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Critique of Systemic Reason: Josef Cibulka and Evald Ilyenkov on Cybernetics and Artificial Intelligence

Isa Jacobs, Jiří Růžička[1]

ABSTRACT: The meteoric rise of cybernetics, systems theory and machine-based thinking in the Eastern Bloc during the 1960s was far from universally accepted. While Marxist humanists opposed those approaches, viewing them as a threat of manipulation and alienation, another significant strand of Marxist theorists took a different stance; they critiqued cybernetics and machine thinking as non-dialectical and therefore reductive. This paper examines the contested reception of cybernetics in Czechoslovakia and the Soviet Union, focusing on two key figures in the debate: Josef Cibulka and Evald Ilyenkov. Both engaged with cybernetics from a dialectical standpoint while criticizing different aspects of it. In Ilyenkov's case, the cybernetic conception of the mind as a machine clashed with his theory of the thinking body, which was influenced by Spinoza, Marx and Vygotsky. The core of Ilyenkov's disagreement lies in how to define thinking: for cybernetics, thought is a process of problem-solving, whereas for Ilyenkov it is the resolution of contradictions. Cibulka, by contrast, critiqued cybernetics for its formalistic and conservative tendencies, particularly in its application to social issues. He argued that it fails to account for qualitative change and defining systems primarily in terms of stability, whereas dialectical formations are inherently unstable. Beyond those immediate critiques, the essay also considers the broader implications of their analyses. Ilyenkov's engagement with cybernetics, particularly in his story *The Mystery of the Black Box*, offers a prescient reflection on artificial intelligence by raising fundamental questions about language and learning, as well as the social constitution of mind. Meanwhile, Cibulka's critique opens new perspectives on the problem of reason's self-reflexivity by offering a counter-argument to Adorno's negative dialectics, thus also highlighting key differences between Western and Eastern Marxist traditions and their respective critiques of machine thinking and automation.

KEYWORDS: Dialectics, artificial intelligence, cybernetics, systems theory, Evald Ilyenkov, Josef Cibulka, Eastern Marxism, dialectical materialism.

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• *Correspondence: Isa Jacobs*, Pompeu Fabra University.
• e-mail: isabel.jacobs@upf.edu
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Introduction

In his collection of sci-fi stories *The Cyberiad: Fables for the Cybernetic Age*, written in the 1960s, Stanisław Lem presents Trurl and Klapaucius, two inventors of all sorts of fantastical machines, including an apparatus that can create anything in the world beginning with the letter "n"—"nuclei" and "noses" but, apparently, not "Nothing":

> The machine sat still. Klapaucius rubbed his hands in triumph, but Trurl said:—"Well, what did you expect? You asked it to do nothing, and it's doing nothing."—"Correction: I asked it to do Nothing, but it's doing nothing."—"Nothing is nothing!" (Lem 2014, 5)

Another of their machines insists that two plus two is seven and then threatens the engineers if they fail to repeat its faulty result. There are poetry machines and the Femfatalatron, a vibrator reminiscent of Andrei Platonov's Anti-Sexus, a communist masturbation device designed for the Soviet market.[2] Besides building cybernetic gadgets, Trurl and Klapaucius are immersed in the study of the General Theory of Dragons, a scientific paradigm dissatisfied with the simple fact that dragons do not exist. They believe that dragons can be non-existent in several different ways—a problem that can only be solved through cybernetics. There are "anti-dragons," "minus-dragons," and "imaginary dragons" (Lem 2014, 84). The two engineers founded an entirely new field of "statistical draconics," a probabilistic theory of virtual dragons. Using a "dracotron," the draconical cyberneticians quantize a dragon, measuring the energy of its particles and even determining the coordinates of its tail (Lem 2014, 87). In Lem's parody of the cybernetics of his time, life is reduced to statistical fluctuation.

Similar critiques of cybernetics were formulated in socialist Czechoslovakia and the Soviet Union respectively, attacking a systemic conception of the mind from the vantage point of dialectical logic. This article reconstructs two of those critiques, focusing on Josef Cibulka and Evald Ilyenkov.[3] It operates on both a historical and systematic register,

2. See Platonov 2013.
3. While Evald Ilyenkov has increasingly become a household name in Anglophone Marxist scholarship (Bakhurst 2023), the Czechoslovak thinker Josef Cibulka (1926) needs a few words of an introduction. He was among the most prolific and original Marxist philosophers of the post-Stalinist era in Czechoslovakia, yet remains almost entirely forgotten today. Unlike many of his contemporaries, in particular Marxist humanists, Cibulka did not foreground the human being and its activity in his critique of orthodox Marxism-Leninism. Instead, he centred his analysis on the concept of law

aiming to recover two critiques of cybernetics from the Eastern Bloc, situating them in their respective intellectual and political context while aiming to make them relevant for contemporary debates. We argue that socialist cybernetics and its various criticisms have gained new relevance in today's age of AI and climate crisis, where the possibilities and pitfalls of technosocialism—fusing algorithmic control with socialist economic planning—become urgent once again, as claimed in a recent study: "The organization of society through AI must, as was the case with proposals for comprehensive central planning or decentralized market-socialist planning before it, be able to achieve the goal of rationalization and thus eliminate the inefficiency, instability and inequality that is claimed to plague capitalism" (Boettke and Candela 2023, 45). In what follows, we argue that while cybernetics was embraced in the Soviet Union as a scientific tool for socialist planning, it also introduced a model of rationality that went against dialectical and materialist conceptions of mind. Marxist thinkers like Ilyenkov viewed machine intelligence as primarily oriented towards systemic control, thereby risking to reproduce the alienating logic of capitalism as an automaton. Against this, Ilyenkov and Cibulka defended a dialectical, embodied, and socialized conception of thinking. The collective labour of working through contradictions, they argue, is not reducible to computational or cybernetic processes. Cibulka in particular critiques cybernetics for reducing qualitative differences to abstract functions and thereby failing to grasp transformation. Ultimately, the paper frames the debate on cybernetics as a struggle between systemic and dialectical reason. What exactly those two concepts denote and why our two respective thinkers decided to criticize the first and defend the latter will be elucidated throughout the paper.

Marxist Machines? Cybernetics in the Soviet Union

In *Capital* I, Chapter Fifteen, entitled "Machinery and Modern Industry," Marx writes that a centrally organized system of machines is the most developed form of production—"a mechanical monster whose body fills whole factories, and whose demon power, at first veiled under the slow and measured motions of his giant limbs, at length breaks out into the fast and furious whirl of his countless working organs" (Marx 1996,

as an objective tendency, placing it at the heart of Marxist epistemology and ontology. In doing so, he argued that orthodox Marxism had failed to grasp this concept dialectically. His project, therefore, was to elaborate a genuinely dialectical form of determination, which he regarded as intrinsic to the very notion of law.

384–385). The mechanical monster with endless tentacles, automated labour, thereby substituting the human individual. This demonic automaton is nothing less than capitalism itself. As Ilyenkov put it similarly in a 1966 article on cybernetics:

> The organisation of this—unfortunately, not fantastic at all—machine, was already understood in detail a hundred years ago and described in a famous work called "Capital." It is what capitalism is—production for the sake of production; a grandiose machine, that has become an end-in-itself, and has turned human into a means, a raw material for the production and reproduction of its insatiable organism. This grandiose machine, consisting of millions of partial machines, has gone beyond the control of human reason and will, it has become smarter and more powerful than any separate human individual that within it is playing the unenviable role of a cog. (Arsen'ev, Ilyenkov and Davydov 2024, 167f.)

The only way out of this machine, in order to liberate humans from their function as mere cogs, Ilyenkov argues, is "the communist transformation of the whole system of relations between human and human" (Arsen'ev, Ilyenkov and Davydov 2024, 169). Both Marx and Ilyenkov see capitalism as a machine, whereas they consider machines themselves not as inherently anti-socialist. Machinery has no essentialist political or social features; it acquires its socio-political nature within and through historically specific modes and conditions of production.[4] In *Capital*, Marx uses the example of the knife which does not have an intrinsic social essence independent of its use and function. Machines only become capitalist through their interactions with and participation in human labour and activity. In the famous "Fragment on Machines" from *Grundrisse*, Marx writes that the absorption of labour into machinery was at the very origin of capitalism. "The accumulation of knowledge and of skill, of the general productive forces of the social brain," according to Marx, "is thus absorbed into capital, as opposed to labor, and hence appears as an attribute of capital, … insofar as it enters into the production process as a means of production proper" (Marx 1993, 694).

Under industrial capitalism, the worker's skill is progressively absorbed into and, ultimately, supplanted by the machine. Yet the machine still presupposes the continuous presence of a worker, whether skilled or not, to operate it: to switch it on and off, to set it up, maintain it, supply raw materials, and oversee the production process as a whole. Human labor is divided and reduced to those fragmented activities. No

4. We thank one of the anonymous reviewers for their astute comments regarding the social and political nature of machinery.

longer does the machine serve the worker in the way an instrument or tool once had; rather, the worker now serves the machine. Yet, the worker remains still part of the immediate process of production. This ceases to be the case with the expected advent of full automation, when the worker ceases to be a cog in the machinery of production. A question then arises: according to what principles do these automata operate and by what logic are they guided? The answer is: by computers which are themselves governed by cybernetic principles.

In the Soviet Union, the adoption of cybernetics had a rocky start, at least regarding its official, public reception. Before the mid-1950s, it was denounced as a "bourgeois science" that allegedly sought to replace human beings with machine computation, thereby revealing its antihumanist and capitalist nature. However, the conditions for a broader positive reception had already been quietly established in the immediate postwar period, as computation and automatic control began to play an increasingly significant role within the military (Gerovitch 2002, 131–141). During the 1960s and early 1970s, cybernetics arguably gained greater prestige in the Soviet Union than anywhere else. One of the reasons was that computers were declassified and Soviet scientists could openly use them for the defense of the country.[5] The second reason may have had an even greater impact: Stalinist "newspeak" convinced many Soviet scientists that words are inherently manipulable and therefore had to be replaced by mathematical formulas and algorithms which alone could claim objective truth (Gerovitch 2002, 161–163). Yet it was arguably the third reason that provided cybernetics with its ultimate practical legitimation: the promise of reforming the initially voluntarist and rigid framework of socialist planning by placing it on more flexible and scientifically verifiable foundations.

An edited volume entitled *Cybernetics in the Service of Communism* (1961) first explored the application of cybernetics in the USSR's national economy, framing cybernetics as a general theory of controlling the centralized socialist economy. Economic planning was now conceptualized as cybernetic control.[6] Among the early champions of cybernetics in the Soviet Union was the Czech philosopher and mathematician Arnošt Kolman who was based in Moscow at the time (Graham 1987, 274). Kolman's 1954 speech in defense of cybernetics, later published in

5. On the rise of cybernetics, see Gerovitch 2002 and Graham 1987, 267–293.
6. On the institutional development of the AI research programme of the Soviet Academy of Sciences in the 1970–80s, see Kirtchik 2023. Also see Rindzevičiūtė 2016 and Tatarchenko 2019.

the journal *Problems of Philosophy*, ignited Soviet debates on machine intelligence and the legitimacy of cybernetics.[7] Later, however, Kolman became more cautious: "Cybernetic machines, even the most perfected, handling complex logic processes, do not think and do not form concepts" (cited in Graham 1987, 278).

In many respects, analogous developments can be observed in Czechoslovakia. The cybernetization of production and management—and even education—was widely seen as a bridge to a new phase of socialism capable of overcoming the distortions of Stalinism.[8] Radovan Richta, arguably the foremost exponent of techno-optimism within the Eastern Bloc, regarded cybernetization as one of the three principal pillars (alongside chemicalization and nuclear energy) of the impending *Scientific-Technical Revolution* (STR), which announced a full automation of human production and science as the leading force of production.[9] Cybernetics thus became closely intertwined with a new revolutionary vision in which the transformation of the productive forces—now conceived as the fusion of science with the full automation of production—was expected to bring about a real qualitative change within the economic base. Within this revolution Richta conceived the role of cybernetics primarily, if not exclusively, as a new form of management that replaces directive-based control with an active self-regulatory system—one that not only accommodates individuality and creativity but actively depends on them. Yet in one important respect, developments in the Soviet Union and Czechoslovakia initially diverged. In the Soviet case, during the Thaw, scientists' (counter)attack was directed against the so-called philosophers who had been responsible for the official vilification of cybernetics.

In Czechoslovakia (and likewise in the GDR), by contrast, cybernetics presented itself, at least implicitly, as already a philosophical standpoint. This accounts for its interventions not only into ontological and epistemological debates but also the field of dialectics itself.[10] For many philosophers associated with the techno-optimist current, it was, after all, cybernetics that could finally provide dialectics what it had lacked

7. Wiener himself visited the editorial office of *Voprosy Filosofii* in 1960, presenting his views on controlling thinking machines (Graham 1987, 280).
8. See Sommer et al. 2019.
9. See Richta 2018. For an analysis of post-Stalinist Marxist thinking in Czechoslovakia, particularly the role of technooptimism, see Mervart and Růžička 2025.
10. Setting aside the peculiar case of Arnošt Kolman, in Czechoslovakia it was above all the works of Juraj Bober and Jiří Zeman who sought to bring cybernetics into philosophical debates (See Bober 1967; Zeman 1962).

thus far: scientific rigor. As a result, dialectical totalities could be transformed into systems (entities with input and output, a mechanism of self-regulation capable of maintaining metastability); contradictions were basically replaced by *noise* (that is, the effect of the external environment), and Hegelian sublation by the feedback mechanism.

Almost immediately after the onset of the cybernetic frenzy in the Eastern Bloc, however, critical voices began to emerge from among Marxist philosophers, particularly those influenced by Hegelian dialectics and existentialist critiques of modern technology. Marxist humanists targeted above all the concept of the system, which they sharply contrasted with that of totality. In their view, the system operates predominantly through processes of selection guided by a utility function. In relation to human beings, such systemic behavior has a dehumanizing effect: it cultivates only those human qualities necessary for functional efficiency while neglecting the rest. The Hegelian-Marxist concept of totality, by contrast, seeks to embrace the human being in its entirety, leaving none of its qualities underdeveloped.[11]

Another critical perspective centered on the perceived incompatibility between the dialectical and the cybernetic approach, both in their conceptualization of reality and in their understanding of thought itself. As noted earlier, cybernetics sought to recast traditional dialectical concepts within its own theoretical framework. For these philosophers, however, such an attempt was fundamentally misguided, as it failed to grasp the very essence of dialectical reasoning. In what follows, we will outline and examine the arguments of two prominent critics of cybernetic and systemic thinking: Ilyenkov in the Soviet Union and Cibulka in Czechoslovakia. We argue that both, in their own way, defended the primacy of dialectics, particularly in its significance for socialist society and communism as a permanent emancipatory horizon of humanity.

Can Machines Think? Two Critics of Cybernetics

In May 1962, the Academy of Sciences, where Ilyenkov worked, cohosted the All-Union Conference on Philosophical Questions of Higher Nervous Activity and Psychology in Moscow.[12] More than a thousand Soviet physiologists, psychologists and philosophers discussed the latest developments in computation and cybernetics and how it affected materialist psychology. As Olessia Kirtchik put it, Soviet thinkers viewed

11. See, for example, Kosík 1976.
12. On the conference, see Graham 1987, 191f.

computers less as "thinking machines" than "tools to think with," emphasizing the importance of human-machine interaction over algorithmic autonomy (Kirtchik 2023, 114). With regards to the impact of Lev Vygotsky's enactive psychology on theories of technology in the 1960s, Kirtchik emphasizes that conceptions of social activity were at the heart of Soviet critiques of cybernetics. Thinking was approached in a holistic, anti-reductivist and enactive, rather than mechanistic manner.[13] Social activity is also a key concept in Ilyenkov's critique of systemic reason, where the cybernetic conception of the mind as machine clashed with his theory of the thinking body which he derived from Spinoza and Marx. The core of Ilyenkov's disagreement with cybernetics lies in his uniquely dialectical conception of thinking: for cybernetics, thinking is a binary process of problem-solving; for Ilyenkov, following Marx, thinking is a creative grappling with contradictions.

Ilyenkov first approached the issue of cybernetics in a 1966 article, co-written with Anatoliy Arsenyev and Vasily Davydov, which argues against the claim that cybernetics can create a thinking machine modelled after the human brain.[14] Ilyenkov and his co-authors were all members of the Scientific Council on Cybernetics, critically evaluating the philosophical and political implications of artificial intelligence. They claim: "When some people think that the whole problem lies in simply replacing the current state organs with thinking—planning and governing—*machines*, boxes like refrigerators, they are stepping on the ground of a kind of cybernetic-bureaucratic illusion, mythology" (Arsen'ev, Ilyenkov and Davydov 2024, 170). Cybernetics can never promise liberation from machine-like work; only communism can liberate humans: "It is much more reasonable to dream not of a machine smarter than human, not of an electronic brain, comparable to the human one, but of every living human brain working at the level of truly contemporary human culture, which for now, unfortunately, it still cannot do, being loaded with machine work" (Arsen'ev, Ilyenkov and Davydov 2024, 172). Communism frees humans from machine slavery and transforms the brain into a creative and fully developed organ of concrete thinking rather than systemic calculation.

13. See Di Paolo and Potapov 2024.
14. The paper was included in the volume "Lenin's Theory of Reflection and Modern Science," a collection emerging from the 1965 Meeting of Modern Problems of Materialist Dialectics in Moscow (Arsen'ev, Ilyenkov and Davydov 2024, 156).

Who Thinks Concretely?

Ilyenkov's foundational disagreement with cybernetics lies in the nature of thinking: where cyberneticians claim that "it is *the brain* that thinks," Ilyenkov insists that "it is not the brain that thinks, but the human with the help of the brain" (Arsen'ev, Ilyenkov and Davydov 2024, 157). One example is the famous brain in a vat experiment, an idea that fascinated both Feuerbach and Luria. For Ilyenkov, separated from the human body, the brain "will be thinking just as little as any telegraph pole or mould spread on the rocks of distant planets" (Arsen'ev, Ilyenkov and Davydov 2024, 157). In his 1968 sci-fi book *On Idols and Ideals* (Ob idolakh i idealakh), Ilyenkov would contemplate the possibilites of mold thinking, and in *Abstract and Concrete* even the cognitive potentialities of stones. One of the problems of his intelligent materialism is an inherent anthropocentrism: throughout his writings, Ilyenkov insisted on the peculiarity of human thinking over other minds.

For Ilyenkov, thinking requires more than just a brain; it needs the whole of the human body and its social activity, embedded in a larger framework of socio-economic relations. The brain needs other "organs," Ilyenkov contends, both organic and inorganic ones, such as tools: "In particular it is the organs that provide the sensory-object contact of this brain with the world outside of it, something like eyes, ears, tactile hands and other 'external receptors'" (Arsen'ev, Ilyenkov and Davydov 2024, 158). Referring to Marx, Ilyenkov and his colleagues note:

> As long as a machine remains a machine, it remains only an artificially created organ of the socio-human intelligent will, the means of its active manifestation. And in this sense—an organ of the human brain, for by "brain" Marx always meant not only and not so much an organ of the individual's body, but an organ of the socio-human intelligent will, socio-human needs and of the "goals" that ideally express these needs. (Arsen'ev, Ilyenkov and Davydov 2024, 166f.)

In *On Idols and Ideals*, Ilyenkov claimed that the binary logic of machine thinking was incompatible with truly human, that is, dialectical thought. Staging a dispute between a cybernetician and a philosopher, the book also criticises the famous mathematician Andrey Kolmogorov, an early proponent of artificial intelligence.[15] Artificial intelligence, for Ilyenkov, lacks two main qualities of thinking: mediation and imagination. Where machines only operate according to their own logic, human minds are able to mediate the logic of another through ideals. Machines

15. On Kolmogorov's view on machine thinking, see Kirtchik 2023, 117.

can be media, in this framework, but never mediators. What they lack is imagination (*voobrazhenie*), the ability to come up with new things, to create objects of fantasy. It is imagination for Ilyenkov that enables human beings to see the world through images and to actively participate in this shared world created by collective activity, within a system of ideals called culture. If one wanted to create a truly intelligent AI, he argues, it would not be enough to build an isolated brain but one would need to recreate an artificial version of the whole of human civilization. Human thinking is only one organ within a collective system of culture. Kirtchik places Ilyenkov's critique of cybernetics alongside Yury Lotman's 1977 article "Brain–text–culture–artificial intelligence" which argues, along similar lines, that a dialectical theory of AI "should not start from the facts of individual consciousness, but from the collective consciousness that is culture" (Kirtchik 2023, 116). Within Ilyenkov's materialist dialectics, the thinking mind is always already embedded in a larger collective culture.

While cybernetics has proven that "it is possible to reproduce only the machine-like functions of intelligence," it can not generate intelligence itself whose special feature "consists precisely in the constant process of 'sublation' of any finite scheme, in revealing logical contradictions within this scheme and resolving them by further investigation of *the concrete reality*, namely this reality itself" (Arsen'ev, Ilyenkov and Davydov 2024, 164). Artificial intelligence, for the Soviet dialecticians, "can be created only on the basis of dialectical logic and in no case on the basis of axioms and postulates of the logic of formal-mathematical constructions" (Arsen'ev, Ilyenkov and Davydov 2024, 164). It is important to note that Ilyenkov was not a Luddite: rather than being against machines as such he insisted on the necessity to transform human-machine relationships, in order to prevent machines from transforming humans into soulless slaves blindly serving the machine. For Ilyenkov, any human-machine relationship is at its core a human-to-human relationship mediated by a machine. It is not the machine itself that alienates humans but, as Ilyenkov examined in *Idols and Ideals*, it merely mediates existing alienated social relations. A similar point can be made about Large Language Models (LLMs) today: rather than being a source of alienation, LLMs mediate and process existing socio-economic conditions. For Ilyenkov, humans need to consciously shape the ways they use and interact with machines in order to prevent becoming merely living flesh as an energy resource for the machine, consumed

entirely and transformed into a calculating and labouring mechanism—a thinking brain.

The Black Box

Ilyenkov's most sustained engagement with cybernetics took place in an iconic story from *On Idols and Ideals*, titled "The Mystery of the Black Box." The tale offers a prescient reflection on AI, while raising fundamental questions about language and the social constitution of thinking. Even though Ilyenkov was a science fiction fan, he took a skeptical stance on machine intelligence and automation. Written for a general public, *On Idols and Ideals* aimed to defy hopes to solve problems within Soviet socialism by way of self-governing systems and technology. As we have seen, cybernetic visions of the mind as machine went fundamentally against Ilyenkov's theory of a thinking body. For Ilyenkov, thinking cannot be broken down into a series of neurological processes in the brain. In Ilyenkov's conscious materialism, the human mind joins a process of collective meaning-making. Interconnectivity is crucial to Ilyenkov's epistemology. Thinking is a communal activity, "not a mental act that is taking place in the skull of the individual, in the secret spaces of the brain's grey matter" (Ilyenkov 2019, 53).

Spinoza's somatic monism was crucial to Ilyenkov's post-Cartesian theory of thinking as an expression of collective, self-conscious activity. Like Spinoza, Ilyenkov considered the interaction between body and mind as an objective motion in the world. For Ilyenkov, thinking manifests itself in "the entire 'non-organic human body' that stands objectively over and against an individual human being, the body of civilization, including tools and temples, statues and offices, factories and political organizations, ships and toys—all that with which we are involved from the moment we are born and enter the human family" (Ilyenkov 2019, 13). Body and mind, the two Cartesian halves, are united in one thinking body, which thinks by molding its own form to shape other bodies.

Like blood, thinking streams through society's vessels and arteries, shocking through the entire system. Thinking is shaped by ideals, similar to the form of a jar growing under the hands of a potter, as Ilyenkov described it in *Dialectical Logic*. Thinking happens within the interactivity of hands, clay, and tools. The ideal is situated neither in the piece of clay nor the body of the potter but arises from the activity of transforming the clay into a jar. Rather than a systemic code, the ideal functions as a sort of "social algorithm" (Alva 2024, 8). Ilyenkov considered

cybernetics—which detaches thinking from its social milieu—a false science that had regressed to pre-Marxist materialism. He strongly opposed the idea that thinking machines could be more intelligent than humans. For Ilyenkov, no computer can think dialectically; it can solve problems but not sublate contradictions. Humans can think through the logic of an other, he argues, whereas machines only operate according to their own precoded logic. A truly philosophical question, only resolvable through further study, will always remain uncomputable to a machine.

"The Mystery of the Black Box" is a post-humanist tale featuring all sorts of non-human thinking machines, including a brain on spider legs, a lazy flying saucer, a deaf ear and a brainless set of hands. In their communist gatherings, the machines celebrate the overcoming of the human. They worship the Black Box, an advanced thinking machine that appears capable of resolving any problem. Nobody remembers when or how the Black Box was created; it was always simply there. If the Black Box is given two mutually inconsistent prompts, it produces no output but remains silent. What is the Black Box's secret? How does it know the truth? At the end, it turns out that the box is empty. It was never able to think from the start, merely producing random outputs. For Ilyenkov, thinking cannot be simulated by machines or grasped by simply measuring brain waves. We think through many organs: our hands, tools, friends. Communism, he concludes his book, "is not a fairy tale about some bright future, but a real movement of modernity" (Ilyenkov 2020, 495). Communism puts an end to any machine worship, discarding old ideals and bringing idols down from heaven to earth.

Cybernetic Quantification as Control

Ilyenkov's critique implicitly rejects the reductive nature of cybernetics: it subsumes qualitative differences between various layers of reality under one common denominator, abstract form or mathematical function. *On Idols and Ideals* traces the roots of cybernetics back to Karel Čapek's play *R.U.R.* which features an army of soulless robots staging an uprising against humanity. Maybe not entirely coincidentally, it was the Czechoslovak philosopher Josef Cibulka who centered his own critique of cybernetics around precisely its tendency to quantify and hence control. Yet, despite this similarity with Ilyenkov's critique, Cibulka's stance in the debate is the opposite of what one might expect. He begins with almost the same accusation that Stalinist philosophers had directed at cybernetics: the reduction of qualitative differences between

various layers of reality to a common denominator—a general form expressed through mathematical equations and functions. However, his aim is not to reinforce orthodox Marxist positions but rather the reverse: to demonstrate that the Stalinist and cybernetic approaches (to totalities, systems, wholes, etc.) in fact share a common foundation, albeit unwittingly. But what, then, constitutes this shared point of departure?

Cibulka begins his analysis by highlighting the concept of quality as the central issue in the debate. Initially, he aligns himself with Czech cyberneticians such as Jiří Zeman and Juraj Bober, who criticized the Marxist-Leninist "qualitativist" approach as outdated—still operating within the confines of a traditional Aristotelian view, in which quality is regarded as an essential property that defines a thing as what it is and distinguishes it clearly from others (Cibulka 1964, 328). Such a perspective risks forcing things—or more broadly, any entities—into prefabricated categories, thereby denying them the possibility of transformation or a change in use. For example, it becomes difficult to conceive how something could undergo continuous changes in its essential properties while still remaining fundamentally the same (as in the case of living organisms), or how it might retain its core qualities while engaging in a very different activity than its original purpose (as with tools or instruments).

A question immediately arises: to what extent can the qualitativist approach actually be attributed to Stalinist Marxism-Leninism, given that the latter—at least rhetorically—claimed adherence to dialectical thinking, which should, in principle, account for precisely such types of change? Cibulka helps to clarify this problem by arguing that the Stalinist perspective is essentially non-dialectical. It understands change either empirically—through the mere comparison of two distinct qualities—or quantitatively, via the so-called law of the transformation of quantity into quality. What is missing entirely, he notes, is an account of the change itself. In the first case, comparison alone cannot explain transformation; in the second, the explanation is merely superficial or illusory, as quantitative accumulation cannot by itself account for more fundamental structural shifts (Cibulka 1964, 332–333).

Cybernetics tries to remedy for these deficiencies by conceptualizing all kinds of objects and relations as *functions* or components within sys-

tems. In this framework, every element of the structure acquires a certain plasticity.[16] They are effectively reduced to variables and the operations that could be performed on them. A function, in this context, presents the assignment of one set of objects to another according to a specific rule; or, in more distinctly cybernetic terms, a function prescribes the method for transforming inputs into outputs. From this point of view we can say that things or objects are, in a certain sense, "dissolved": defined not by their inherent properties, but solely by the functions they could perform. Having lost their substantial "solidity," they became, ontologically speaking, pliable matter, ready to assume whatever form ("function") the system assigned to them (Cibulka 1964, 337).

For Cibulka, such functionalization represents an extreme form of abstraction: not only are qualitative aspects reduced to quantitative ones, but these quantities are further transformed into functions, distancing them even more from their original qualitative determinations (Cibulka 1964, 336–337).[17] Yet this was precisely what cybernetics aimed to accomplish. As noted earlier, one of the core motivations behind the emergence of cybernetics (and systems theory more broadly) was the effort to coordinate "subsystems" characterized by significant qualitative and quantitative heterogeneity. In this context, any abstraction from both qualitative and quantitative specifics (such as energy flows or metabolic exchanges) was not a drawback but a necessary condition for achieving coordination, that is, for effective management and control.

Contradictions or dysfunctions?

It is, however, crucial for Cibulka's critique that he does not reject the partial validity of cybernetic and systemic approaches—particularly in relation to their effectiveness in management and control but above all in its heuristical sense, i.e. as an initial approximation to reality (Cibulka 1968, 31). What he primarily objects to is the *ontologization* of cybernetic concepts: that is, not only their identification as the most fundamental components of reality, but, perhaps even more importantly, the very mode of this identification (Cibulka 1965, 291). According to Cibulka, cybernetics commits the same fundamental error as Aristotelianism and Stalinist Marxism-Leninism: namely, the abstraction of

16. The term is not Cibulka's but ours, although the idea of plasticity as a desirable feature (of systems, human beings) was certainly present in the technooptimist and cybernetic vocabulary, at least in Czechoslovakia. See e.g. Richta 2018.

17. Cibulka refers here especially to Klaus 1961.

form from content and the subsequent imposition of this independent form onto an allegedly formless matter. This error, he argues, is evident in the abstraction from qualitative aspects, such as metabolic exchanges, and their reduction to universal denominators—functions, flows of information, feedback loops, etc.—which are supposed to be found in every entity interpreted as a system.

Two major problems arise from this. The first is philosophical: from the standpoint of dialectical thinking, there is no greater error than the a priori separation of form from matter, where form is simply applied to content. As is well known from Hegelian dialectics, every form is, to some extent, shaped or "tainted" by its content. For Ilyenkov, too, materialist dialectics does not understand matter as just pliable and then solidified form but is interested in how dialectical change occurs on a qualitative level. For Ilyenkov, matter and form are enmeshed: forms materialize and matter forms. Ignoring this interdependence, Cibulka argues, does not lead to a better understanding or governance of reality—the declared aims of cybernetics and systems theory—but rather to its distortion or (to speak with Hegel) even its destruction. The second problem is historical and political. When such abstraction is applied to society, it tends to obscure—or renders incapable of recognizing—essential distinctions between different socio-economic formations, most crucially the difference between capitalism and socialism. For Cibulka, these deficiencies fundamentally undermine the ontological and epistemological legitimacy of cybernetics, especially when cybernetic and systemic frameworks are used in the attempt to "scientificize" the materialist-dialectical approach.

For Cibulka, however, cybernetic approaches are failing especially in the task which should be paramount for materialist dialectics: to account for the explanation of the genesis of the socio-economic formations. This brings us to the last problematic point. There appear to be two key obstacles that prevent cybernetic and systemic approaches from adequately explaining this issue. The first lies in their focus on the outward functioning of systems, encapsulated in the so-called black box metaphor that we have already encountered in Ilyenkov's critique of cybernetics. In the black box, the internal workings of a given entity are treated as fundamentally inaccessible to cognitive inquiry. Put differently, the internal dynamics of an entity are considered only in terms of its interactions with the external environment.

Machines, organisms or societies are seen as intelligible only to the extent that their outward behavior can be observed and interpreted as

a set of functions. The core problem with this functionally oriented and externalist perspective is that the source of change is always presumed to lie outside the system. Functions may operate more or less efficiently, but disruptions or transformations are seen as resulting only from external disturbances. This logic is reflected in the central cybernetic concept of information, which, in typically abstract fashion, is defined not by its content but by the amount of noise it absorbs during transmission. Such a negative definition, however, lacks any positive determinations—determinations that, for Cibulka, are absolutely essential for identifying and differentiating specific socio-economic formations.

Here we come to what is perhaps the most fundamental difference Cibulka identifies between the cybernetic and dialectical perspectives: the nature of the entities each takes as its primary object of analysis. In the case of cybernetics, those entities are subsumed under a *system*, while dialectics speaks of *totality*. At this point, it is important to recall how cybernetics originally formulated its core problem: the control and regulation of complex systems, where the central goals are communication and the preservation of stability within an unstable or chaotic environment. Cybernetics thus models its object as a goal-directed entity, continuously interacting with an environment that is seen both as a source of disruption and as an indispensable source of energy. In this framework, the system is compelled to change in order to preserve its stability, however provisional this might be. A permanent equilibrium is unattainable, yet stability remains the system's ultimate aim. All negative elements—noise, disruptions, contradictions—are treated privatively: they are obstacles to be avoided, suppressed or minimized (Cibulka 1964, 333–334).

While cybernetics acknowledges that such negativity is the motor of change, bringing it superficially closer to dialectics, it nonetheless treats this negativity as something external to the system itself. For Cibulka, this poses both an ontological and a political problem. Ontologically, qualitative change cannot ultimately be regarded as an intrinsic part of the system, since it is imposed from the outside; the essence of the system—if we can even speak of an essence here—is proper functioning and the maintenance of order. Politically, the system's perspective is inherently reactionary. Consider social phenomena such as riots, protests, strikes or revolutions: from a cybernetic standpoint, these appear merely as disturbances to be either suppressed (reaction) or pacified (reformism), without necessitating any genuine qualitative transformation of the system.

It can be argued that the very concept of a system remains grounded in a non-dialectical view of human thinking: the system exhibits goal-oriented behavior, and its primary objective is to achieve this goal while maintaining its integrity by controlling ideally all of its functions. From Cibulka's (and more broadly, the dialectical-materialist) perspective, however, socio-historical formations do not function in this way. Or, to put it differently, the central issue is not primarily the operation of social systems or formations, but rather *qualitative change*—the emergence or genesis of something new.

To address this issue, Cibulka advances a theoretical perspective that stands in stark contrast to that of cybernetics and systems theory more broadly. First, he locates the source of change not outside the formation (system or totality) but within it. Only in this way can radical, qualitative change be understood as an essential feature of the formation itself, as something immanent rather than externally imposed. Second, implicit in Cibulka's view is the rejection of models based on goal-oriented behavior. Dialectical totalities, in his account, cannot be defined by the pursuit or maintenance of stability—even if such stability is temporary or purely ideal—but instead by inherent instability. Third, this essential instability arises from an internal dialectical split within the totality, which Cibulka conceives as a *tendency*, that is, a real socio-historical movement governed by laws. Its peculiarity lies in the fact that it simultaneously contains, as an internal moment, phenomena that run counter to the very movement prescribed by those very same laws. As a result, such a tendency is always fractured between a so-called main side and a secondary one, the latter undermining the former.

As a result, disruptions, dysfunctions, anomalies or noise are to be understood primarily as products of the contradictory nature of the totality itself, rather than as results of interactions with other systems or the outside. It is precisely at this point that Cibulka introduces his concept of *quality*. For him, quality does not refer to an empirical feature of a particular thing, but to a concrete contradiction inherent within the entity itself (Cibulka 1968, 282–283; Cibulka 1964, 331).[18] For example, as Cibulka explains, the dialectical theory of feudalism cannot rest

18. It has to be noted that Cibulka himself is not consistent in his terminology, for he sometimes uses the term "quality" in the sense of the so-called main side of the objective tendency and sometimes (in the case of "essential quality") as a definition of this tendency as such, which is always internally contradictory. For the sake of simplicity we use "quality" in the latter sense of essential quality.

solely on its "pure" feature, that is, on the natural form of the economy and the appropriation of surplus product through non-economic coercion by a feudal lord.[19] It must also encompass the movement that runs counter to smooth functioning of the main ("pure") feature of the economy—in this case, the transition to the money-form of rent. The dialectical explanation resides precisely in showing (or, more precisely, in deducing) how the tendency toward a transition from rent in kind to its money-form is already implied within this economic form (i.e. feudal type of natural economy) (Cibulka 1968, 81–83).

It is clear that what Cibulka aims to offer here is an account of transformation in the strongest possible sense: change understood as the self-movement of an entity—whether a tendency, system, or structure—something he believes cybernetics is fundamentally unable to explain (Cibulka 1968, 25). In other words, transformation as self-movement can only be described dialectically, not systemically, since only dialectics can adequately reflect upon and rationally account for the internally split structure of any entity. Yet—and this is where Cibulka's lack of elaboration may lead to confusion—this notion of "quality" still does not, paradoxically, determine the concreteness of any given entity. As an essential determination of tendency, it remains formally indistinct from the cybernetic system's own *mode* of determination through interaction with its environment or through functional operation.

The reason is, that while determination through contradiction may account for the possibility of qualitative change, it still does not provide an adequate explanation for the concretization of a particular entity. Without such an account, we would be unable to identify the entity undergoing change; or, more precisely, to distinguish its initial, intermediary and final states. Put differently, determination through contradiction should avoid both empirical determination (based on observable states or facts about entities) and purely formal determination (based on functional abstraction). If this is a valid position, then contradiction cannot be treated as an inherent property or feature of an entity—and certainly not as an empirical quality. It cannot be ontologized, at least not in the traditional, uncritical sense (in the Kantian sense of "dogmatic" metaphysics). Rather, contradiction must be deduced, not in an axiomatic-mathematical fashion, but dialectically, through the observation of the entity's movement in its practical activity (at least in the case of society).

19. Cibulka draws here on Robert Kalivoda's account of the transition from the feudal to the capitalist mode of production.

As we have already suggested, this is precisely the kind of explanation that Cibulka fails to provide; instead, he frequently lapses into forms of ontologization, as in statements such as "Every objective tendency *is* contradictory."[20] At this point, one can hardly avoid the impression that he falls into the very same mistake he seeks to expose in cybernetics: unjustified ontologization; for it is not enough merely to substitute contradiction for function. Rather, contradiction must first be encountered—indeed, experienced—in the form of dysfunction, tension, disruption, or failure; only then can it be reflexively situated within reality as a structuring moment of the concrete totality. This possible critique does not necessarily invalidate Cibulka's dialectical perspective and its criticism of cybernetics; rather, it points to the danger of fetishizing theory, a risk that arises whenever generalizations are detached from their concrete historical or social context. In this sense, the same reservation that Cibulka directed at cybernetics can also be applied to his own theory of objective tendencies: it may serve as a valuable heuristic tool, but not as an ontological claim.

Socialist Systems Theory

Cibulka's critique of cybernetics deserves serious attention, as it sharply delineates the differences between dialectical-materialist and cybernetic-systemic approaches. In doing so, he exposes significant shortcomings in systemic thinking, which, in his view, is unable to grasp reality at higher levels of complexity—precisely what cybernetics claims to achieve. Complexity, he argues, cannot be attained through reduction to the highest level of abstraction, through a formalization that seeks a common dimension across different layers of reality or systems, regardless of their qualitative distinctions. Yet, as Cibulka's anti-empiricist stance suggests, it also cannot be reached merely by acknowledging the richness of empirical reality. Instead, it requires an account of reality as qualitatively evolving. In short, it calls for a genetic explanation, not merely a factual or functional one.

Cybernetic and systems approaches ultimately fall short of providing such an explanation, as they focus primarily on what might be called "negative" change: the kind of change a system must undergo in order to maintain its stability within a highly unstable environment. Herein lies the very heart of Cibulka's accusation of formalism. In cybernetic terms, the sources of variety—noise, anomalies, disruptions—are located in the environment, while the existence of this variety is taken as

20. Italics ours.

a given. The system is then presented essentially as a form that admits into itself only as much variety as it can control; reducing variety becomes then a necessary condition for the system's survival (Cibulka 1964, 333–334). Cibulka, in turn, argues that a dialectical-materialist approach should proceed exactly the other way around: it must explain variety through the movement of the system itself—through its internal development, or what Cibulka refers to as its objective tendency. To put it differently, anomalies and deviations must be understood as processes of anomalization rather than random facts, even when they exhibit a certain probability of occurrence—and, as such, as rational entities that the theory must account for (Cibulka 1967, 299). Cibulka illustrates this point with the example of the second serfdom, which re-emerged in Central and Eastern Europe during the 17th century. From the standpoint of cybernetics, focused on structural similarity, this phenomenon would be interpreted as a mere reappearance of earlier feudal forms, still constituting an essential component of feudalism. By contrast, the dialectical perspective understands it as re-integrated into the emerging capitalist system, functioning as an element of commodity production.

As both Cibulka and Ilyenkov insist throughout their writings on cybernetics, systemic reason cannot cope with the totality of the system itself, its inner modulations, but can only strive to preserve its stability by moderating subsystems—reminiscent of Lem's two engineers and their "statistical draconics," which measures dragons according to their quantitative coordinates without ever capturing their qualities. Despite his sharp critique, Cibulka recognizes the significance of systems theory, which distinguishes his position from the Stalinist denunciation of cybernetics. However, he assigns it a heuristic rather than epistemic (let alone ontological) value. Structural similarities and functional homologies represent only an initial step in explaining reality, by no means the final one. They serve as preliminary approximations that must be further concretized and differentiated in relation to the role they play within the developmental trajectory of each specific entity.

Conclusion

Cibulka's and Ilyenkov's critical interventions can be read as symptomatic of a broader fissure within the ideological landscape of the so-called Eastern Bloc. While not entirely dissimilar to the debate between humanists and techno-optimists—with its familiar oppositions of art and science, human and machine—the division at stake here was articulated less in terms of domains than of modes of thinking: systemic or cybernetic on the one hand, dialectical on the other. Ilyenkov focused on

the distinction between mere problem-solving and truly dialectical resolution, emphasizing the irreducibly embodied character of thinking. Machines, he insists, can never attain dialectical reason. Cibulka, by contrast, directed his critique at the ultimately conservative character of systemic thinking, which proves incapable of accounting for qualitative and revolutionary transformations and instead confines itself to adaptation to, or even the elimination of, disruptions and dysfunctions.

The stakes for both thinkers, however, were considerably higher. Their critique was not merely about differing assessments of the possibilities and limits of cybernetics, but about the very foundations of rationality that ought to underpin new forms of socialism emerging from the wake of Stalinism's collapse. Cybernetics and systemic thinking prided themselves on offering an approach that, in contrast to the purportedly chaotic directivism of Stalinism, could finally place socialism on a firm scientific footing. Dialecticians such as Ilyenkov and Cibulka were not opposed to science or rationality as such (and in this respect they diverged from many humanist critiques); rather, they argued that systemic thinking was limited in scope: adequate only to the domains of automata and computers, but incapable of grasping the qualitative complexity and dynamism of reality. Precisely here, they contended, systemic reason failed on its own terms: it could not adequately account for the very processes it sought to master, above all in their human and social dimensions. The new form of rationality they sought to articulate was instead grounded in the irreducibility of contradiction: something that human activity cannot eliminate or circumvent but must instead engage affirmatively—as a moment this activity has to "pass through," transforming itself in the process, even radically, if necessary.

It is true that Ilyenkov and Cibulka approached systems thinking and cybernetics from markedly different critical perspectives. Ilyenkov began from the premise that human thought is necessarily embodied and social—qualities that machines and automata can never attain. Cibulka, by contrast, emphasised the inherently contradictory character of social reality, a dimension that systems theory and cybernetic approaches are fundamentally incapable of grasping. Despite these differences it seems to us that both thinkers identified a common problem in systems theory and cybernetics: their inability—indeed, their inherent incapacity—to grasp contradiction as a constitutive feature of human social reality, one whose resolution requires a revolutionary transformation of society. In this conception, thinking is itself a mode of trans-

formation rather than a process of learning from mistakes, self-regulation, or adapting a system to the stochastic behaviour of its environment. On the other hand, neither Ilyenkov nor Cibulka denied the usefulness of systems theory and cybernetics. Both instead confined their legitimacy to a limited sphere: for Ilyenkov, to the operation of machines and automata; for Cibulka, to their heuristic function. In both cases, systems theory and cybernetics were to remain subordinate to the dialectical logic of human—that is, social—thought and interaction. The main reason for this lay, however, in the different approaches to reality within which the two modes of thinking were supposed to operate. While for cybernetics and systems theory the key task was the control and management of an entity—a society, enterprise or automata—within an unstable environment, where instability appeared as a condition requiring regulation, for dialectics the task was to work through the differentiations and ramifications of unstable—that is, contradictory—reality itself, creatively unfolding its movement and development.

It is noteworthy that, in this respect, both remained firmly committed to a rationalist and, more precisely, anti-empiricist orientation. Yet they resisted any rigid dichotomy between the rational and the empirical, or between the conceptual (the general) and the individual. The decisive distinction structuring their thought ran instead along the axis of the abstract and the concrete: the former as a necessary point of departure that must lead to the latter, rather than the other way around. In this sense, their critiques diverge from several Western Marxist rearticulations of rationality, particularly within Critical Theory, which also criticized systemic thinking but tend to proceed either from an opposition between the general concept and empirical individuality (Adorno),[21] or from a dualism between distinct forms of rationality, such as instrumental and communicative (Habermas). For the "Eastern" dialecticians, there was just one rationality: dialectical reason that seeks to totalise

21. We are well aware that Adorno himself would reject any formulation that places individuality and the concept in such stark opposition. It is also true that, despite privileging the former, he insists on the indispensability of concepts. Yet this raises a fundamental question: how can individuality be thought if, from the very outset of *Negative Dialectics*, thinking is defined as a process of identification and totalisation that necessarily excludes the individual? From the perspective developed here, Adorno ultimately remains trapped within an undialectical conception of thought. Despite his critique of identity thinking, he continues, unwittingly, to treat thinking primarily as an epistemological problem governed by the logical categories, rather than as a socially mediated, dialectical process in which concepts emerge from and participate in the transformation of reality itself.

all segments of reality—whether logical, empirical, moral or emotive. Dialectical reason does not aim to dominate or subsume them all under one principle, but to salvage every single aspect of reality while simultaneously reconnecting them, so that none appears as an isolated fragment.

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Biographical Notes

Isa Jacobs is a Postdoctoral Researcher in Philosophy, German-Jewish Studies, and Translation Theory at Pompeu Fabra University, Barcelona. She is a Research Scholar at the Northwestern University Research Initiative in Russian Philosophy, Literature, and Religious Thought, and an Associate Editor at *Studies in East European Thought*. Her work explores Soviet and East European philosophy, visual culture and the history of science. She has recently translated Ilyenkov's "Cosmology of Spirit" into German (Matthes & Seitz, 2026) and is currently co-editing a collection of essays on Ilyenkov. In 2025/26, she was a Research Fellow at the Institute of Philosophy of the Czech Academy of Sciences in Prague, and a Visiting Fellow at the Institute of Contemporary History in Ljubljana.

Jiří Růžička is a researcher at the Institute of Philosophy, Czech Academy of Sciences. He focuses on the history of Eastern Marxism, the philosophy of Michel Foucault and Karl Korsch, and the epistemology of the humanities. He is the author of several studies on Czech and Slovak Marxist philosophy and the theory of history, and editor of Karl Korsch's *Marxism and Philosophy* (in Czech). Together with Jan Mervart he is co-author of *"Rehabilitate Marx!" The Czechoslovak Party Intelligentsia and Post-Stalinist Modernity* (University of Pittsburgh Press, 2025).