of "ability"—the capacity to act where there is no method of action given in advance or where there is no "indicator" for activating one or another of the given "operations."

For it is just the capacity to act in such a situation that distinguishes the

"able" or "capable" person from the "incapable," the more capable from the less capable, and in the final analysis the human being from the machine.

> It is not enough to supply the student with set schemas of action (although it is not possible to get by without doing this). It is also necessary to give thought to the creation of internal conditions for their productive use (not to mention the possibility of the student himself finding new generalizations, new devices, new methods of action—operations). In order to successfully form thinking, it is necessary to take into account this interconnection between external and internal conditions in the determination of thinking.
>
> Nothing provides such an obvious indicator of mental giftedness as the constant emergence of *new* thoughts in a person.

And not simply the capacity to reproduce memorized "operations" and activate them in accordance with prememorized indicators of applicability.

When we decompose "abilities" into series of operations through which they are exercised and series of "indicators" by which they are activated, it is precisely the "core of ability"—the subject—that is extinguished.

We obtain a situation similar to the one into which a chemist falls when he decomposes water into its component parts, into hydrogen and oxygen. On the one hand, it is reliably known that "water" consists of nothing but hydrogen and oxygen. On the other hand, it is evident that a simple sum of two parts of hydrogen and one part of oxygen does not yet constitute water. It is precisely the "water" that has disappeared.

In order to obtain water once more, a special reaction is required, a special kind of synthesis of hydrogen and oxygen, a special series of conditions under which this special synthesis will take place.

What conditions are required if the individual is not simply to have inculcated in him a series of operations and indicators, but is to acquire an *ability*?

Rubinshtein says: *internal conditions*—that is, certain mental mechanisms, given prior to and independently of the process of mastering "skills," "operations," and indicators for their activation—constitute that soil, that living trunk of the personality on which alone skills can be grafted. Without this the system of operations and of indicators for their activation will not be productive but only reproductive. In other words, a machine-like type of intellect will be obtained, the type of intellect that even today can be replaced successfully by a machine or electronic device.

In its general form, the argument is unanswerable. Lacking an answer to it, the theory of "internalization" cannot consider itself correct.

But, on the other hand, I can agree with Rubinshtein only up to the point where passes on to the concrete-psychological description of those "conditions" that he calls *internal*.

What is the "internal core" of ability and where does it come from? Is it given by nature, together with anatomical and physiological preconditions, together with the unconditioned-reflex basis of the systems of conditioned-reflex connections that take shape after birth?

Or is it—just like the system of "operations"—a fact created during ontogenesis, in the course of the exercise of organs on objects created by man for man? Is it therefore the same kind of "internalized" property of the individual as a concrete schema of action, an "operation?"

Rubinshtein fails to make this clear. He provides no direct answer. What is more, a number of his formulations compel me to suspect that he inclines toward a natural, anatomical-physiological interpretation of this "internal core." There are grounds for suspecting this in the extracts that I have quoted.

But such an interpretation contradicts Rubinshtein's own intention. Indeed, if the "internal core" of ability is to be understood as something given prior to and independently of the process of the individual's assimilation of the historically accumulated experience of mankind, then the pedagogue must accept it as a precondition, set in advance, of all purposive pedagogical actions. And the entire sum of actions is again reduced to the training of "skills"—that is, of formal (formalized) operations that are activated by "indicators" given in advance.

But Rubinshtein himself wants education to be understood not as the formal mastering of knowledge (operations) but as the development of ability. Therefore, the "internal core" must also be a product of the purposive activity of the pedagogue and not of the physiological act of the individual's parents.

A natural, anatomical-physiological interpretation of the "internal core" wholly and categorically excludes the possibility of the purposive formation of that very "core of ability" that is left out of the whole system of well-perfected operations activated by prememorized "indicators."

In this case the pedagogue must teach the child precisely "operations" and the indicators for their activation. "Ability" in the true sense of the word will be for him an objective fact (i.e., an anatomical-physiological fact quite independent of his will and consciousness), a precondition formed prior to and independently of his influence on the child. As a result, whether the given individual will turn out to be "capable" or "incapable," more or less capable of making productive use of the system of skills (operations) will also be a fact that depends in no way on the pedagogue.

Thus, in practice there is no effective difference between the type of "education" that, so Rubinshtein supposes, the theory of internalization dictates to the pedagogue and the type of education that he himself would like to see.

So I am inclined to suspect Rubinshtein of interpreting in a naturalistic fashion that "core of ability" that remains as a "residue" after removing from

the equation all strictly formalized elements (i.e., both well-perfected schemas of action or "operations" and strictly formulated indicators for their activation). I am inclined to attribute such an understanding of the "internal core" to certain errors in his formulations.

For the whole pathos of his position consists precisely in his quest for a means of purposive pedagogical influence on the child that will ensure the development and even the emergence of that mental function that constitutes the "core of ability"—the productive (and not reproductive) use of operations in accordance with indicators known in advance.

For against what is Rubinshtein always polemicizing?

Against conceptions according to which "thinking is mainly the manipulation of generalizations obtained in set form, and mental activity is the functioning of operations that are activated automatically by indicators given in advance. . . . Thus, thinking is the business only of the teacher, not of the student!"

This conception, he continues, in its basic orientation "artificially emphasizes the receptive aspect of thinking, the ability to assimilate the given, and masks its active, creative aspect—the ability to discover the new."

If Rubinshtein does indeed treat the nature of the internal core—that is, of the active, productive, and creative element within "ability"—in a naturalistic, anatomical-physiological fashion, then he himself makes it impossible to pose the question of means of pedagogical action that ensure the emergence of this element in mental activity.

According to his own research program, "I emphasize the investigation of the *process* of thinking and investigate thinking not only where it manipulates set generalizations but also—and even especially—where it . . . moves toward *new* generalizations."

This means that the trick lies *not* in training the individual to act in accordance with a memorized schema, activated by an "indicator" of its applicability given in advance, but in placing the child in a situation within which he will be compelled to act as "himself," as a subject. This situation, evidently, must possess the following characteristics.

First of all, it must be sharply conflictual—that is, such that the "operations" and "indicators" for their activation that are already known to the individual *do not work,* and the individual must himself find a means of overcoming a difficulty, must discover a course of action that is *new* to him (though not new to the pedagogue). He must himself "discover" the sole means of action or "operation" that leads to the goal. Or, conversely, he must discover a new (to him) "indicator" of the applicability in an unforeseen case of operations known to him.

The art and tact of teaching, which the pedagogue acquires by "experience,"

consists precisely in always knowing how to place the child in a situation such that its "resolution" is within his reach, given the level and store of knowledge with which he approaches the task or difficulty, and is possible by only one means—through the child's independent "discovery" of the operation that is required and that gives a "way out" of the difficulty.

For "activeness"—as the "internal condition" for mastering an operation and the indicator of its applicability—awakens, as is self-evident, only and exclusively when the individual confronts a difficulty and has to overcome it *by his own efforts,* without coaching, without a hint or "prompt."

Therefore, the art consists in being able to create a "difficult" situation from which there is objectively *a single way out,* which is known to the pedagogue and is a pure "operation" but is not known to the child, who must find it independently as something "new" and not as an "operation" in accordance with a given indicator.

Under this condition the "operation" will be mastered—not, however, by means of training and repetition, but through the individual's independent action, by awakening his productive activeness.

This, it seems to me, overcomes the conflict between the advocates of the "theory of internalization" and Rubinshtein, keeping the strong points of both approaches while getting rid of the weaknesses for which each side reproaches the other.

For "ability" consists in the capacity to act in accordance with the logic of that reality within which operations and indicators for their activation are "deposited," relying on mastered schemas of action but not floundering in perplexity where already mastered formalisms have exhausted their potential and led to difficulty, to antinomy.

For it is in the form of an antinomy, of a formally insoluble contradiction that a person always encounters a *question* that has to be solved and to which there is as yet no *answer,* no ready means of action leading to an answer and solution.

This is precisely how Karl Marx understood the problem of *ability,* or the problem of the difference between *understanding* and simple formal mastery of the known.

Here is the decisive place. Describing Roscher, Marx writes:

> Roscher undoubtedly has a considerable—and often quite useless—knowledge of literature. . . . But … what avails me a fellow who, even though he knows the whole of mathematical literature, yet understands nothing of mathematics? . . .
>
> If only such a professorial schoolboy, by nature totally incapable of ever doing more than learn his lesson and teach it, of ever reaching the stage of

teaching himself, if only such a Wagner were, at least, honest and conscientious, he could be of some use to his pupils. If only he didn't indulge in spurious evasions and said frankly: 'Here we have a contradiction. Some say this, others that. The nature of the thing precludes my having an opinion. Now see if you can work it out for yourselves!' In this way his pupils would, on the one hand, be given something to go on and, on the other, be induced to work on their own account. But, admittedly, the challenge I have thrown out here is incompatible with the nature of the professorial schoolboy. An inability to understand the *questions* themselves is *essentiellement* part and parcel of him, which is why his eclecticism merely goes snuffling round amidst the wealth of set *answers*.*

Notes

1. S.L. Rubinshtein, "Problema sposobnostei i voprosy psikhologicheskoi teorii," in Rubinshtein, *Problemy obshchei psikhologii,* 2d ed. (Moscow, 1976), pp. 219–34.

2. A.N. Leont′ev [Leontiev], "O sotsial′noi prirode psikhiki cheloveka," *Voprosy filosofii,* 1961, no. 1, pp. 26–40.

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*Letter to Ferdinand Lassalle of June 16, 1862; see K. Marks [Marx] and F. Engel′s [Engels], *Soch.,* vol. 25, p. 404; English translation from www.marxists.org/archive/marx/works/1862/letters/62_06_16.htm.

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E.V. Ilyenkov

The Biological and the Social in Man

It might seem that there is no problem here worthy of serious discussion. It might seem that all is simple. On the one hand, a human being is a biological organism, a specimen of the species Homo sapiens. On the other, he always appears as a member of one or another social organism, as a representative of society at a definite stage of its development, and therefore as a representative of a definite class or occupation, of this or that social group. In order to understand this circumstance one does not need to be either a philosopher or a physician. It is as obvious as the fact that the Volga flows into the Caspian Sea.

Why then has this question arisen in science time and time again over the centuries? Why do disputes repeatedly flare up concerning the exact interrelation between these two aspects of the life activity of the human being? Is this not an artificial dispute, one that has nothing to do with the real problem in the tightening grip of which man finds himself?

Evidently, it is not. And the problem arises precisely because man is not an "on the one hand social and on the other biological being" who can be split, at least in thought, into these two aspects, but a *dialectical* being in the literal sense of the word.

This means that any social departure, any action, any manifestation of social life in man is made possible by biological mechanisms—above all,

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Translated by Stephen D. Shenfield.

by mechanisms of the nervous system. On the other hand, all the biological functions of man's organism are subordinated to the performance of his social functions to such a degree that the whole of biology becomes here merely a *form of the manifestation* of a principle that is quite different in nature.

There is therefore always the possibility here of two polar interpretations of any particular or concrete case. Thus, we can regard the biological functions of the organism as a form of the manifestation of the historically determined social functions of the given individual. Or—just the reverse—we can regard social functions as a form of the manifestation of the natural inherited characteristics of the human organism, as merely the external form in which the functions organically built into this organism are revealed.

From the point of view of pure or formal logic, both approaches are equally correct. That is why we obtain two clashing, directly opposed logics for considering the same fact. And this possibility of thinking about the same fact from opposite directions creates the potential for a dispute that is not just formal.

Value is the concrete form of the manifestation of an abstraction; use value is merely a form in which exchange value is embodied. And *not* the other way around.

The question arises, as a rule, when people encounter one or another *anomaly,* with a more or less marked deviation from the usual, "normal" course of human life activity, and start to ponder the causes of this anomaly, of this violation of the norm. Where are we to seek this cause, which is altering the normal, usual course of life activity, in order to eliminate it? I speak, of course, not of single cases but of cases that for some reason have a tendency to become *typical,* widespread, and therefore demand some general solution. I have in mind, for example, such facts as a fall in the birthrate or a rise in mortality, a rise or fall in the prevalence of specific diseases, or, for instance, crime statistics. In general—any troubles of general significance.

Here there has always arisen the possibility of attributing phenomena of purely social origin to natural causes, of deriving, so to speak, the social from the biological or (more broadly) from the natural, of curing social diseases by medical means, and of treating organic diseases with social measures.

The guillotine is a physician and a pharmacist.

This line of thought, which becomes tempting under certain conditions and for certain types of people, is observed constantly in the history of theoretical culture and long ago crystallized into an entire worldview. It may be called the *naturalistic* view of man and his life activity.

A textbook example—we find it amusing, but it was by no means amusing in its time—is provided by the thesis of Aristotle according to which some individuals are slaves and others their masters by nature. And the most inter-

esting thing here is that this thesis arose precisely at a time when the classical ancient society was starting to enter the phase of its decline and dissolution. This thesis arose precisely as a theoretical justification for the defense and protection of the collapsing social organization, as a counter-thesis to the demands for some other means of organizing life that were already taking vague shape in many heads.

But naturalistic explanations of certain social phenomena may be not only *defensive* but also *destructive* in character and effect. In 1789, for example, the French bourgeoisie rose up in revolution in the name of the so-called nature of man, declaring the order of feudal estates "unnatural," contrary to "nature," to the natural organization of human life. Conversely, the right to private property and freedom of private property were declared natural.

Thus, the naturalistic illusion may conceal either a conservative and reactionary conception or a conception that is objectively progressive or even revolutionary. Nevertheless, in both cases this illusion remains an illusion, to which even very progressively minded people may be susceptible.

Materialist philosophy, being a principled adversary of all illusions, makes no exception for this one, which has a tendency to revive in the most unexpected forms.

Marxism had to confront the naturalistic illusion at its very birth, in the course of the polemic with the revolutionary-inclined Left Hegelians. In *The German Ideology,* Marx and Engels demonstrated the whole cunning of this theoretical illusion, which in reality and unknown to themselves turned the radical Left Hegelians—the Bauers and Stirner—into theoretical apologists for the existing social order, despite all their sincere revolutionary inclinations and phrases (*Soch.,* vol. 3, pp. 424–26).

Marx and Engels always spoke out categorically against all variations of the naturalistic conception of human life activity, even when it was combined with politically progressive intentions. They understood that this illusion, by virtue of its being precisely an illusion and not a scientific-materialist explanation, sooner or later would lead these people to politically incorrect and harmful decisions, that sooner or later, despite all their subjectively revolutionary inclinations, they would take up defensive positions vis-à-vis the existing social order—that very order which seemed to them abnormal. This is indeed what happened to the majority of the Left Hegelians.

A naturalistic explanation of the main large-scale calamities and abnormalities of our century always and everywhere proves to be a very suitable form of thinking for *anticommunism*. As an extreme, limiting case of this kind, in which the cunning of naturalistic explanation is especially striking, we may consider the conception of Arthur Koestler—a theorist who enjoys great popularity in the West.

The general position of true materialism, as formulated by Marx, Engels, and Lenin, may be characterized briefly as follows:

All that is human in man—that is, all that specifically distinguishes man from the animals—is 100 percent (not 90 percent or even 99 percent) the result of the social development of human society, and any ability of the individual is an individually exercised function of the social and not of the natural organism, although, of course, it is always exercised by the natural, biologically innate organs of the human body—in particular, the brain.

This position seems to many people somewhat extreme, accentuated in an exaggerated fashion. Some comrades are afraid that such a theoretical position may lead in practice to underestimation of the special biological-genetic innate characteristics of individuals, or even to leveling and standardization. These fears, it seems to me, are groundless. It seems to me that, on the contrary, any concession—even the smallest—to the naturalistic illusion in explaining the human mind and human life activity will sooner or later lead the theorist who makes this concession to the surrender of all materialist positions, to complete capitulation to theories of the Koestlerian type. Here it is a question of: "Remove the claws and the whole bird perishes." For initial arguments concerning the genetic (i.e., natural) origin of individual variations in one or another human ability always lead to the conclusion that these abilities are themselves natural and innate, and indirectly—through naturalistic explanation of these abilities—to the perpetuation (at first in the imagination, but later also in practice) of the existing, historically shaped and inherited mode of the division of human labor.

This is the result whenever a theorist makes purely physical indicators of the human organism (for instance: height, color of hair, or color of eyes) into a "model" in accordance with which he also starts to understand mental indicators such as degree of intellectual giftedness or of artistic talent.

This logic implacably leads to a view of talent (and of its opposite—idiocy) as a deviation from the norm, a rare exception, and of the "norm" as *mediocrity,* the lack of any capacity for creativity, an inclination toward uncreative, passive, and often routine work.

And here it seems to me that it is the duty of a Marxist to object categorically to this kind of explanation of mental differences. It seems to me much truer—both in theory and in practice—to assert that the "norm" for man is precisely *talent* and that by declaring talent a rarity, a deviation from the norm we simply dump onto Mother Nature our own guilt, our own inability to create for each medically normal individual all the external conditions for his development to the highest level of talent.

For this reason it seems to me not only absurd but also harmful to speak of a person's mental abilities as genetically predetermined. For the practical

consequence of this view is always a faulty strategy for establishing the collaboration between pedagogue and physician that is so essential to the task of ensuring the all-around development of each person—that is, to the main task of communist transformation.

For once we dump onto Mother Nature, onto the organics of the human body the blame for the fact that our schools produce quite a large percentage of ungifted people and too few talented people, the task of reconstructing the education system and all the other conditions of human development is automatically replaced by the task of reconstructing organics, the brains and nervous systems of individuals. Hence people start to see the task of medicine and of the physician not in the protection and restoration of the biological *norm* of the functioning of the human organism, but in the utopian undertaking of *reconstructing* this norm. Or else the physician will be pushed into the unworthy role of apologist for all the deficiencies in our education system and in the way we bring up our children. First we shall turn the child into a neurotic or even a psychopath, and then we shall send him to a neurologist, who, naturally, will diagnose a neurosis. And we shall end up with a vicious circle, in which it will always be easy to pass off the *cause* as the *consequence*.

Thus, the problem of the relationship between the biological and the social in human life activity and in the human mind is not an artificial problem but a vital one, and the physician, just as the pedagogue, must be familiar with the general theoretical solution to this problem in the philosophy of Marxism-Leninism, so that he will make fewer mistakes in the particular concrete cases that he encounters.

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E.V. Ilyenkov

A Contribution on the Question of the Concept of "Activity" and Its Significance for Pedagogy

The discussion raised on the pages of the journal *Voprosy filosofii* by A.N. Leontiev seems to me not only very timely but also very well-aimed. So I would like to regard the fact that the appearance of A.N.'s articles and the establishment of our seminar occurred at the same time as a happy coincidence. Evidently, the concept of *activity* is indeed the key concept that alone makes it possible to unite the efforts of pedagogues, psychologists, and philosophers in accomplishing the central task of our entire education system—the task of organizing it on the basis of a clear system of theoretical ideas. It seems to me that this concept can be likened to a crystal cast into the supersaturated solution of our pedagogical thinking.

The need to create a single system of theoretical foundations for the organization of teaching-educational work in our schools is, indeed, very acute, very urgent. The most reliable sign of the tenseness of the situation is the rapidity with which "epicenters" have recently been arising and disappearing in the atmosphere of our pedagogical thought—points of attraction around which sympathizers immediately start to gather. Now it is the idea of "programmed teaching," now "genetic pedagogy," now "developmental teaching," and now "cybernetics," "information theory," and similar fashionable

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trends. By no means do these enthusiasms pass without leaving a trace: they are absorbed willingly, even greedily. You only have to peruse any guide to pedagogy written in recent years in order to discover traces of all of the short-lived enthusiasms—something like a layered pie or a cross-section of geological strata.

What will you *not* find there?! External feedbacks and branching programs, talk about genetic factors underlying ability and the role of the environment, and about the role of Communist Youth League (Komsomol) organizations.

Of course, there is also talk about the significance of "activity," the importance of independent activeness in the course of mastering material. Sometimes there is even a lot of talk, and at first glance it seems that what is said is correct. In fact, however, this talk remains one fragment among others: its removal would not affect the rest of the picture in the least. But this just goes to show that the process of education (and upbringing) is understood in isolation from any connection with the main characteristic of the specifically human relation to the world and to other people, with what made and makes a human being a human being—with the process of changing nature, with object-oriented activity in the most serious meaning of this expression.

In general form this has already been said with adequate clarity. And the point, evidently, is not to repeat it once more in general form. I shall therefore try to analyze one very well-known pedagogical problem that causes our schools, both higher and secondary, much trouble. And it will, perhaps, cause them increasing trouble as time goes on.

I have in view the problem that is ordinarily referred to as the problem of *applying knowledge to life* or in "practice." It does not need to be proven, I think, that this is a painful problem. It is, moreover, a problem that requires a fundamental solution, a theoretical and practical solution.

Is there such a problem? There is. Often—and more often than it may seem—the graduate of our education system does not know how to apply the knowledge that he has acquired at school to the solution of the tasks and problems that he has to deal with outside the school walls. The situation is absurd: a person *knows* how it is necessary to act in accordance with science, but nonetheless acts as though he did *not know* this. And this is not because he does not want to act in accordance with science, but because he is unable to do so.

A rather strange phenomenon, if you think about it. Indeed, the knowledge appears to be there, the object to which this knowledge is to be applied is at hand, and there is a burning desire to apply it, but for some reason the knowledge is *not* "applied."

Hence arises the idea that among human abilities and "skills" there must be

a special ability that is distinct from knowledge itself—the ability to "apply" the knowledge in one's possession.

And the question arises: can this special skill be *learned and taught*?

If this special skill can be taught, this means that a special kind of activity exists (or should exist)—the activity of correlating knowledge with its object (of bringing them into mutual relation). This means that special "rules" should exist, in accordance with which this activity is performed.

And so people start to seek out and formulate rules for correlating knowledge with its object—or, more precisely, for correlating general theoretical formulas with direct object-related situations. They start to classify typical mistakes made in the course of this activity for the purpose of warning against these typical mistakes.

They do not notice that the problem they are trying to solve is insoluble in principle, in its very essence, and that the only solution to it may be to make the problem itself impossible, so that it does not and cannot arise.

In other words, the only way to solve this problem is to eliminate the conditions that give rise to it.

The point is that the "knowledge" that still has to be specially correlated with its object is by no means *knowledge* as such, but only an illusion, only a surrogate for knowledge.

In this connection, the distinction that Leontiev draws here between "knowledge" and "conviction" seems to me not altogether precise. The borderline, it seems to me, passes not between knowledge and conviction, but between genuine knowledge and illusory knowledge. This is the difference between knowledge *of the object* and purely formal—that is, purely verbal—familiarity with terms, symbols, signs, and combinations thereof, with *phrases*.

The word "knowledge" is sometimes really used to mean only the latter—namely, mastery of the *language* of a particular field of knowledge, mastery of its terminology and the ability to use this terminology.

What takes place here is by no means the mastering of the *object* of knowledge (and knowledge can consist of nothing but this), but merely the mastering of *phrases* about this object, merely the mastering of the verbal shell of knowledge *in place of* knowledge.

Here lies the root of that illusion out of which then grows the peculiar and essentially absurd and irrational problem of "correlating" knowledge with its object. This is a problem that by its very nature does not and cannot have a rational solution.

This was understood very well by as subtle an analyst as Immanuel Kant. His *Critique of Pure Reason* contains a very acute analysis of the situation I have described. The essence of this analysis is as follows.

If the knowledge that a person masters at school consists of a certain aggregate of *concepts, definitions,* and *formulas* and their combinations in *judgments, deductions,* and *systems of deductions,* that is, in a collection of *rules* that constitute professional erudition, then apart from this collection of rules one other quite special task remains for mental activity—namely, the task of placing individual, particular, special cases under these rules, the task of placing *the special under the universal.*

It is here, as a rule, that the breakdown occurs.

This ability, as Kant quite accurately defines its special task, consists in knowing how to distinguish whether or not a given case *comes under* a given rule. Kant called this special ability the *power of judgment*. And it is impossible in principle to acquire this specific ability in the form of another rule. And for a very simple reason: a rule—precisely because it is a rule, that is, something general—in its turn requires guidance from the power of judgment, that is, from the ability to distinguish whether or not a given case of *application* of the rule comes under the rule that we have formulated for such application.

> And thus it appears that, though understanding is capable of being instructed, and of being equipped with rules, judgment is a peculiar talent that can be practiced only, and cannot be taught. It is the specific quality of so-called mother-wit; and its lack no school can make good. For although an abundance of rules borrowed from the insight of others may indeed be proffered to, and as it were grafted upon, a limited understanding, the power of rightly employing them must belong to the learner himself; and in the absence of such a natural gift no rule that may be prescribed to him for this purpose can ensure against misuse.
>
> Deficiency in judgment is just what is ordinarily called stupidity, and for such a failing there is no remedy. An obtuse or narrow-minded person to whom nothing is wanting save a proper degree of understanding and the concepts appropriate thereto, may indeed be trained through study, even to the extent of becoming learned. But as such people are commonly still lacking in judgment, it is not unusual to meet learned men who in the application of their scientific knowledge betray that original want, which can never be made good. (vol. 3, pp. 217–29)

From this directly follows the conclusion that the power of judgment is an *innate* ability. It makes no difference whether it comes from God or from Nature. If a child is born with it, he can and should be educated. If not, no education, however refined, will be of help.

Hence the tradition that comes down from this reasoning of Kant sharply divides people into two categories—people who act in accordance with rules that originate in the minds of others and people who are able to derive rules from experience and apply them intelligently.

The majority of people, naturally, fall into the first class or category. And the minds of people of this sort operate in accordance with schemas that resemble the schemas of action of a trained animal more than the actions of a human being. Such a mind acts in strict accordance with schemas of formally mastered "rules" and is unable to cope with a task in which the objective situation makes it impossible to act in accordance with a schema given in advance.

The question arises: is there any way out? There is. And the way out is very simple in principle, although very difficult to find in terms of concrete pedagogy.

The way out is as follows. The entire art of the pedagogue must, from the very start, focus not on inculcating set rules regarded as tools or instruments of action, but on organizing the external, objective conditions under which learning activity is to take place.

In other words, the pedagogue must concern himself first of all with creating a system of conditions of action that impose on the student such and such a method of action.

And when the action is accomplished, the pedagogue can and must bring to light the rule or schema to which this action was forced to comply. Then this rule can and must be given expression in words and signs. Then—and not before—the rule can be brought into verbalized consciousness.

In this case, the student is already able to handle the object in conformity with the requirements set by the nature of the object, and not by a "rule" or schema of action given in advance and independently of action with the object.

Here we have a very curious and very cunning dialectic.

If you induce the ability to act in accordance with a rule by means of an external situation that requires a certain method of action but exists outside the student's consciousness and independently of his will, then the student will master the rule as a subjective form (or method) of action with the object.

But if you do the opposite, if you present the rule in the form of "the rule as such," that is, as a schema for the subject's action, then the student will not master the rule as a schema for subjective action. He will master it precisely as an external schema, as an *object* alongside other objects, as a *thing* that possesses certain properties. Consider, for instance, a formula or algorithm. The student will learn to act with them in the same way that he acts with any other external thing.

We have here a psychological paradox: in both cases the pedagogue achieves a result exactly opposite to the result he intended.

If he conveys a "rule" through organization of the objective situation, that is, not as a rule but as a set of external conditions of action, then he achieves the desired result: the rule is mastered as a rule of subjective activity.

But if he presents the rule precisely as a schema for subjective activity (as a sequence of operations), then the rule is mastered as one more object, one more external thing with which special actions have to be produced—namely, actions to bring it into a special mutual relation with another thing.

For this reason, thinkers who have taken the difficulties highlighted by Kant as their point of departure have insisted that the subjective mode of action with things arises and takes shape solely and exclusively in acts of real activity with things and cannot be given a priori as a schema of action. To learn to swim you have to get into the water, as Hegel liked to say.

Provided that the starting point is real action with an object, accompanied by observation of the method of action ("reflexion"), the rule is mastered directly as a requirement imposed on action by the *object*—in other words, directly in the form of a thing. Knowledge then appears to the student precisely as *knowledge of the thing,* and not as a special structure situated outside the thing that still somehow has to be "applied" to this thing by performing some sort of special actions.

This is a very serious mental reorientation of the personality, entailing a quite different type of mental relation both to knowledge and to the object.

In one case the student finds before him, as it were, two objects that he is forced somehow to relate to one another while remaining separate from both.

In the other case he finds before him only *one single* object, because from the very start he *merges* with the other object (with knowledge). This occurs because he emerges as the subject of action with the object, as personified knowledge, as knowledge that has direct mutual relation with things, as *knowledge of things*. And not knowledge of the phrases that other people have used in reference to these things.

It is here that the fateful difference lies. A person sees and knows an object much more rarely than he imagines. Usually in an object he sees only what he knows from the words of other people, because in essence he does not encounter the object itself. For he is acquainted not with the object, but with what has already been written about this object in books, guides, instructions, and textbooks. And after all, as they say, that is two big differences.*

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*It was a well-known joke in the Soviet Union to call a big difference "two big differences." The joke is said to have originated in Odessa.—Trans.

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E.V. Ilyenkov

Knowledge and Thinking

The slogan that our schools should teach how to think and not simply load the student's head with study material has been popular in our pedagogical literature for some time. It is a reasonable slogan. But it immediately confronts pedagogy with a question the solution of which goes far beyond the bounds of its own competence: what does it mean—to "think?" What is "thinking"?

It is by no means a simple question. Would every pedagogue be able to explain clearly to himself and to others what he understands by this word?

It is not so difficult to make out that the mastering of curricular material does not coincide automatically with the development of the ability to "think independently." Or to be more precise, simply to think, for thinking can only be "independent." However, understanding the difference between the two is merely a first step in the right direction. The second step—much more important and much more difficult—is to overcome this difference, that is, to stop regarding the "mastery of knowledge" and the "training of the mind" as two different tasks. "Different" means that each task can and should be accomplished separately, independently of the other, and, correspondingly, by "different" means and methods. This is impossible by the very nature of things, by the nature of knowledge and thinking, and the entire problem is to construct the process of mastering knowledge in such a way that it should be at the same time a process of training the mind, the ability to think.

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Translated by Stephen D. Shenfield.

Yes, but do we really not encounter at every step what appears to be the opposite situation—people who "know" but who are unable to "think creatively (independently)"? We do encounter such people, and much more often than it may seem to us. But in such cases it would be more correct to say that here there is no trace of real knowledge, but rather something else that is called "knowledge" only through misunderstanding. For it is impossible to "know" in general; it is possible only to know something in particular, this or that object, and truly knowing an object means being able to handle and understand it *independently*. But "thinking" is nothing other than the ability to deal with each object intelligently—that is, in accordance with its own nature and not in conformity with one's fantasies about it. Thinking **is** really functioning knowledge.

And when people say (and they say it quite often) that someone possesses knowledge but is unable to "apply" this knowledge to reality, they are making an essentially quite absurd statement, half of which completely cancels out the other half. How can anyone know an object—and be unable to relate this knowledge (knowledge of the *object*!) to the object?!

In actual fact, this paradoxical situation arises where a person does not really know an object, but knows something else. What? Phrases about the object. Words, terms, formulas, signs, symbols, and stable combinations thereof deposited in science, mastered (memorized) in place of knowledge of the object—as a special object that exists above and outside reality, as a special world of ideal, abstract, phantom "objects."

It is here that an *illusion* of knowledge arises, followed by the insoluble task of relating this illusory knowledge to reality, to life, of which the person knows nothing apart from what has already been expressed in meaninglessly memorized words, formulas, and "rules," in "semiotic constructs." And when he tries to connect this illusory, purely formally mastered "knowledge" with life, with reality, he is unable to come up with anything of value for either knowledge or life.

To the conception of knowledge *sketched* above there corresponds a very widespread and philosophically false conception of thinking.

This conception deceives people all the more easily for seeming, at first glance, quite obvious and psychologically acceptable; it also has the power of a thousand years of tradition. "Thinking" here is understood as something like "inner"—dumb—speech, something like a silent monologue soundlessly whispered for oneself that if necessary can be turned "outward" for others in spoken or written form. The advocates of this view therefore both understand and investigate "thinking" above all in its verbal manifestation, as "language thinking." The very ability to think is, naturally, equated more

or less consistently with the ability to *manipulate words,* signs, symbolism of any kind—with the ability to combine and divide these signs in accordance with known "rules" and perform acts of "calculation of utterances," that is, to carry out procedures for the transformation of one sequence of combinations of signs into another such sequence. The "rules" governing these actions are assigned the status and name of "laws of thinking"—a status and name to which they are not entitled.

It is easy to see that on the basis of this conception it is difficult to train a real ability to think—that is, to achieve awareness of the essence of a matter, of a situation in real life, in objective reality. In place of the ability to think in the sense given this term by the materialist theory of reflection, the ability actively trained here is at best *refined linguistic dexterity,* oriented not toward an objective situation, not toward objective truth in its true—materialist—sense, but toward success, utility, consensus, considerations of the "simplicity and elegance" of semiotic constructs, and so on and so forth. Not infrequently this conception is combined with talk about the role played by intuition, irrational and subconscious motives, moral and esthetic "values," and other purely subjective factors that surreptitiously guide "semiotic thinking," activity in language and with language.

It has to be said that the understanding of thinking sketched above currently enjoys the support of the most influential currents in Western philosophy—namely, neopositivism and existentialism—and exerts the strongest influence both on science and in the field of education. These influences also penetrate our country, and this circumstance needs to be taken into account. Under these conditions it is very important to counterpose to alien philosophical influences dressed up in the fashionable attire of "modern philosophy of science" a clear and principled dialectical-materialist understanding of knowledge and thinking, and of the connection of both with language. But above all—with real, objective reality, with life in the process of its development, which, in its decisive aspects, does not depend on language, or on the ability to use language, or on the ability to make "semiotic constructs"—on everything that is wrongly called thinking. Or even on real thinking—on the ability to achieve awareness of the true situation in the world around us, although some very important things in life do depend on this ability.

The highest forms of thinking—including scientific-theoretical thinking, the foundations of which our schools are obliged to teach—are, indeed, closely connected with language. What I say above should certainly not be read as an argument in favor of ignoring the problem of this connection. Fluent mastery of language, including the so-called language of science, is a very important condition of thinking, although it would be more correct to put it the other

way around: real thinking is an indispensable condition for the fluent mastery of language. A person who does not know how to think independently does not have mastery of language; rather, language has mastery of him, of his consciousness. His thinking (his "inner speech") remains in a permanent state of slavish dependence on verbal stereotypes, on meaninglessly memorized semiotic constructs, on "rules," stipulations, instructions, prompts, and so on—and precisely here lies the secret of the shaping of the dogmatic mind, of dogmatic thinking—a very bad kind of thinking. Dogmatism does not necessarily find expression in the vacuous repetition of the same phrases; it is sometimes marked by a very refined linguistic dexterity, by the ability to force life into the procrustean bed of dead formulas. And there are real artistes at this business. But dogmatism remains dogmatism in essence; it flourishes wherever a set formula obscures living reality in its development, in its tense dialectic.

Teaching how to think means, above all, teaching dialectics—in the most serious meaning of this word, the meaning given it by the greatest Marxist of our era—Lenin. But dialectics is above all "the doctrine concerning how *opposites* can be and are *identical* (how they become identical), under what conditions they are identical, transforming themselves into one another, why the human mind must understand these opposites not as dead and frozen but as living, conditional, and dynamic" [source not given in original, presumably Lenin].

People may ask whether we are not setting ourselves a utopian task when we dream of teaching the school student things that far from all professors in the world as it is are able to understand and master. Is this not hare-brained scheming? Is it not better to teach the child elementary truths and leave the subtleties of dialectics until later, for undergraduate and graduate studies? Is it not dangerous to demonstrate to the immature mind the "contradictions" contained in things and in their verbal expression (in the language of science)? Will this not lead to skepticism, to distrust of science? Is it not safer and more correct to act in the old-fashioned way—that is, to teach the student only firmly established truths, the tried and tested formulas of knowledge?

Safer? Perhaps. But in that case we need not set ourselves the goal of teaching how to think at all. We need only load the student's head with study material, as though it were a container, and not bother to do any more. Such is the alternative; there is no third option here. This, incidentally, is precisely the dialectical problem of contemporary education—how, finally, to combine the process of mastering the solid foundations of modern science with the process of training the mind, the ability to think—that is, independently to develop

these foundations, to correct them, to bring them into correspondence with new data, with the changing conditions of real life, with the world around us (which is not dead and frozen but undergoes constant dialectical change).

Yes, this is a very difficult task—to combine these opposites, the process of mastering established knowledge and the process of developing the ability to seek out knowledge oneself rather than mastering it in set form. But this difficult task can be accomplished. On one condition—provided that from the very start, not putting it off until later, the student is shown in each and every case how a truth that now appears "set" was born as an answer to a difficult problem that arose for people from the midst of life, from its contradictions. Each and every "set" truth that a person can now accept as a guide "without thinking about it" is a contradiction that was resolved at some time in the past, a contradiction that has been *overcome*. In mastering the set result of people's thinking together with the process by which it was obtained, the student will at the same time also master the mode of thinking by means of which this result was obtained and by means of which it may be obtained again if it is forgotten.

For those who seriously want to construct didactics on a dialectical-materialist basis, I offer as food for thought some profound observations of Marx that directly concern pedagogy, the process of the teaching and mastering of knowledge:

> Roscher undoubtedly has a considerable—and often quite useless—knowledge of literature, although even here I seem to discern the Göttingen alumnus rummaging uneasily through literary treasures and familiar only with what might be called official, *respectable* literature. But that is not all. For what avails me a fellow who, even though he knows the whole of mathematical literature, yet understands nothing of mathematics? . . .
>
> If only such a professorial schoolboy, by nature totally incapable of ever doing more than learn his lesson and teach it, of ever reaching the stage of teaching himself, if only such a Wagner were, at least, honest and conscientious, he could be of some use to his pupils. If only he did not indulge in spurious evasions and said frankly: "Here we have a contradiction. Some say this, others that. The nature of the thing precludes my having an opinion. Now see if you can work it out for yourselves!"
>
> In this way his pupils would, on the one hand, be given something to go on and, on the other, be induced to work on their own account.
>
> But, admittedly, the challenge I have thrown out here is incompatible with the nature of the professorial schoolboy. An inability to understand the *questions* themselves is essentially part and parcel of him, which is why his eclecticism merely goes snuffling round amid the wealth of set *answers*. (letter to Ferdinand Lassalle of June 16, 1862)

Of course, the reconstruction of didactics on the basis of dialectical logic is very far from a simple matter. It can be accomplished only by means of the friendly collaborative efforts of philosophers, psychologists, and pedagogues—teachers of concrete-scientific disciplines directly engaged in training the student's thinking. We cannot make do here with general philosophical (logical) considerations alone. But nor can we achieve anything without the most serious competence in philosophy. I would like to remind pedagogues of this.

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E.V. Ilyenkov

A Contribution to a Conversation About Esthetic Education

(January 15, 1974)

1. To recapitulate briefly. Esthetic education is connected above all with development of the power of *imagination,* understood not as the ability to think up what does not exist but as the ability (skill) to see what does exist, what lies before one's eyes. And this is not an innate but an acquired skill, with different levels of development. The ability to see what in fact exists is not a whit more common than the ability to think subtly and deeply. As Goethe said: "What is the hardest thing in the world? To see with one's own eyes what lies before them."

A person who lacks imagination—more precisely, who has an undeveloped imagination—sees in the world around him only what he already knows beforehand, what is registered in verbal form in his consciousness, in his mind.

For very often the real concrete situation that a person runs into is for him not an object of attentive examination but merely an external trigger that activates readymade verbal stereotypes in his consciousness. That is why it is not interesting to listen to such a person's verbal report of what he has seen. He simply repeats what we have already heard thousands of times; he will tell us nothing new, although in fact he may have witnessed a very

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Translated by Stephen D. Shenfield.

interesting and unusual event. Of such a person it is said: he *looked* but he *did not see*. And this means that in the given case the power of imagination is underdeveloped.

2. In one of his notes, the poet B. Pasternak formulated an observation that is at first glance very unexpected but actually very profound: "The tyrant is a man lacking in imagination." Here he had in view, of course, not only the "tyrant" in the direct political sense, in the sense of the despotic ruler (although the statement applies to him as well). It is possible to be a tyrant in the family, in relation to animals, and even in relation to so-called dead nature—to woodland, to water, to mineral resources.

What is important is that in all cases the tyrant tries to impose upon the world around him his own selfish, egoistic will. And he usually does so *not* out of evil intent but simply because such a character is unable to "put himself in another's shoes"—to imagine the real consequences of his active intervention in the course of events. So he forces his way through reality like a bulldozer until such time as he either gets bogged down in resistance that he cannot overcome or else breaks his own neck.

3. The power of imagination can therefore be defined as the ability to *see things through the eyes of another person* (without, of course, turning into him in reality), *through the eyes of all other people, through the eyes of mankind,* and to see not from the point of view of my individual interests, needs, and desires, but from the point of view of the long-term interests of the human "race."

In this respect, the esthetically developed power of imagination is connected with the mysterious feeling of *beauty* that has always given theoretical esthetics and philosophy so much trouble. But there is a solution to the puzzle.

Kant already understood the feeling of beauty as a peculiar kind of feeling of the harmony of parts with the whole and, in the final analysis, with the supreme goal of human development—human culture. Formally he defined beauty as the sensation of *goal-conformity without the concept of any kind of definite goal*—that is, as the sensation of goal-conformity in general, of supreme goal-conformity.

Developing the rational kernel of this understanding, Marx formulated the secret of the feeling of beauty in a more definite fashion by showing that this feeling arises on the basis of a specifically human relation to the outside world and to the substance of nature. In his *Economic and Philosophical Manuscripts* (1844), he declared:

> Animals produce only according to the standards and needs of the species to which they belong, while man is capable of producing *freely*—that is, without being tied in advance by his own biological-physiological orga-

> nization—according to the standards of every species and of applying to each object its inherent standard; hence, man also produces in accordance with the laws of *beauty*.[1]

This point is, undoubtedly, crucial both to the problem of beauty and to the problem of the essence of "esthetic education." The feeling of beauty is, indeed, connected with the specifically human capability of approaching each object not with schemas set out in advance, but with a developed ability to reckon each time with the character of the work material (with its form and measure), which is always new, particular, and unique.

The feeling of *beauty* enters here as one of the most important mental mechanisms characteristic of truly human life activity, in whatever special sphere this life activity may occur—a *criterion of the human character* of an individual's relation to an object, be it in mathematics or in politics, in industry or in everyday life.

By way of conclusion, let me cite another very serious and profound definition of the essence of esthetic education:

"Truly esthetic education is the stern learning of the human race from the experience of its productive activity."[2]

Thus understood, esthetic education has the most direct relation to a multitude of problems. Consider, for instance, the problem of education in *internationalism*. For in words each of us knows that all peoples [ethnic groups] of the world have equal rights, that they all have the right to cultural, economic, and political development, and so on and so forth. But in practice the situation is not so good in this respect. Everywhere, we come across a lack of elementary understanding of the specific psychology of one or another ethnic group: very many people are accustomed to judging everything according to their own standards. There is often a lack of the power of imagination needed to appreciate the point of view of those belonging to another ethnic group, to look at things through their eyes. And this quite often leads to political misunderstandings and other very unfortunate consequences. It is hardly necessary to demonstrate that an enormous role in the solution of this problem can and must be played precisely by *art*.

Or consider an exchange that I heard about recently. A group of Japanese industrialists had come to Moscow, and in the course of conversation they happened to mention that in postwar Japan the elementary schools had given top priority to esthetic education in terms of teaching hours, scope of curriculum, and financial provision. Why? "It is very simple," one very bright big entrepreneur replied, the head of a large Japanese company, one of the bosses of the postwar Japanese economy. "Our worker can distinguish 700 shades of color, while yours can only distinguish 7. For that reason we are

happy to give you licenses and technology and you will be able to do nothing with that technology. The same with transistor receivers. Your worker does not possess the *spatial imagination* necessary to assemble them—the ability to project a diagram drawn in two dimensions into the three dimensions of space."

I say all this in order to suggest to you a somewhat broader view of the task and essence of esthetic education. Singing, drawing, literature, the plastic arts—all of these are means, merely means for the development of such a universal capability as *productive imagination,* oriented toward the feeling of beauty, toward a feeling that enables people, immediately and without long reflexion, confidently to develop beauty and ugliness, mastery of the material free from the whims of individual caprice. Thus understood, esthetic education appears as a necessary component of any creativity, of any creative-human relation to the surrounding world.

Notes

1. K. Marks [Marx] and F. Engel′s [Engels], *Iz rannikh proizvedenii* (Moscow: Politizdat, 1956), p. 566. [Translation is based on the English-language version available at www.marxists.org/archive/marx/works/1844/manuscripts/labour.htm.]

2. Ibid., p. 339.

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E.V. Ilyenkov

A Contribution to a Conversation About Meshcheriakov

(November 20, 1975)

Thinking over my plan for today's talk, I tried first to set out briefly the main theoretical conclusions that, as it seems to me, flow naturally from the enormous amount of material that has accumulated in the archives of the Sokolianskii Laboratory [at the Institute of Remedial Education]. However, as I tried to put together such a plan I quickly became convinced that I would

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Translated by Stephen D. Shenfield.

Aleksandr I. Meshcheriakov (1923–74) was a pedagogical psychologist within the Vygotskian tradition who worked on methods of educating the "deaf-blind" or "blind-deaf"—that is, people who are both blind and deaf-mute. A student of Ivan A. Sokolianskii (1889–1960), whose pioneering work in Kharkov in the 1930s gave him the reputation of "father" of this new field, Meshcheriakov continued his mentor's work after the war at the Institute of Defectology (later renamed the Institute of Remedial Education) in Moscow. In 1963 he established a boarding school for deaf-blind children in Zagorsk; the Sergiev Posad School for the Deaf-Blind remains open today and is the largest such school in the world (see www.perkins.org/news_details.php?StepTwo_ID=16/). For a scholarly discussion of Meshcheriakov's work, see David Bakhurst and Carol Padden, "The Meshcheriakov Experiment: Soviet Work on the Education of Blind-Deaf Children," *Learning and Instruction,* vol. 1, 1991, pp. 201–15 (available at http://communication.ucsd.edu/people/PADDEN/Bakhurst%20&%20Padden.pdf).—Trans.

get nothing worthwhile out of this material. I would get nothing worthwhile because the material is too rich and complex, too multifaceted. Were I to try to talk about everything I would still not manage to do so, and in the process I would risk wasting all my time on things that you in this audience would not find particularly interesting, while leaving out precisely those things that would arouse your professional interest. Especially considering that some of my conclusions would surely evoke doubts and objections and thereby lead to arguments over questions that may be of only secondary importance.

For example, take the question of the relationship between social and biological factors in the emergence of the human mind—a question that is already sufficiently confused in our literature.

It was for this reason that I decided not to tie myself in advance to any rigid plan and did not prepare a coherent lecture with each proposition resting on the preceding one and leading logically to the following one—that is, a rigorously thought-out and academically polished lecture.

It seems to me that for a first acquaintance it will be better if I confine myself to a more or less unsophisticated account of those impressions, which I gained over the twelve years that I followed the work of Meshcheriakov and of the Zagorsk boarding school for blind-deaf children. In any case, I shall *begin* with such an account in the hope that the questions it provokes will lead our conversation onto a more distinct theoretical plane. I shall probably be able to answer some questions and unable to answer others, at least today, and in this way we shall mark out the field of our mutual interests, the area of intersection of philosophical and psychological aspects, the scope of a mutually interesting dialogue between the psychologist and the philosopher.

I also want to explain why I was interested, as a philosopher, in things that A.I. [Meshcheriakov] told me when I ran into him by chance on the street (Lerner on happiness, N.K. with her question: "Generally speaking, what am I?" and so on).*

And very quickly it became clear: this work—at first glance very specialized, narrowly defectological—is actually least interesting from a narrowly defectological point of view. The reaction of Vlasova is very indicative and—most important—justified: why are people making such a fuss over the blind-deaf?

Yes, this is a paradox. At the defense of Meshcheriakov's doctoral dissertation, D.B. Elkonin (or A.V. Zaporozhets—I do not remember which) talked about a "synchrophasotron for the humanitarian sciences," while

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*The references are to Yuri Lerner and Natalya Korneyeva, two of a number of Meshcheriakov's blind-deaf students who became collaborators in his research.—Trans.

Academician N.N. Semenov—who had done a great deal to help A.I.—said that previously he had not thought that a "pure experiment" was possible in psychology—"pure" in the same sense as in chemistry or physics.

The more closely I got to know Meshcheriakov's work, the stronger grew my conviction that blind-deafness as such literally does not create a single problem—apart, of course, from purely technical problems of secondary importance—that is not also a problem for general psychology. The only circumstance specific to blind-deafness is that here all of these problems are a hundred times more acute and therefore literally force the researcher to pose them in as sharp, clear, and theoretically thought-out—that is, competent—a fashion as possible. And to pose a problem sharply and clearly is to be halfway to solving it.

And first of all Meshcheriakov was forced to pose—and then solve—the fundamental question: *what is the human mind?* What he needed, of course, was not a pedantically polished or quasi-scientific definition but a *concept*—that is to say, an understanding of the essence of the matter. In practical terms this meant sharply drawing the boundary between the mind of an animal and the mind of a human being, pinpointing where the human mind *begins,* showing what constitutes the *first, elementary form* of this mind, out of which later unfold, like an oak out of an acorn, all the riches of the developed human mind, up to its highest and most refined levels.

The initial material—encountered, fortunately, not so very often but encountered nonetheless (I myself have had occasion to observe these rare cases)—is the *complete absence of mind*. Not only of a specifically human mind, but of *mind in general*. The child born blind and deaf is a being that, strictly speaking, cannot even be called an animal. In its existence there is not even a hint of those phenomena that are studied by the zoopsychologist. There is not even an animal mind. According to all the criteria used in biology, it is something like a *plant*—that is, an organism endowed by nature with a certain set of purely vegetative functions. That is, it breathes, digests food, increases in size—and that is all. It is like a rubber plant that lives only so long as it is watered. That is exactly the picture we have here.

Life activity in the strict sense of the term is not present here, just as it is not present in any plant—in the sense that there is no *activity* in its most elementary form—in the form of *independent movement in space* to provide for the existence of this living organism, for *life,* again in the most direct and elementary sense, in the sense of the exchange of substances.

This child will starve to death without a peep if food, let us say, is located at a distance of at least ten centimeters from his mouth. He is unable to overcome these ten centimeters by moving, by shifting his body. He lacks even this elementary ability, although his sense of smell signals to him that

milk is somewhere nearby. In other words, there is an *organic need,* there is an object that can satisfy this need, but there is no ability to unite the need with the object by means of body movement. Nor therefore is there a *mind*. No mind *at all,* let alone a specifically human mind.

And this is so despite the fact that, as the subsequent course of the experiment will demonstrate, all of the so-called *internal* conditions for the emergence of mind are present. That is, there is a brain that is normal in the medical-biological sense. A brain exists as an organ for controlling bodily processes, but there is no hint of a single *functional* organ for the performance of *mental* functions—even of the most elementary kind, even in embryonic form.

In other words, the *substance* of the mind is in general *life activity,* in the sense explained above, while the brain with its innate structures is merely a biological *substratum*. By studying the *brain,* therefore, you will learn little of the *mind*—just as little as you will learn of the nature of *money* by studying the material properties of the material (gold, silver, or paper) in which the money form of value is embodied.

For the very same reason, the fantasies of certain "reckless cyberneticists" who entertain the possibility of mental phenomena emerging in an *unmoving* material body or device are absolutely absurd.

And this is a very important conclusion: the substance of mental phenomena is *life activity,* the *activity of a living organism,* understood as the independent movement of this organism in a space filled with objects, some of which are external conditions of life while others are indifferent to life. In other words, the mind, from beginning to end, is a function and derivative of the *external action of the organism*—that is, of its movements in an external space filled with objects. Thus, movements, schemas, and trajectories are not and cannot be inscribed in the structures of the brain for the simple reason that, each time, they are individual, unique, and therefore unexpected.

So the first task is to form a *mind of some kind*—that is, the mind in its elementary *animal* form. To turn the plant into an animal.

(Explain how Meshcheriakov and his colleagues did this and the paradoxical result: the deaf-blind child acquired greater vitality—in the sense of the presence of *animal* forms of activeness and mind—than his seeing and hearing peer.)

And next, the most interesting and important task: *how to turn the animal into a human being*—that is, how to make it cross the line that divides animal life activity—and the mind that corresponds thereto—from specifically *human* life activity and the specifically human *mind* that corresponds thereto.

The difference between the animal mind and the human mind marks the boundary between zoopsychology and the psychology of man. In Meshcheriakov's work this dividing line was drawn in a quite rigorous, clear,

and at the same time purely experimental fashion. Sokolianskii had already given this decisive stage a name, which A.I. accepted as a very accurate one: the stage of "primitive humanization." What is its essence?

Suppose we have an organism that displays the ability (or skill) to satisfy its organic needs (for food, for oxygen, for a temperature within a certain range) by means of independent movement in space that overcomes the gap between the organism and the objects of its organic needs—that is, of its biologically inbuilt bodily requirements. Then the entire focus of "primitive humanization" lies in *again severing* contact between them, in interposing an obstacle that this organism is in principle unable to overcome by moving its body in space—that is, by the means that is in principle accessible to any animal.

Theoretically this question takes the following form. What kind of obstacle would make the animal mode of satisfying organic needs impossible and pose the issue point-blank: *either* accomplish the transition to the *human* mode of satisfying organic needs *or else* perish?

An obstacle that would be at the same time a bridge or, so to speak, a level crossing between animal and human life activity, and therefore between the biological (animal) and the specifically human form of mind.

Such a bridge-obstacle is any object created by man for man, any artificial tool that man places between himself and an object of his organic needs.

For example—a *spoon*. A spoon is a pass into the realm of human—social—culture, into the sphere of human life activity and of the human mind.

Let us analyze more carefully what it is that occurs here.

What occurs is no more and no less than the act of the *birth of the human mind,* the mysterious act of the *birth of the soul,* the act of transforming the brain as an organ for control of the individual's own body, as an organ for control of the biological life activity of an organism of the species Homo sapiens into an organ for control of the *highly complex system of external objects* that constitutes, to use Marx's expression, the *inorganic body of man*.

Here the first, elementary, cellular form of the human mind turns out to be the *work of the hand in accordance with a schema* and along a trajectory determined *not* by biologically inbuilt requirements but by the *form and disposition of things* created by human labor, created by man for man.

In accordance with schemas and along trajectories that could and can in no way be envisioned in advance by the structure of the internal organs of the human body, including the cerebral structures of its brain.

What occurs here is not "development" in the sense of complication or improvement of the animal mode of satisfying organic needs, but the *replacement* of this mode by the *reverse* mode, the supplanting of the animal mode of life activity by the specifically human mode. Here there is

development not in the sense of the evolution of one mode into another, but in the sense of the *transformation of the old mode into its direct opposite,* a new mode in conflict with the old.

The child does not want to eat with a spoon. He resists and tries as before to thrust his snout* into the bowl, but they do not let him. Instead, they stick something in between his snout and the bowl—some sort of very inconvenient object, superfluous to the old mode, a superfluous and incomprehensible "mediating link."

And this "mediating link" requires unfamiliar actions of him, actions the schemas for which are inscribed neither in the organic need itself nor in its object (say, in porridge) but only in the form and designated purpose of a *spoon* (towel, potty, table, chair, bed, etc.).

Meshcheriakov, following Sokolianskii, liked to repeat: if you have managed to teach a child to use a spoon in human fashion, then all of the remaining human development of this child is simply a matter of technique and patience. By learning to use a spoon, he has already obtained a pass both into the world of human thinking and into the world of language—that is, into the world of Kant, Dostoevsky, and Michelangelo.

This point in Meshcheriakov's work, it seems to me, is of the most fundamental theoretical significance for many current disputes. There is probably no need for me even to enumerate these many disputes, and to do so would place a prior limit on the significance of this point—namely, the experimental proof of the thesis that the specifically human form of mind emerges only and exclusively on the basis of *artificial objects,* that is, objects created by *labor,* objects that correspondingly demand *artificial*—that is, shaped in the labor process itself—modes of action with them.

It is only here that there *first arise and take form* those "mobile functional organs" in a person's nervous system that are able to support the specifically human form of life activity and the corresponding—higher—mental functions.

I must emphasize the words: *first arise*. They do not "develop" by means of the simple complication of the functions of organs also possessed by animals. The latter are replaced and supplanted by the former; they arise on a fundamentally different foundation.

They arise on the foundation of specifically human action with specifically human objects, with objects specially created by man for man and not by nature as such.

Thus by teaching a child to use a *spoon* you teach him to act in human fashion with any other object—with a stick, with a stone, with a banana, with

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**Morda,* a word generally used in reference to animals or as an insult.—Trans.

fire. If you try to do things in reverse order you will achieve nothing.

In the given case, Meshcheriakov applied with great consistency the understanding of the human mind developed by Vygotsky and his followers and described by them in terms of a process of *internalization,* the process by which external actions—that is, actions in the space outside the skull, outside the human body—are turned into internal actions, into actions that take place inside the human body in general and inside the brain in particular.

Here, finally, was the solution to the old problem of the relation between the natural *preconditions* of specifically human life activity and of the specifically human mind and the *real conditions of existence* of this life activity and of this mind, in their fundamental opposition to all forms without exception of animal life activity and animal mind.

(In order to clarify this assertion, I would like to draw attention to one seemingly simple fact:

Let us suppose that we have gathered in a crowded room and are running out of air. We have used up the oxygen. It has become unbearably stuffy in the room.

How will our biology, with its innate mechanisms, react to this fact? Our pulse rate will rise; so will our respiration rate; and we shall try to get out of the room into some other space, into "fresh air" as fast as we can. Any animal will react in these ways.

But what do we do?

We go to the window and open a *fortochka.** Or we turn on the air conditioning. And this way of reacting to environmental conditions was not and could not be inscribed either in the external environment itself or in our physiology. It was inscribed only in the design of the *fortochka* and of the air-conditioning system.)

One thesis that is connected inextricably with such an understanding is the following. All specifically human forms of mind (all 100 percent, and not 20 percent as [psychologist Hans] Eysenck thinks, and not 80 percent as some of his opponents think, reproaching him for exaggerating the role of nature and understating that of nurture in the development of human intelligence) are determined socially and not biologically by innate structures of the brain and body of the individual of the species Homo sapiens.

I have deliberately sharpened this thesis, at the risk of setting off a burst of objections. I have done so nonetheless, for I see distinctly that without accepting it you will be able to understand absolutely nothing of the work of Sokolianskii and Meshcheriakov.

I insist on this because it is precisely here that the true theoretical dividing

*A windowpane that opens separately to allow in fresh air in winter.—Trans.

line lies between genuine—dialectical and historical—materialism and the pseudo-materialism that tries to explain phenomena of the specifically human mind by proceeding from the biologically innate structure of the brain of the individual of the species Homo sapiens. The advocates of this pseudo-materialism, of course, do not deny "external conditions" a role; they are only displeased at those who, as they put it, "exaggerate" this role.

These pseudo-materialists allegedly also "take into account" the role of "external conditions" under which specifically human forms of mind emerge and develop. But they admit them into their understanding only and precisely as *external conditions* that accelerate or, on the contrary, slow down the course of a process the program of which is allegedly inscribed "inside" a person's body and brain, in the genes.

Meshcheriakov was the most consistent opponent of all of the atavisms and relapses of such pseudo-materialism in psychology, an opponent of the explanation of phenomena of the human mind by reference to special, biologically innate characteristics of man's body and brain, an opponent of the idea of the *spontaneous development* of the human mind.

Why? Simply because in the course of his experiment this idea proved itself an utter failure, completely groundless, and—the most important thing—completely helpless. Absolutely nothing could be done here on the basis of this idea. But, on the other hand, it became a major *impediment* to progress when people deliberately or inadvertently tried to drag it into his work—that is, to suggest conclusions flowing from it as recommendations for the pedagogical process.

The question had to be tackled point-blank: at what preconditions *inside* the organism of the deaf-blind child can you grasp in order to develop these preconditions to the level and significance of specifically human mental functions?

Nothing apart from purely organic—and, moreover, purely vegetative—needs: the need for food, for oxygen, and for a temperature within a certain range (not too cold and not too hot). That is all.

The *keenest and most meticulous efforts failed to discover* such mythical "reflexes" as [Pavlov's] "freedom reflex" or "purpose reflex," the "collecting reflex," and so on, including the notorious "orienting-investigating reflex." They were simply not there.

It proved necessary actively to form all of these allegedly innate so-called "reflexes." And the only way that this could be done was to *place the child in a situation of practical interaction with an adult within and concerning the world of human objects,* objects created by man for man.

The human mind emerges when and only when we manage to organize—or, more correctly, create—the activity of the child's hand with objects that have

been created by man for man and therefore require specific actions that were not and could not be pre-inscribed in the biological structure and functions of his body in general or of his brain in particular.

The whole of the human mind (all 100 percent of it and not 80 percent or even 99 percent) emerges and develops as a function of the work of the hand in an external space filled with such objects as a spoon, a potty, a towel, a pair of pants, socks, tables and chairs, boots, stairs, windowpanes [*fortochki*], and so on.

The brain is merely the natural material that turns into an organ of specifically human life activity and mind *only* as a result of the actively formative influence of *active work by external organs of the body in an external space filled* not with natural but *with artificially created things*.

It is such—and only such—work of the hand that is the *substance* of the specifically human mind.

In the same sense in which the sole substance of value and of all its modifications such as money, profit, and rent is *labor*—and, moreover, not labor in general but a historically specific form of labor.

This was the theoretical position that alone enabled Meshcheriakov not only correctly to understand the higher, specifically human mental functions but also to create them and then develop them to their highest potential.

From this point of view, therefore, the biologically innate structure of the individual's brain and body is just as *external* a condition of the emergence and development of a specifically human mind as are things outside the body.

And the sole cause and substance that ties these external conditions into a single knot, into a single system is the *sense- and object-oriented life activity of man,* understood not naturalistically—as the biologically innate life activity of the body of an individual of the species Homo sapiens—but as a process of the production of specifically human life, of its *specific* conditions. And these conditions are 100 percent *social*—that is, they have a sociohistorical origin and existence, outside of which they are altogether absent.

Yes, of course, such an external condition as a medically normal brain must be present. In the absence of this condition there will be no mind, human or even animal. Lacking will be that *material* out of which human life activity (which arose sociohistorically) *makes* the organ of the human mind, transforming an organ for the control of processes inside the body into an organ initially for the control of the movement of this body in external space, and then also for the control of all those things and processes *outside the organic body,* in what Marx called the *external, inorganic body of man*—that is, man understood not as a biological type but as a *species being,* as a *species* in relation to any other, as a *universal* being, as the aggregate of all his social relations.

I do not know of and cannot imagine any other obvious experimental situation that would embody so completely those profoundly theoretical truths to which Marx gave expression in his *Theses on Feuerbach*—theses that are often learned in purely verbal fashion, without a full understanding of the complex and multifaceted character of the reality exposed by them, of the process by which such a specifically human form of mind as intellect or thinking is established.

I could also talk specially about such indubitably psychological problems as the problem of the relationship between intellect and will and between intellect and imagination, understood as the ability to construct an image and change that image, and the problem of the role of language in all of the mechanisms of the development of the human mind. I could talk about much else besides, even the theoretical elaboration of the problem of *consciousness in general* and of its relation to *self-consciousness*. But this will suffice for now.

In its most general form, the mind is none other than the ability of a highly organized living being to carry out its life activity in forms dictated to it not by the structure of its own body, but by the form and disposition of those other bodies that in aggregate constitute the external environment of its life activity. Therefore, the mind necessarily includes the ability to form *reflections* of the objective situation outside the animate organism, the ability to construct an objective *image* of the form and disposition of things in external space.

Such an understanding also guides us in defining the object of psychology as a science. Where—in which space—are situated those facts and events the analysis of which must be the special concern of psychology as a science, as distinct, let us say, from physiology of the human body and brain? In the space inside the skull? No. In a wider space. In that space within which the hand performs real activity in and with an object.

This was already understood very well by Hegel, who said that in the form of the *work of the hand* the "internal"—that is, the mind—"does not manifest itself but *exists*," for the hand "is what man does, for in it as an active organ of his self-affirmation man is present as an animating principle" (G.W.F. Hegel, *Sochineniia,* vol. 4 [Moscow-Leningrad, 1929], p. 168 [retranslated from Russian]).