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Why we should remember the Soviet Information Age?

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The work of memory is demanding. This is particularly true when looking back at the computer-related technological aspirations of the Soviet Union, the geopolitical juggernaut that disappeared three decades ago. Unlike the famous successes, such as the atomic and space programs, Soviet computing evokes a double failure: scarce hardware and a limited network infrastructure. Moreover, motivation alone is insufficient to fully appreciate the history of Soviet computing beyond enumerating technological developments. Our very notions about what could be understood as a computer, what the main challenges were in the communication between man and machine, and what the hopes and fears of Soviet people were, are too often misleading. Remembering the Soviet version of the information age requires a synergy between motivation and a leap of the imagination. But the work of memory is also rewarding. At stake is restoring not simply a national history—one among many others—but also a counter-narrative to the alleged digital triumphs of capitalism.

The first step in remembering the Soviet information age is to suspend the received notions on the inevitable implosion of socialism as a breakdown of the planned economy. The reason is simple—no one expected the events of 1991 to take place; on the contrary, automation and digital transformation were perceived as the main items on the future-oriented agenda of the late Soviet Union. The second step is to break the association with technical backwardness, or the computer gap, and to acknowledge the role of software. But the last step is the least intuitive: embracing the multiplicity of experiences and contradictions encompassed in the aspirations to digital socialism. The authoritarian party-state that, in the late 1970s, proclaimed to have achieved the "developed socialism" or "real existing socialism"—distinguishing it from the capitalist world—did not operate in a uniform continuum but allowed for and, sometimes non-voluntarily produced, conditions for multiplying modes of the Soviet ways of digital existence. The notion of the socialist political subject, the entangled geography of technological modernity, and the alternative materiality of digitalization form three analytical axes that enable the reinterpretation of the history of Soviet computing.

However, imagination knows no end—it stocks up on details. The case under scrutiny here—highlighting the goals of personal transformation that would not be subservient to an individual possession of devices—is that of the Soviet computer literacy campaign of the 1980s. Initiated in the late 1970s, it came into public existence with the Central Committee's resolution appearing in *Pravda* on March 29 1985.[1] Although relatively brief, ending in 1991, the campaign encapsulated the aspirations, singularities, and contradictions of the Soviet information age.

For some, the computer literacy campaign became synonymous with the absurdity of the Soviet system: because the state was slow to supply educational computers to schools when the reform was introduced on September 1 1985, jokes were made domestically about the futility of learning to ride a bike without the bicycle or learning to swim without water. One influential

American observer pointed out that the campaign's very notion of computer literacy as rooted in algorithmic reasoning and programming skills was misplaced and the Soviets would be better off learning from the more technologically advanced West:

> Through the experiments gained from thousands of different ad hoc programs of introducing personal computers into schools over the last ten years...we now know that computer literacy is not-knowing how to program. It is not-understanding how a computer works. It is not-knowing about bits and bytes and flip-flops and gates. We know that true computer literacy means having the skills to use advanced application programs such as word processing and spreadsheet systems.[2]

Back in the 1980s, such criticisms held a lot of sway. Indeed, the application-based usage of the computer prevailed. Yet, today, "we now know" these optimistic words describing the interface-based information society seem ironic at best.

Unlike the critics of the 1980s, we have observed several generations of digital natives grow into algorithmically naive users: consumers turned products. If anything, when compared to the intellectual agenda of the movement for computational thinking gaining traction in elite Western institutions of learning since the 2000s, the Soviet emphasis on the mind and not on the device seems visionary, not backward. "First humans compute. Second, people can learn computational thinking without a machine", affirmed one of the movement's leaders, Jeannette Wing.[3] Yet, both interpretations of the Soviet computer literacy reform—either as a symbol of technological backwardness or as the unrecognized prophecy—are more limiting than fruitful. As one astute observer of the reforms noted at the time of their implementation, their most salient feature was an inclusive debate about digital technology and Soviet generations. In this sense, the key benefit of remembering the meaning of the Soviet computer literacy campaign is not in drawing direct lessons on how to solve the problems of digital capitalism. We can, however, appreciate the demonstration that today's technopolitical outcomes are not determined by any inherent characteristics of digital technology; we can gauge the information age we want for our children via a scenario featuring a different form of society—neither backward nor visionary—in times of transformation.

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To understand the computer literacy campaign as a site of debate is to listen to the voices of its participants. In fact, the compulsory new subject, "The basics of informatics and computational technology", introduced into Soviet schools in the fall of 1985, was not met with widespread enthusiasm. By the end of the school year, a group of ninth-grade students from the middle school No. 11 in Khabarovsk, a major city in the Russian Far East, was desperate enough to pen a letter of complaint to the academician Andrei Ershov, the initiator and the public face of the reform. Concerns with the lack of access to the computers themselves was a typical feature of the mass of correspondence received by Ershov's team dealing with educational informatics and localized at the Novosibirsk Scientific Center. Most such letters were special requests used to game the Soviet system of centralized allocation of resources. The letter from the Khabarovsk students is different, as their concern with the absence of the computer transformed into a bold critique of the content of the course. But even more ambitiously, the letter challenged the core value of the computer literacy program, its universalism. The schoolchildren suggested that there should be specialized classes for those who have a professional interest, instead of wasting everybody's time by making it required across the board.[4]

However, the compulsory character of the course was not simply a feature of a centralized educational system. Part and parcel of the transformative aspirations of the reform was not professionalization but the loftier goal of bringing up a novel type of socialist citizen. The metaphor of "programming—the second

literacy" was at the core of the universalizing goals underlying "the basics of informatics." Ershov coined it as a title of his 1981 keynote address at the 3rd World Conference on Computer Education held in Lausanne, Switzerland. Although delivered in an international setting reflecting Ershov's status as an active and respected member of the transnational community of computer scientists, the agenda of the talk relied on a creative adaptation of Marxist notions and communist vocabulary. While the reference to the early Soviet literacy campaign is an obvious source of inspiration for the metaphor, the connections to Soviet ideology are deeper. In particular, the moral dimension of his broad description of the second literacy, as "not only the ability to write computer instructions, but also a way to bring up a man who is resolute and prudent at the same time" was dependent on a criticism of the bourgeois self, disengaged from social action to an isolation of abstract thinking.[5] Ershov's vision of the universality of programming was grounded in a naturalizing ontology of information postulating the computer as a self-actualization device, amplifying humankind's innate capacity to goal-oriented action. This idea of universal programming literacy was conceived not in a narrow reading as a skill that would subvert professional know-how, but, on the contrary, as the highest professional aspiration to defuse the role of mediation between human and machine. According to this perspective, the ultimate expression of the power to actively engage in the world by transforming abstractions into actions was not localized in the device. This power resided rather in the human mind and its capacity to bring machines to life.

The dialog between the Khabarovsk youths and the academician highlights how these ideals translated into particular arrangements across vast Soviet spaces. Despite his elevated status and tremendous workload, the academician found time to write back. His personable letter is anything but condescending: it identifies the problem and indicates sources of support. Ershov emphasizes that it is wrong to ascribe the students' difficulties to the absence of the machine. "The teacher may have pity on you", writes Ershov in a flight of poetical animism, "but the machine has no pity, it will remain an unresponsive piece of metal. Without the algorithm, without a plan, there is no point in sitting in front of the computer."[6] Adopting the problem-solving attitude advized by Ershov entailed concerted actions. The resources indicated in his letter illustrate how Soviet centralization came hand in hand with bottom-up action. Collectivism was one key mechanism. As the students in question wrote collectively, Ershov also responds to an interlocutor that is not an individual but a collective. This collective is in fact the first resource that Ershov draws attention to. As there must be at least several highly achieving students among them, implied by the letter, the solution he proposes is for them to learn together. Komsomol obligation is a format for institutionalizing such mutual help and obtaining infrastructural resources at school. On the other hand, Ershov also encourages them to look for computer time elsewhere. No less essential than collectivism were the Soviet patronage networks. Ershov points to industrial and scientific computer centers of a large city such as Khabarovsk and that the local administration of the party-state is mandated to help. In practice, many urban settlements were operated as company towns and industrial enterprizes patronized local learning establishments.

The geographic entanglement transpiring in this epistolary exchange, connecting what might appear to be two remote points—Novosibirsk and Khabarovsk—with the Moscow-mandated campaign extends beyond the tensions of centrifugal and centripetal dynamics. The letter also reveals the infrastructural divide between urban and non-urban and the interdependencies between digital and environmental dimensions as characteristic of both the socialist and capitalist versions of modernities. To stress the possibilities open to urban youths, Ershov evokes the difficulties and creative solutions found by enthusiastic students and teachers in the remote Northern settlements. In fact, in the late Soviet context, both the remote North and the Far East became the bearers of futuristic potentiality. More prosaically, they were sources of hard currency exports. Ershov's idealistic depiction of the Northern regions as a frontier of computer literacy was not a fiction. Retracing the reference in his correspondence reveals the campaign's dependency on industrialization associated

with the extraction of natural resources: while waiting for the state to supply the specialized classrooms it had promized, schoolchildren in the Tumen region were gifted with the programmable calculator popular in the Soviet oil and gas industry.[7] The significance of this particular instance is beyond anecdotal. If the ideal of algorithmic thinking underlying the computer literacy reform was nurtured within the transnational community of computer scientists, its material realization was coupled with the global carbon economy. The delays in the Soviet government's capacity to supply the hardware considered necessary to raize the new generation of Soviet citizens were due to the 1986 oil price collapse.

By the late 1980s, the Soviet-produced machines finally reached classrooms, but by that time the party-state itself faced a major crisis and its last attempts at social engineering, such as the computer literacy campaign, were discredited. Ershov succumbed to cancer at the end of 1988, and the campaign lost its most authoritative expert and tireless promoter. On the level of the general public, the abstract goal of algorithmic thinking lost its luster in the face of the alluring new micros and PCs imported from the West, even if few could afford them.

The unexpected twist to this rise-and-fall storyline is that, in a sense, both Ershov and his young critics turned out to be right. The reform did not succeed in inculcating a universal algorithmic mindedness. But the broader ecology of state support for the computer literacy campaign nurtured the generation of future entrepreneurs of the post-Soviet digital infrastructure and commerce. Along with his letter, Ershov sent a couple of issues of the popular journal *Kvant* with his own and his colleague's publications on programming. These were but a drop in the ocean of popular scientific and technical literature on the subject. Moreover, the journals that published materials combining education with entertainment were devoured hot off the press by the community of avid gamers. The games in question were not necessarily computer games, however. Another digital device with a very limited display capacity, the programmable calculator, led to a creative fusion of textual and digital imaginaries. Unlike the Soviet-made micros, such calculators were produced by the millions and sold at affordable prices. Diffused across the country far beyond their intended consumer base of scientists and engineers, these calculators gave rize to a youth subculture of calculator gamers and hackers, as most non-scientific activities involved exploring the limits of hardware and producers' specifications. The late Soviet digital age was thus not only an aspiration of the Soviet experts to disseminate their professional ideals in a top-down manner, but was also a bottom-up movement connecting multiple communities and distant locations. Although the system supporting the infrastructures for these communities disappeared in the years following 1991, the strengths of the Russian IT sector were the strengths of its manpower as employed in the face of digital scarcity, and its playfulness with both software and hardware limitations. These human-centerd repercussions of the reform reached across political ruptures and borders: facing economic hardships, the generation that matured in the 1990s often saw their versatile skills as an opportunity for emigration.

With capitalism remaining as the only option for the global political economy, the source of our motivation to recover these forgotten modes of the digital and the algorithmic is conflicted. It comes from a sense of bewilderment split between the complacency generated by the convenience of digital technologies and a

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growing anxiety as we learn of its price, namely that our data constantly feeds the surveillance machinery of Big Tech. Even as epithets of "digital" and "smart" become associated with a planet-wide promize of sustainability, social divides are already amplified by the interdependency of the online and offline words. The Covid-19 pandemic, propelling digital infrastructures to centerstage, has exposed the digital divide as a calculable factor of risk. A critical challenge to capitalism, the disappeared socialist past does not harbor solutions to our problems. Nevertheless, the socialist humanistic aspirations to equality, self-realization, and solidarity alone offer a reason to persist in envisioning the unfamiliar world of the Soviet Information Age. Remembering is a reminder that an alternative history bears the potential of alternative designs.

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The essay is based on the following publications by the author: "Right to be Wrong: Gaming, Science Fiction, and Cybernetic Imaginary." *Kon-tiki: A Path to the Earth* (1985-1986), *Kritika* 20.4 (2019): 755-81; "Thinking Algorithmically: From Cold War Computer Science to the Socialist Information Culture." *Historical Studies in the Natural Sciences* 49.2 (2019): 194-225; "'The Man with a Micro-calculator': Digital Modernity and Late Soviet Computing Practices." *Exploring Early Digital: Communities and Practices*. Ed. Thomas Haigh. Cham: Springer, 2019: 179-200; "Before the Collapse: The Soviet Programming Cultures," in *From Russia with Code: Russian Computer Scientists Abroad*. Ed. Mario Biagioli and Vincent Lepinay. Durham: Duke University Press, 2019: 39-58; "'The Computer Does Not Believe in Tears:' Programming, Professionalization and Gendering of Authority." *Kritika* 18.4 (2017): 709-739.

1 *Pravda*, 29 March 1985.
2 Ershov Archive: Ed Fredkin. "Computation and Social Systems." 1985. Web. http://ershov.iis.nsk.su/node/792511
3 Jeanette M. Wing. "Computational Thinking's Influence on Research and Education for All." *Italian Journal of Educational Technology* 25.2 (2017): 7-14; also see: Jeanette M. Wing, 'Computational Thinking." *CACM* 49.3 (2006): 33-35.
4 Ershov Archive: http://ershov-arc.iis.nsk.su/archive/eaindex.asp?pplid=3269&did=8699
5 Ershov Archive: http://ershov.iis.nsk.su/ru/second_literacy/article
6 Ershov Archive: http://ershov-arc.iis.nsk.su/archive/eaindex.asp?did=8699
7 Ershov Archive: http://ershov-arc.iis.nsk.su/archive/eaindex.asp?did=7005