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The Translations of Bogdanov's "Science and the Working Class"

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Introduction

Below, we reproduce two key texts by Alexander Bogdanov, undoubtedly one of the most profound Marxist scientists to have ever lived. Both texts were published in 1918 under the same title "Science and the Working Class." The first text in our publication order was translated into English by Fabian Tompsett (Tikka et al. 2016, Tompsett 2021), while the second appears to be an anonymous translation.[1]

We have placed the later text (September 1918) first, alongside Tompsett's short introductory text and notes (given as a quote at the end of this introduction) that provide publication details for both works. The subsequent second text, dated February 1918, is more elaborate. As Tompsett indicated, it appears to provide theoretical groundwork for the more compact September text.

The primary significance of these two texts lies in the fact that they articulated the concept of "two sciences"—proletarian versus bourgeois—to a new generation of Russian Marxists following the October Revolution.[2] The texts are intense and carry programmatic importance, as they integrate Bogdanov's two major interconnected projects: Tektology (the universal science of organization) and Proletkult (the cultural

1. An anonymous translation of the pamphlet that included the February 1918 text, alongside two other highly relevant texts, is digitally available in English (Bogdanov 1918). We plan to republish them in the coming issue of M&S.
2. Bogdanov had refined his notion within the context of the *Vpered* (Forward) faction, which he led after the 1907–1910 split with Lenin and the Bolshevik faction of the RSDLP.

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union of the working classes). Both projects, to which Bogdanov dedicated his life, were essential elements of the Russian revolutionary's vision of "cultural revolution"—a concept coined by the author and later adopted by figures like Lenin, Gramsci, Stalin, and Mao, eventually becoming a key concept in Marxism. Bogdanov believed that the production of proletarian culture and science should be initiated before the seizure of political power to allow the working class to maintain a stable orientation and build a new socialist society after the revolution.

These texts are also the original source of a major debate on "Marxist science" that began in the 1920s (between the Mechanists and Dialecticians) and later reached its peak during the Cold War. Most notably, this was seen during the Lysenko affair, which illustrates the corrupt nature of official ideological intervention and its impact on knowledge production and dissemination under the Stalinist regime. Critically, however, they demonstrate how distinct Bogdanov's own thinking was from the distorted applications of "proletarian science" and the "cultural revolution" as later practiced by Stalin and, subsequently, Mao.

Despite Soviet criticism ranging from Lenin to Ilyenkov—claiming that Bogdanov's work supported an idealist or technocratic vision, his conception of proletarian science and culture placed precise emphasis on the role of collective human subjectivity and praxis. Thus, in contrast with later scientific paradigms like cybernetics, General Systems Theory, and complexity science, Bogdanov's work was far from dismissing the historical role of "agency" (or revolutionary subjectivity); rather, it granted it a central place. For this reason, his universal science of organization should be seen as the first version of what we might retrospectively call "Marxist systems science."

It is not surprising therefore that these texts were circulated within the framework of Proletarian Cultural and Educational Institutions (Mally 1990, and Tompsett's introduction). This organization—and Bogdanov's central role within it alongside his brother-in-law and former *Vperedist* comrade, Lunacharsky—was the target of the campaign Lenin launched, as well as the proletarian culture debates that followed it in the early 1920s (see Şenalp in this issue).[3]

We consider this special issue of *Marxism and Science* the ideal venue to reproduce these important documents. We believe this will allow such foundational work to be better circulated and re-evaluated

3. See Biggart and Gloveli's (1991) discussion on the close relationship between Bogdanov and Lunacharsky.

within Marxist circles, providing important input for contemporary debates and practices on the topic.

The following is the text of Fabian Tompsett's introduction to the translation of September 1918 text:

> This text consists of fourteen "Theses" published in advance of a presentation delivered by Aleksandr Bogdanov (1873–1928) on 17 September 1918 to the First All-Russian Conference of the Proletkults held in Moscow from 15–20 September 1918. The "Theses" were published in advance of the Conference in the journal Proletarskaya kul'tura, No.2 (July, 1918), pp. 21–23.[4]
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> In his footnote to the "Theses," Bogdanov states that the theoretical foundations of his forthcoming presentation could be found in the brochure 'Science and the Working Class', which was based on an earlier presentation which he delivered to a Conference of the Moscow Proletkults in February 1918. He is probably referring to Nauka i rabochiy klass (Moscow, Soyuz rabochikh potrebitel'nykh obshchestv goroda Moskvy i ee okrestnostey), 16 pp. The text of the presentation of February 1918 can also be found in: Sotsializm nauki (Nauchnye zadachi proletariata) (Izdatel'stvo zhurnala "Proletarskaya kul'tura," Moscow, 1918); 'Nauka i rabochiy klass,' in O proletarskoy kul'ture 1904–1924 (Moscow & Leningrad, "Kniga," 1925), pp. 200–221; Voprosy sotsializma. Raboty raznykh let (Izdatel'stvo Politicheskoy Literatury, Moscow, 1990).
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> The text of the presentation of 17 September 1918 was published in the protocols of the Conference: Protokoly Pervoy Vserossiyskoy konferentsii proletarskikh kul'turno-prosvetitel'nykh organizatsii, 15–20 sentyabrya 1918 g. (Edited by P.I. Lebedev-Polyanskiy (Moscow, Izdatel'stvo "Proletkarskaya kul'tura," 1918), pp. 31–36; and under the title 'Nauka i proletaria,' in: O proletarskoy kul'ture. Stat'i 1904–1924 (Leningrad and Moscow 1925), pp. 222–230 [in this anthology, owing to a misprint, the presentation is dated "1913"].
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> A French translation 'La science et la classe ouvrière,' by Blanche Grinbaum of 'Nauka i rabochiy klass,' appeared in La science, l'art et la classe ouvrière (Bogdanov 1977). However, the accompanying bibliographical information was incorrect. We have added annotation to the present translation for ease of comprehension for a modern readership. Minor formatting changes have also been made.

4. See Biggart, Gloveli, and Yassour 1998.

Science and the Working Class, September 1918
Alexander Bogdanov

1. To say that the class character of science resides in the fact that it *defends the interests* of a given class betrays either a journalistic understanding of science or is a complete misrepresentation. An actually existing science may be bourgeois or proletarian by its very "nature", that is to say in terms of *its origin, its point of view, and the methods by which it is elaborated and explained*. In this fundamental sense, all the sciences, not only the social sciences but all the other sciences, including mathematics and logic, may be said to have, and actually do have, a class character.[5]

2. The nature of science resides in the fact that it is *the organized, collective experience of people* and that it serves as *the instrument of the organization of the life of society*. The current dominant science, in its various branches, is *bourgeois* science: it has been developed, for the most part, by representatives of the bourgeois intelligentsia, who have concentrated in it the material experience that was available to the bourgeois classes; who have understood it and interpreted it from the point of view of these classes; and who have organized the processes and practices to which these classes were accustomed, which were characteristic of them. As a result, this science has served and continues to serve as an instrument of the bourgeois structuring of society, firstly as an instrument of the struggle with, and conquest of, the bourgeoisie over the classes that had had their day; and then as an instrument of their rule over the labouring classes. At all times this science has served as an instrument for the organization of production and for all of the progress in production that has been achieved under the leadership of the bourgeoisie. Such is the organizing strength of this science. But here also resides its historical limitation.

3. This limitation is manifest in the very material of science, that is to say in the content of experience that it organizes, and it is especially evident in the social sciences. For example, in studying the relations of production, bourgeois science could not grasp or discern a particular form of cooperative labour, the comradely or collectivist form, which is in fact the highest form, because this form was virtually unknown to the bourgeois classes.

Even more significant is a *fundamental limitation of point of view* that affects all of the bourgeois sciences and which is determined by the position of the bourgeois classes in the social system, and consequently, by their very social being. This particular limitation derives from the

5. For an alternative English translation of this first paragraph, see Bogdanov 1977.

separation of science from its real basis: social labour.

4. This separation has its origins in a differentiation between mental and physical labour. In itself, this differentiation does not preclude an awareness of the indissoluble link between practice and theory in the social process as an integral whole. But for the bourgeois classes the integral nature of this link is invisible; it lies outside their field of vision. They have been educated in terms of the individualistic economy, to think in terms of private property and of market competition; they have therefore acquired an *individualistic* consciousness, and the social nature of science is incomprehensible to them. For them, science is not the organized experience of collective labour and an instrument for the organization of collective work; for them, knowledge is something in itself, even something that is opposed to practice, something that is of an "ideal" or "logical" nature, which, even when it manages and guides practical activity, does so only by virtue of its higher nature, and not because it has arisen out of practical activity or because it is been acquired in order to be used in practical activity. This particular *fetishism* can be described as the "abstract fetishism of knowledge".

5. The bourgeois world developed, in every sphere of its creative activity, the scientific sphere included, along lines of ever-increasing *specialization.* Science became fragmented into branches that increased in number and diverged at the expense of vital interactions between these branches. The individualistic separation of people accentuated this process, because although specialists working in the same sphere still needed to share their experience and ideas, specialists working in different spheres were less bound by this necessity. The consequence was a huge loss of coordination in science just as there was a loss of coordination in capitalist society. The development of both science and society followed the same anarchic path.

What all of this means is that bourgeois science, whilst it accumulated in all its branches an enormous wealth of knowledge and of methods for exploiting that knowledge, has been unable to assemble this material into a planned, organized and integrated whole. Each specialism has created a language of its own that has become incomprehensible not only to the broad masses but even to scientists of another specialism. The same correlations, the same links in experience, the same processes of cognition are studied in different branches as if they are quite different things. The methods of one branch only penetrate into other branches with much delay and difficulty. This is the origin of the narrow, professional outlook that develops amongst people working in science, weakening and acting as a brake on their creative activity.

6. The development of machine production, which brought about a unity of technical methods, stimulated a trend in science for the unification of methods and an overcoming of the harmful aspects of specialization. Much has been achieved along these lines, but as long as the fundamental divide between the individual branches of science remains, this trend will be effective only in some sectors, and will not result in the integrated organization of science as a whole.

7. Bourgeois science, with its laborious, obscure and complicated professional language is scarcely accessible to the working class. Furthermore, in so far as it has become a commodity in capitalist society, it sells at a high price. If individual representatives of the proletariat, at a cost of enormous expenditure of energy, become masters of one or another branch of science, the class character of science comes into play: the gulf between science and the principle of collective work, make for an estrangement in their lives from the interests and mentality of the working community from which they emerged. Here, professional narrowness and a tendency towards intellectual aristocratism converge. In a word, bourgeois science, given that it is a bourgeois ideology in origin,[6] organizes the soul of the proletariat according to the bourgeois model.

8. What this means is that the working class has specific tasks to carry out in relation to contemporary science:

. . . science must be reinterpreted from a proletarian point of view, both in its content and in the form in which it is taught; the creation of a new organization, both for the elaboration of science and for the dissemination of scientific knowledge amongst the working masses.

In most branches of science, accomplishing these tasks will entail a methodical assimilation of the legacy of the old world; but in some branches there will be a need for profound and far-reaching innovation.

9. A reinterpretation of the content of science must first of all abolish the divide that separates science from the collective-labour principle: the material of science must be understood and explained as being the practical experience of humanity; the schemas, conclusions, and formulae of science must be seen as tools for organizing the entire social practice of people. At the moment, this work is being carried out almost exclusively in the social sciences, but the approach is insufficiently planned and organized; this work must be extended to all fields of

6. "Our usual ideas about the social relations between people imply *mutual understanding* as their first precondition. (…) What is the essence of this mutual understanding? It is contained in a common language and the sum of concepts which are expressed by this language, in what is called common "culture" or, more exactly, ideology" *Bogdanov's Tektology Book I* (1996).

knowledge. This transformation will bring science close to the life of the working class: astronomy as the science that explains the orientation of work processes in time and space; physics as the science of the resistances encountered in the course of the collective work of humanity; physiology as the science of labour power; logic as the theory of the social harmonization of ideas – given that ideas are also organizational instruments of labour – all of these sciences will enter into the consciousness of the proletariat more directly, more easily and more deeply than they do in their present form.

10. We must also strive to overcome the fragmentation of science that has come about in the course of specialization: our objective must be the unity of scientific language and a convergence and generalizing of the methods of the various branches of knowledge, not only within the sphere of knowledge but also in relation to the various spheres of practice, so that a total monistic system can be developed, comprising both domains. The realization of this goal will be expressed in a universal organizational science, a science that is needed by the proletariat as the future organizer of the whole life of humanity in all of its aspects.

11. With regard to the forms in which science is taught, here, what is needed is a degree of simplification, without prejudice to the essence of what is being taught. Recently, the work of a number of democratizers of science has shown how much can be achieved in this respect, by discarding useless scholastic ballast and by avoiding repetition of identical principles when they are encountered under different names in related branches of science. A significant degree of simplification will be achieved by the very reinterpretation of science from the point of view of collective labour, since this will liberate science from the abstract fetishism which, in the old mathematics, mechanics, logic, and other sciences, frequently resulted in so many pseudo-problems and unnecessary stratagems being presented as "evidence".

12. A reinterpretation of the content and a transformation of the external form of science will mean that "socialism" will become its foundation, which is to say that science will become adapted to the tasks of the struggle for, and construction of, socialism. The dissemination of knowledge and of scientific work must be organized in parallel. The two processes are inextricably linked. The means for actually achieving these ends will be the Workers' University and the Workers' Encyclopaedia.

13. The Workers' University must be a system of culturaleducational

institutions that operate at various levels and culminate in a single centre for the training and organization of scientific forces. At each level of the system, general educational courses must be complemented by special, practical and scientific-technical courses that are of use to society. The unity of principle that underlies the programme, and links together the various levels and complementary courses must not inhibit initiatives to perfect particular programmes or particular teaching methods. The basic form of relationship between teachers and students should be comradely co-operation, in which the competence of the former is not taken to justify an unaccountable exercise of authority, and the trustfulness of the latter does not degenerate into passivity and an inability to criticize. The principal goal of teaching should be a mastery of methods.

14. The development of these educational courses, and the publishing activity of scientific workers of the Workers' University which is part of this development, should be directed towards the creation of a Workers' Encyclopaedia, which should not be a mere compilation of the findings of science, but a complete, harmoniously organized system of explanation of the methods of practice and cognition and of the vital links between them.

Science and the Working Class, February 1918
Alexander Bogdanov

What is science?

Let us examine this question using a concrete example. Let's take one of the purest, most "lofty" sciences, i.e., the least accessible to the laboring masses—astronomy.

Its origins emerged at the early dawn of human thought. A primitive savage knew more about the heavenly lights through experience than nine-tenths of today's townspeople and peasants. He knew the daily path of the sun well enough to calculate the time by its position in winter and summer with sufficient accuracy. He was well aware that in winter the arc of this path was shorter and lower, while in summer it was longer and higher, that the movement of the sun was very even, and the highest point of the day's arc was always in the same direction from his dwelling and from all other surrounding objects. He firmly remembered the bright star that hangs motionless all night on the firmament in the direction directly opposite to the sun's midday position and memorized the location and movement of other bright stars around this motionless one.

He knew the timing of the mysterious transformations of the moon and its changing path in the sky. He passed all this experience to his children, who then passed it on to theirs. Over generations, small pieces of new knowledge were quietly added. This was the initial collection of astronomical experience—primitive astronomy was growing.

With the beginning of the first civilizations, this collection entered a new phase. In the valleys of the Euphrates, Nile, and Yangtse-Kiang, Chaldean, Egyptian, and Chinese priests, striving for the precise division of time and accurate knowledge of directions in space, consciously organized the astronomical knowledge handed down from their ancestors, systematically verified and supplemented it with new observations, formalized it using gradually developed methods of measurement and calculation, and consolidated it by means of records. Later, mainly through the works of scientists from ancient Greece, Rome, and Alexandria, astronomy was separated and isolated from the general mass of other knowledge and brought to a coherent unity: it became a scientific system.

Another millennium passed. At the beginning of the Modern Era, new data were collected, and a number of astronomers, starting with Copernicus, found contradictions and discrepancies with experience in the old system. To eliminate these contradictions and harmonize all the data, they rebuilt the entire system. There were also partial restructurings afterward, caused by further collection of material. Thus, it continues to develop to this day.

Therefore, people collected experience, organized it, formalized it, consolidated it, eliminated its contradictions, harmonized it, and grouped it into a coherent unity. Such actions can be performed both on people and things. If people are gathered, if their mutual relations are organized, formalized, consolidated, contradictions eliminated, and linked into a coherent whole, then this whole is called an "organization," and the entire work is organizing. It is clear that science is nothing but the organized experience of human society.

Furthermore, how is this experience obtained? Through labor. In the labor of his arduous struggle for existence, primitive man learned the connection between the changes in the sky and the changes in conditions on the earth, the positions of heavenly bodies, and earthly directions; the distribution of labor and rest is the initial meaning of time calculation according to celestial phenomena. And all the further, conscious work of creation, assimilation, and dissemination of science was, of course, labor—more intense, more complex, more tiring than all other types of labor. As it developed, this work required special tools, which, again, became more and more complicated. Now it is carried out in special factories—observatories—with huge and delicate machines, with strict division of labor between workers, scientists, and non-scientists. And the precious products of this labor are formed into a gigantic, coherent system of scientific knowledge.

Thus, the characterization will be more accurate if we say: science is an organized social and labor experience.

Further, what made the primitive savage conceive and memorize the movements of such distant celestial lights? The harsh necessity of life's struggle. As a wandering hunter of forests and steppes, he needed reliable ways to know directions, to determine time, and by time and distances in order not to get lost in the wilds of primitive nature, which threatened destruction everywhere, to calculate meetings of community members and their return home, to coordinate their labor efforts in general—in a word, to organize work. For the organization of labor means, first of all, its distribution in space and time, hence, it is based on their precise recognition, on "ordering." The heavenly bodies make such orientation possible: they are enormous and at enormous distances from each other; therefore, their correlations are the most stable, their movements are not subject to random influences, and they are strictly regular, precisely periodic. They provide a reliable basis for all calculations of space and time in the field of labor organization.

This is how it was from the very beginning and how it has always remained. It was not out of mere curiosity that Chaldean masters and Egyptian priests studied the mysterious life of the sky, observed, measured, and recorded the paths of celestial lights. In the valleys of great rivers, the entire economy depended on periodic floods that fertilized the

soil and at the same time threatened people and their property with destruction. Here, scientific calculation of time for agricultural works, on the one hand, and scientific determination of directions, angles, and distances for engineering works regulating water levels, on the other, were matters of economic life and death for nations. In the hands of priests—the intellectuals of that time—astronomy and geometry, which was not yet separate from it, were powerful tools for organizing national labor.

Four or five centuries ago, the impetus for a revolution in astronomy, for its new flowering, was driven by the needs of oceanic navigation, which sought new lands for labor and exploitation and new routes for world trade. For wooden ships carried on the endless water desert, only constant precise orientation in directions, time, and distances could be a support against the elemental vagaries of wind, waves, and currents. Such orientation was provided by the new astronomy—the astronomy of the Castilian astronomers, then Copernicus and Galileo. The eclipses of Jupiter's satellites discovered by Galileo were an invaluable means for checking chronometers at sea and determining the longitude of a place.

The main astronomical instrument is the clock, a machine that imitatively reproduces the movement of the sun across the sky. This instrument decisively regulates the entire modern organization of production. Clocks control the cooperation of workers, gathering them at the same time to the factory, indicating the time for breaks and the end of work; they also provide the basis for calculating wages, directly in the case of hourly wages, and indirectly in the case of piecework. The clock is also the basis for calculating the operation of machines, measuring their power and output. The clock regulates the movement of trains and steamships; every assembly, every association, and community of people is subject to it.

Astronomy also guides human labor through the universal system of measures, the metric system, which dominates production, transportation, and trade in all advanced countries. A worker making a millimeter cut may not realize that astronomy directs the movement of his hand; yet it does, because a millimeter is one forty-millionth of the Earth's meridian, measured with the help of stars and the sun. Look how absurd the usual understanding of astronomy as "the science of heavenly bodies" is. It even logically contains a contradiction, because "heavenly" is exactly the opposite of "earthly" in its very concept; yet the planet Earth is among the bodies studied by astronomy.

Thus, it should be quite clear to us: science is the instrument of organizing social labor. This is its real, "objective" significance for life. It is permanent and unchangeable.

But sometimes science can acquire another meaning. If a society consists of different classes, and if the organization of labor is based on the domination of some classes over others, then science becomes an instrument of this domination. So it was with astronomy, and so it is even now.

In ancient Egypt and Babylon, as has already been mentioned, priests, the intellectuals of that time, were at the head of the organization of production. With their astronomical and other scientific knowledge, they directed agricultural works, irrigation, engineering works for regulating rivers, construction, road building, and if not directly, then indirectly, all other works. The masses of people obeyed them because they did not possess the necessary knowledge themselves. And the priests carefully kept their science secret from the people, strictly ensuring that the sacred knowledge did not penetrate the minds of the lower classes. This firmly cemented the dominance of the priests.

Now, the ruling classes—the bourgeoisie and the segment of intellectuals allied with them—in advanced societies do not seem to obstruct the spread of knowledge among the masses; some even "popularize" science. Yet the highest, precise knowledge, which in the broadest scope guides the organization of production, remains the privilege of a few, the chosen ones—a kind of "sacred secret." This is achieved not by prohibitions and punishments, but by other means. First, knowledge is sold as a commodity, and higher knowledge, in universities and scientific institutions, is sold at a high price, so that generally only the children of the bourgeoisie can afford to pay for it. Secondly, the prevailing methods of presenting and teaching exact sciences lead to the same result. It is extremely complicated and hindered by a number of features that make it inaccessible to the vast majority of the working masses: an abstract form unfamiliar to the common person, an excess of special terms and notations, a multitude of intricate and essentially unnecessary proofs, an excessive accumulation of material through which the main ideas and methods of science are harder to grasp. All this is recognized, protested against, and fought by progressive, democratically-minded scientists who work to simplify the form of science and make it accessible to broader working circles. For example, astronomy, like many other sciences, is entirely based on mathematical analysis. This analysis is now taught much more simply and easily than 30-40 years ago; but still, Prof. John Perry has convincingly shown in his lectures on "Practical Mathematics" that even now, the largest share of time and effort in studying mathematics is spent on things that are completely unnecessary and useless, the same concepts are studied under different names several times, and so on. Of course, this happens not from the malicious intent of the bourgeoisie, but from the insufficient organization of their

own thinking, which is cultivated in the anarchic, contradictory relations of capitalism. But this does not change the essence of the matter; one way or another, it turns out that seriously mastering one or another exact science, rather than its meager and powerless "popular" crumbs, is possible only with considerable leisure and secure living conditions over many years—conditions inaccessible to the working masses. For them, the secret remains a secret.

However, not a few energetic, knowledge-hungry people stand out from the working environment and make their way to this mystery. Then the ruling classes willingly accept them as "educated" people, offer them good jobs with high pay and leisure time.

Most of these newcomers succumb to the temptations of the new bourgeois existence because they are already tired of the defeated difficulties and have wasted the best part of their strength in the struggle to possess knowledge. They forget about their former working life, its interests, their comrades left down there, and they join the side of their new friends—or, if not completely, they try to harmonize their past and present, to bridge the gap between their working ideals and the bourgeois understanding of life. In short, they turn into half-hearted people, "opportunists."

But the very science they have mastered, serve, and live by, sets them up and educates them in such a way as to detach them from the tasks and aspirations of the working class and to bring them spiritually closer to the masters of the situation. Here, you have seen what astronomy is: it is clear to you that it is the science of work, cooperation, organization of human efforts in the struggle against nature. But is this the current, official understanding of it? No. It is developed and taught by specialized scientists, who by their entire education and the structure of their lives are detached from the labor of the masses, from its global connection—people who retire to their offices and observatories, as monks do to their cells. There they forget about the living practice of mankind, about its continuous struggle with nature on the entire front of labor; and their scientific knowledge seems to them pure truths about heavenly bodies and about the forces that set them in motion, independent of this labor struggle. Possessing such lofty, truths above life, inaccessible and alien to the dark masses, they naturally consider it a great privilege; and it seems to them that they are the chosen ones, marked with the stamp of intellectual nobility, uninterested in the trivialities of worldly vanity; while down there, inferior beings are cowering, chained to brute labor, to the care of sustenance; shouldn't these beings be proud of the fact that they work for people of pure thought, of higher knowledge - shouldn't they be grateful for those pieces of this thought and knowledge that are thrown to them from above?

Such moods are created by the detachment of science from labor and a lack of understanding of the labor nature of knowledge. It is clear that astronomy, like any other science in its current bourgeois-intellectual development, subtly instills in people the conviction of the legitimacy and necessity of the masses working for higher culture, for the benefit of the classes that live off it.

You see, comrades, that the idea of modern mathematics, astronomy, and other sciences being bourgeois is not as ridiculous as it might seem to the old representatives of Russian Marxism. Thus, in a class society, science, while remaining an instrument of labor organization, can also become an instrument of domination. However, it can also play another role in the struggle of social forces.

The impetus for the development of new astronomy in the 14th to 17th centuries, as we have indicated, was driven by the development of merchant shipping, i.e., the needs of merchant capital. And trade capital was a representative of the bourgeois system that was emerging within the feudal medieval organization. The bourgeoisie began its struggle for dominance against the land-owning nobility and clergy, the rulers of life at that time.

The new astronomy met the needs of trade, capital, and the new class connected with them; but it did not align with the views of the old order and the teachings of the clergy. In this way, it undermined their authority and weakened their organizational power.

The clergy soon realized this and waged a fierce battle against revolutionary science: one of its first proponents, Giordano Bruno, was burned at the stake, and Galileo was imprisoned. But this only strengthened and united the advanced bourgeoisie in their offensive against the ruling classes. Science became, of course, not the only, but a precious battle banner of the most progressive class of the time, greatly contributing to its victory.

As we see, science can also be an instrument for organizing forces for victory in the social struggle. What we have shown about astronomy is just as easy, or even easier, to demonstrate through corresponding research on any other science, and it has been clarified even earlier for all social sciences. These characteristics are fully applicable to philosophy, which is considered to be the culmination and unification of sciences. Philosophy tries to organize the entirety of human experience into a coherent whole, striving to guide all aspects of human life, i.e., to be a universal means of its organization. The philosophy of the ruling classes, as clarified by many Marxists, is an instrument of their domination. And, of course, proletarian philosophy must be an instrument for organizing the forces of the working class for its struggle and victory.

II

The tasks of the working class in relation to science are directly derived from its general tasks in life. If the working class is to transform the entire order of social life and become the inheritor of the whole class society, it must, of course, also become the inheritor of complete scientific knowledge, i.e., the labor experience of society as a whole. But when should this inheritance be received—now, or only after the working class has seized the material inheritance, all the means of labor, into its hands? If the old science serves as an instrument of domination for the upper classes, it is already clear that the proletariat must oppose it with its own science, powerful enough as an instrument for organizing the forces of revolutionary struggle.

But it is not only a question of defeating the former rulers; it is also about creating, in place of the overthrown system, a new and radically different system. Science is a tool for organizing production. If we are dealing with a planned organization, built on conscious calculation—as is the case with the socialist system—then it is undeniable that science is even more necessary here, and more perfect in its methods, than for an anarchic, unorganized system like capitalism. The working class must already have this science in its hands to consciously, purposefully, and successfully carry out the restructuring.

Thus, the proletariat has to master science not only after the socialist revolution, but also before it and for it. We know that step by step it is doing this, seeking knowledge and, despite all the obstacles posed by harsh living conditions, acquiring it.

But these efforts lack class-based planning; knowledge is often acquired in ways that are not really needed. In many cases, it exerts a bourgeois influence, and almost always it is obtained at the cost of excessive expenditure of time and labor, due to methods of expression alien to the proletarian system and to presentations cluttered with details and obscured by difficult academic and technical language.

The working class needs proletarian science. This means a science perceived, understood, and presented from its class point of view, capable of guiding the fulfillment of its vital tasks—a science that organizes its forces for struggle, victory, and the realization of the social ideal.

What Marx first demonstrated regarding political economy and history—social sciences—from the proletarian perspective, I had to elucidate once again through a comparison drawn from astronomy: "Three and a half centuries before Marx, there lived a modest astronomer, Nicolaus Copernicus. He too advanced his field...

Ancient astronomers earnestly observed the skies, studied the movements of celestial bodies, perceived a profound, orderly, and unchanging

pattern within them, and sought to articulate and communicate it. However, they encountered a perplexing complication.

Planets moved variably among the stars; at times, they appeared to halt, reverse course, then revert to their original direction, returning to their previous positions after a certain number of months and days. This necessitated the invention of intricate theories: separate spheres for each planet, predetermined orbits for each sphere, revolving in sequence around other spheres, and so forth. Clarity remained elusive, and calculations proved exceedingly challenging.

Copernicus pondered: Could the complexity and confusion arise because we are observing from Earth? What if we were to shift our perspective and attempt—albeit only in thought—to view from the Sun? Upon doing so, everything suddenly appeared simple and lucid: planets, including Earth, followed circular, rather than convoluted paths, with the Sun at their center. Previously, this understanding had been elusive because Earth was perceived as stationary, its motion intertwined with the paths of the planets. Thus, a new astronomy emerged, elucidating the celestial dynamics to humanity.

Before Marx, bourgeois scholars studied society, naturally viewing it from their own societal position—the perspective of a class that does not produce but commands the labor of others and benefits from it. Yet, not everything is discernible from that vantage point; much appears distorted, and many facets of life become so convoluted as to defy comprehension.

What did Marx do? He altered the perspective. He examined society from the standpoint of those who produce—the working class—and this revealed a fundamentally different reality. It became evident that society's life and development centered on them, akin to the Sun around which the paths and movements of people, groups, and classes revolve.

Marx was not a worker, but through the power of thought, he was able to fully immerse himself in the perspective of a worker. He discovered that with this shift, everything immediately changes shape and form: the underlying forces of things and the causes of phenomena, unnoticed from the old perspective, become visible; reality, truth, and even what seems obvious, often turn out to be different, sometimes opposite to what was previously understood.

Yes, even the notion of obviousness itself. What could be more obvious to a capitalist than the idea that they provide sustenance to the worker? Don't they offer employment and earnings to the worker? However, for the workers, it's equally obvious that they sustain the capitalists through their labor. Marx demonstrated through the theory of surplus value that the first appearance of obviousness is an illusion, a façade, akin to the daily movement of the Sun around the Earth, while the second represents the truth.

Marx observed that all thoughts and feelings of people diverge, shaped differently depending on the class to which they belong—meaning, their position in or around production. Their interests, habits, and experiences vary, leading to different conclusions. What seems rational to one class appears irrational to another, and vice versa. What is just, legal, and normal for one class may be seen as injustice and abuse of power by another. What appears as freedom to one class may appear as enslavement to another. The ideals cherished by one class may evoke horror and repulsion in another.

Marx summarized this by stating: 'The consciousness of people is determined by their social existence,' or in other words, thoughts, aspirations, and ideals are shaped by economic circumstances. This idea revolutionized the entire field of social sciences...

Based on this, he developed the significant doctrine of class struggle, through which societal progress unfolds. He traced the trajectory of this development and forecasted which class would need to establish a new mode of production, what that organization would entail, and how it would bring an end to class divisions and their historical strife.

Marx was not a worker, but within the working class, the great thinker found a point of intellectual leverage—a perspective that enabled him to delve deeply into reality and gave birth to his groundbreaking ideas. At the core of this concept lies 'the self-consciousness of the working proletariat'...

Marx articulated the task and charted the course; however, he could only partially accomplish the transformation of the sciences he engaged with. Others have since continued and will continue: scientific creativity is a collective endeavor; the capabilities and lifespan of any individual, no matter how brilliant, are finite. Moreover, new experiences continue to accumulate: in our era, many facts have come to light that were unknown in Marx's time, or were not fully understood.

However, this endeavor to transform the sciences continues to proceed completely disorganized, lacking any systematic approach. It remains entirely reliant on personal initiative and, consequently, chance. A theorist emerges with an article or book proposing a new theory, a fresh perspective on facts; other theorists either stay silent or express their views, for or against, according to their own preferences. All of this is conducted "scientifically," articulated in specialized language, and remains within the realm of academia — the working masses are not involved. Occasionally, and often belatedly, the echoes of scientific debates reach them, but in an incidental manner, filtered through the usual distortions of factional strife.

The bourgeois world possesses its scientific institutions — universities, academies, societies of specialized scientists — collectively support-

ing and advancing bourgeois science. The proletariat has yet to establish anything comparable. Any sincere observer must acknowledge that the development of proletarian science over the past century has progressed more slowly compared to most sciences developed by bourgeois scientists.

Nonetheless, the methods and methodologies of proletarian science are inherently compelled to be more refined, profound, and potent than those employed by bourgeois thought.

Allow me to provide a vivid example. In comparative philology, which encompasses the general study of languages and human speech, the longstanding question of the original origins of words remained unresolved for an extended period. This issue could not be tackled from the bourgeois perspective, which fails to grasp the notion that speech serves as a tool for organizing social labor among people, thus necessitating its origins to lie therein. The German scientist Noiret, with no affiliation to the working class, transcended the confines of old bourgeois science through sheer genius and resolved the matter. He demonstrated that words originated from labor cries — the involuntary sounds emitted by individuals during various efforts in collective labor, inherently "signifying" those exertions. It's evident that such a "labor-centric" viewpoint, if further applied, could revolutionize the entire doctrine of speech development. However, bourgeois scientists were unable to carry forward Noiret's work in this direction, and for thirty years Marxists simply overlooked his theories. To this day, as far as I know, there are no adherents among them, despite there being followers now.

But philology is still one of the social sciences. We have discussed astronomy, one of the purest natural sciences, and have seen that its essence is organizational and labor-oriented. However, this is true only from the worker-proletarian point of view, not from the bourgeois perspective. It is clear that with such understanding, the entire elucidation and arrangement of astronomy's material, its presentation, and its teaching method must be changed.

Fundamentally new material, any special discoveries, proletarian methods can hardly be introduced into astronomy: the working class, until its complete victory, will probably not have its own observatories. Nevertheless, this science will appear differently, will acquire new vital significance, and will play a different role in the social struggle. It will cease to be an instrument for the elevation of ruling classes above workers, a means for the imperceptible bourgeoisification of descendants of the knowledge-seeking proletariat who dedicate themselves to its study. Instead, it will become part of deepening proletarian consciousness, one of the tools for uniting and organizing the best forces of the working class, and for attracting the most scientifically-minded individuals from

other backgrounds dissatisfied with detached "science for science's sake."

Again, the same applies to all other natural and mathematical sciences, whose organizational and labor-oriented essence needs to be clarified and developed throughout their presentation.

The least transformations will be required in applied and technical sciences like technology, agronomy, etc. Their organizational and labor content is inherently clear. However, even in these now purely "engineering" sciences, proletarian thought cannot remain fruitless. The scientific technician views the workforce from the outside, not from within, from a certain distance rather than in full proximity. Therefore, certain relationships between labor power and tools, between living and dead elements of production, can and even should escape their notice. For example, the crucial contemporary issue of entire enterprises transitioning between different productions, or workers shifting from one job to another, will be approached by proletarian scientists in significantly different ways and on a broader technical basis than by shop-floor intellectual-engineers.

And naturally, in proletarian treatment, the entire presentation should undergo considerable simplification and streamlining, which need not concern specialized intellectuals. This is how the transformative activity of proletarian class thought should unfold across the entire spectrum of science.

III

And that's not all. The working class will not only have to receive and transform the entire scientific legacy of the bourgeois world for itself. Its historical task, its social ideal, demands that it create something new in the realm of science—something which the bourgeois world not only could not create but was not even capable of questioning.

The realization of socialism entails an organizational effort of such breadth and depth as no class in the history of mankind has ever had to undertake.

The work done by the bourgeoisie and its intelligentsia cannot be compared to this. The capitalist world is organized only in small parts and disorganized as a whole. Separate branches of production and individual enterprises within them are organized independently and inconsistently. Beyond the strict, planned organization of enterprises, in their mutual relations, in their market connections, anarchy, spontaneity, and struggle reign in the entire world economy.

And modern science, which serves this world economy, is similarly fragmented, lacking overall organization. All its branches, the "special sciences," have an organizational and labor character, but each of them

only applies partially, to some separate area or aspect of production. Technical sciences are categorized by branches of production; the predominant role of mathematics is related to the calculation or quantitative aspect of labor processes, astronomy to their spatial and temporal orientation, mechanics, physics to accounting for material resistances opposing labor efforts, and so on. The role of each of the social sciences is also limited. Political economy is usually considered a universal science of economics; this is absolutely false: it is merely a science of the mutual relations between people in cooperation and appropriation; outside it remains the entire technology of production and the entire field of ideology, i.e., social consciousness, which introduces planning and order into economic life.

All the special sciences live independently, each developing on its own—this is their fragmentation, the general anarchy of the realm of science. If the working class were to limit itself to merely mastering them, even if it were to transform them for its own purposes, would this be enough to solve its global task of organizing a socialist society?

We now know—war has made this especially clear—that socialism cannot be realized in any single country; it must encompass all countries or at least such a vast union of countries that could independently manage all production, not dependent on the importation of materials from backward states and not vulnerable to their military power. Such is the gigantic scale of planetary organization that the working class will have to create.

Millions of different tools and hundreds of billions of poods of all kinds of materials, as well as means of sustenance, will need to be purposefully distributed across an area of many millions of square versts among hundreds of millions of diverse workforces, so that all production needs and worker requirements are fully met, and the products of each sector are delivered promptly wherever they are needed for labor or consumption.

But that is not all. The new society must be culturally on par with its unprecedented tasks and sufficiently ideologically homogeneous. If its different parts are as dissimilar in their thoughts and aspirations as, for example, the worker, the intellectual, and the peasant are nowadays, they will not be able to construct their common organization in a planned manner, just as workers who speak different languages cannot construct a building in a coordinated way.

The technical aspect of the social economy can be accurately described as the organization of things, the economic aspect as the organization of people; the ideology of a class or society is the organization of its ideas. Consequently, the overall task appears as a global organization of things, people, and ideas into a single, coherent system.

It goes without saying that only the scientific approach is conceivable to achieve all this.

But is modern science, in its fragmentation—divided into specialized branches working independently—adequate here?

If each branch organizes one or another field, one or another aspect of production, it is clear that a cohesive scientific and structural organization will not result. It's like if, when building a house, carpenters, framers, roofers, and others each work according to their own calculations and considerations. In such a scenario, all individual tasks must be subordinated to the general guidance of an engineer-architect, a representative of the construction science that unites them. Only under these conditions can the planning of construction, the coherence of all its parts and aspects, and the organization of work be achieved.

Clearly, the work of individual scientific branches in organizing a planned global economy must be subordinate to such a unifying science. What kind of science? If the issue concerns the simultaneous and collective organization of people, things, and ideas, then it is evident that it requires a universal organizational science.

This science encompasses and consolidates the entire organizational experience of mankind. It should derive from it the laws by which all elements of existence—objects and forces, whether of dead, living, or ideal nature—are integrated into a unified whole or separated from one another.

The bourgeois world is incapable of creating such a science; it is alien to its essence. It is permeated with anarchy, entirely fragmented, and divided by barriers; its forces collide hostilely, seeking to disorganize each other. Can it gather and harmoniously merge the organizational will and thought scattered within it, amidst its inherent contradictions?

The proletariat organizes things through its labor, itself through its struggle, and consolidates its experience in both. By nature, it is a class of organizers. It is called to dismantle all of humanity's partitions, to put an end to all its anarchy. It is the heir of all classes that have appeared on the stage of history; their organizational experience is its rightful inheritance. It is tasked with bringing this inheritance into a coherent order—a form of universal science. This science will be its primary, indispensable tool for realizing its ideal.

IV

To transform for oneself and supplement the scientific heritage of the old world is far from being the whole task of the working class in relation to science; it does not mean mastering it. It truly possesses only what has entered its masses, what is firmly rooted in them. Here we face issues of the "popularization" of knowledge and educational institutions.

The term "popularization" essentially expresses only that type of knowledge dissemination which is developed by the bourgeoisie and corresponds to its interests. Capital, under modern modes of production, needs workers to be intelligent, cultured, and to some extent intellectual; however, it is not advantageous for them to possess deep and serious knowledge, because such knowledge is power in the class struggle.

"Popular" presentations of any science should be easy and understandable, but superficial; they grasp the surface of knowledge without allowing mastery of the method of its production, failing to create a foundation for in-depth work on it, and not predisposing to such work. Popularization should be interesting; for this purpose, like diamonds in a store window, it contains mind-boggling information, for example, about giant star distances, Saturn's rings, canals on Mars, etc., all as ready-made results. But the transition to real study is more difficult. And "serious expositions," as if contrasting with popularization, are presented in an excessively dry and heavy form, often written in a barbaric and specialized language, complicated by the ballast of scholastic reasoning and proofs. They are usually so tedious, boring, and unattractive that the bourgeoisie's own children, in their secondary, higher, and specialized educational institutions, only cope with them under the stimulus of quite severe discipline, sincerely viewing their studies as a special kind of purgatory. Nevertheless, they manage; and for the masses, there remains literacy from lower schools, and above this, an easy, non-threatening "popularization," often additionally devolving into vulgar, inaccurate, and crude "vulgarization."

In the past decade, a higher form of knowledge dissemination has emerged. It was developed by the democratic segment of the intelligentsia, led by the most progressive figures in science. They strive to bring genuine knowledge to the masses, organizing popular universities and practical courses suitable for them; in accordance with their mission, they revise the methods of presenting sciences. It has been found that it is already possible to greatly simplify and condense the curriculum of almost every science with little loss to depth and accuracy, and usually with a gain in clarity of presentation.

In this case, the primary task is to teach the scientific method and its application methods, so that individuals can both learn and practically apply knowledge. Interest in knowledge is heightened and deepened, and it is disseminated to the masses as genuine knowledge, not as superficial "knowledge." This is the democratization of science.

Is this not what the working class needs? Undoubtedly, yes; but it is far from being enough for them.

Here, for example, is "Practical Mathematics for Craftsmen" by Prof. John Perry. It is intended mainly for mechanical workers and provides in a simple and concise form the methods of mathematical calculation

and analysis together with their practical applications. However, these methods and applications, this power of science, are presented as tools of labor for the studying worker, considered individually, as tools for his personal work and personal success. The democratizing scientists themselves understand the issue in this way, and they can only teach others in the same manner.

But what kind of self-consciousness does this develop in the worker, personal or class-based, social? Does it strengthen the worker's connection with his collective, with the labor mass, or, on the contrary, does he distinguish himself from it with his acquired knowledge, isolating himself from it and elevating himself in his own eyes? Obviously, it should be the latter. We have seen that modern science can bourgeoisify those energetic individuals who rise from the working class to its heights. Here, this effect is weaker, but it must exist: and it is weaker because the democratization of knowledge affects not just individuals, but a wider circle, and has not yet brought them to the pinnacle of science.

Therefore, simple democratization of knowledge is not sufficient for the working class. It certainly enhances their culture, but it does not elevate them as a class because it empowers individuals rather than strengthening the class itself, despite their numbers. What more is required? Consider whether the economic and historical theory of Marxism, i.e., the science already transformed from the proletarian point of view, is spread among the working masses in such a form and meaning. The proletariat eagerly and deeply embraces it; but is it a personal instrument of success for them? Do they see it as a means of rising out of their working environment and transcending it? If this happens to some ambitious individuals, it is an exception because its general significance does not lead in that direction.

Its method is class-based; it involves viewing human life from the standpoint of the proletariat, through their eyes, i.e., based on their collective experience. Its application is also class-based: it entails uniting the working class, building its organization, and engaging in collective struggle for its ideals. Such knowledge is not the power of the individual but of the collective; it does not divide the proletariat by singling out the initiated from the uninitiated, but binds them together more closely.

Here, the dissemination of science among the masses turns out to be not merely democratization, but genuine socialization. The question of how the proletariat can master science has brought us to a familiar task, intertwined with the question of transforming science. And we know that not only political economy or history are capable of and subject to such transformation, but all sciences. Each science, viewed from the perspective of the working class, represents the accumulated labor experience of humanity, a tool for organizing social labor, a means of social struggle and construction, a force that is collective rather than personal.

The condition for the spread of knowledge is not only the simplicity and comprehensibility of its presentation, but above all the interest in it among the masses. As long as, for example, astronomy or higher mathematics are seen as forms of refined amusement for idle individuals, the desire to study them will remain a rare and exceptional occurrence for individuals from the masses, a kind of curiosity or whim.

When it becomes known that such sciences, when studied seriously and with considerable effort, can become instruments for personal success and career advancement, they then attract the most ambitious and capable representatives from among the masses. How much more vibrant is the interest in science, how much closer and dearer it becomes to every worker, to every person from the masses, when they know and feel its presence in all their endeavors, its invisible guidance in all collaborative efforts, in every endeavor of communal work!

Only the socialization of science can deeply embed it within the proletarian masses; only through it can the working class truly master science. And it is essential for them to master it in the full breadth of scientific knowledge across all its various branches. For all sciences contribute to the organization of world production, and it will be incumbent upon the working class to scientifically organize all world production.

V

The task of mastering science, i.e., transforming it for itself and disseminating it amongthe masses, must be accomplished by the proletariat through its class scientific-propaganda organization, the Workers' University.The word “university” originally meant not what is now usually called by this name, but a set, a system of mutually connected educational and scientific institutions. We speak of the Workers' University in the same sense.

It should be a system of cultural and educational institutions gravitating towards one center, uniting and forming scientific forces in a way similar to what is done by today's universities and academies. Higher and lower types of general education courses should serve as stepping stones to this center. General education, of course, should not follow the usual programs of today's state schools, but rather programs as broad and encyclopedic as possible and necessary for the development of a conscious worker-collectivist. Each level of general education courses should be supplemented by a series of specialized courses with more specific practical goals, such as courses on professional development, political agitation, various professional and technical courses, and so on. The unity of programs in this system should be a goal, but in reality, it will only be achieved through the work and development of the entire organization. It cannot and should not be imposed on its parts at the

beginning, because it is necessary to search and test extensively to find the best approach.

The organization of work in the institutions of the Workers' University must correspond to the general type and spirit of proletarian organization; this means it must be based on the comradeship of teachers and students. This is not the usual modern relationship where the teacher or professor is the unquestionable authority, the intellectual power over the students. However, even in a working environment, friendly relations can easily be perverted where there is a great disparity in knowledge and experience—they can easily turn into spiritual subordination of one to another, into blind trust that hinders the development of criticism and creativity. The entire proletarian educational organization must also be a school of comradeship, where the necessary guidance from those who know does not suppress the intellectual independence of thought of those who study, nor lead to explicit or implicit enslavement.

Under these conditions, collaborative work will naturally be infused with the collective-labor perspective, which is the viewpoint of the working class. The transformation of science, its concepts, and their presentation will be achieved not solely through the efforts of leading theorists, but to a greater extent through the collective, self-organizing activity of all participants, where it becomes difficult to discern individual contributions. It is precisely because the essence of transformation lies in the class perspective, in a new logic that sheds light on old experiences differently, that often in general discussions of scientific questions or theories, a student may offer a correct and valuable insight that eluded their supervisor simply due to entrenched intellectual habits. In my personal experience as a propagandist, this scenario has occurred multiple times.

From the collective life of the Workers' University, by refining the optimal approach to presenting each field of science and integrating these approaches cohesively, a Workers' Encyclopedia will emerge. This comprehensive resource will encapsulate in the most refined and concise manner the fundamental corpus of scientific knowledge essential for workers to clearly grasp their place and role in nature and society, enabling them to consciously and resolutely follow their class path. Feudal society produced its religious encyclopedias, and on the eve of the Great Revolution, the bourgeoisie created its Enlightenment Encyclopedia. For the proletariat, tasked with organizing life on a vastly broader and deeper scale, creating its own encyclopedia is indispensable. It will serve as a potent tool for ideological self-organization, a formidable weapon in the struggle, and a constructive instrument in achieving its overarching goal—the realization of the realm of the socialist ideal.

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Biography

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