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Research article

Nikolai Chernyshevsky's Perpetuum Mobile – From Technical to Social Utopia

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Abstract

Nikolai Gavrilovich Chernyshevsky, known as the author of the utopian novel *What Is to Be Done?* and his dissertation on the *Aesthetic Attitude of Art to Reality*, worked on a perpetual motion machine project in his youth. He left notes on the project in the diaries he kept from 1848 to 1853. The article analyzes the text of the diaries in order to reconstruct the inventor's way of thinking, trace how his attitude toward the "machine" changed, and observe how those around him reacted to his idea. Chernyshevsky's mature publicist works assign the same role to technical innovations in improving the social order that the perpetual motion machine had in his youthful dreams. By carefully examining the history of the device's creation, we were able to clarify what features of the professional intelligentsia's perception of technology influenced the formation of his techno social utopian ideas.

Keywords: Nicolai Chernyshevsky, Diaries, *Perpetuum mobile*, Intelligentsia, Utopia, Social history of science and technology.

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Научная статья

Вечный двигатель Николая Чернышевского – От технической к социальной утопии

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Аннотация
Николай Гаврилович Чернышевский известный как автор утопического романа “Что делать?” и диссертации об “Эстетическом отношении искусства к действительности”, в юношеские годы работал над проектом вечного двигателя. В дневниках, которые он вел с 1848 по 1853 год, он оставил заметки о проекте. В статье проводится анализ текста дневников с целью восстановить ход мысли изобретателя, проследить как менялось его отношение к “машине”, и пронаблюдать, как реагировали на его идею окружающие. Зрелые публицистические работы Н. Г. Чернышевского отводят техническим новинкам в усовершенствовании общественного устройства ту же роль, которая в юношеских мечтах доставалась вечному двигателю. При пристальном рассмотрении истории создания устройства, нам удалось прояснить, какие особенности восприятия техники профессиональной интеллигенцией повлияли на формирование его техносоциальных утопических идей.

Ключевые слова: Н. Г. Чернышевский, Дневники, Вечный двигатель, Интеллигенция, Утопия, Социальная история науки и техники

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Nikolai Chernyshevsky was a leading figure in Russian journalism during the 1860s, leaving his mark on literature with the utopian novel *What Is to Be Done?* and his doctoral thesis *Aesthetic Relations of Art to Reality*. According to historian Nikolai Kostomarov, in the late 1850s and early 1860s, Chernyshevsky "became an idol of the youth in St. Petersburg […], even respectable people who did not agree with his extremes treated him with respect" (Kostomarov, 1922, p. 332).

It is important to highlight some of these extremes, which shaped Chernyshevsky's intellectual profile. He rejected the concept of God as a meaningless abstraction, advocated for unlimited human freedom without any form of authority, and showed a disregard for public order and propriety. During his doctoral thesis presentation in 1855 at St. Petersburg University, he criticized prevailing ideas on poetry and art. Despite his radical views, Chernyshevsky had a talent for winning people over. He first attracted followers while lecturing on literature at a gymnasium in his native Saratov after graduating from the university. Later, he spread his ideas as a columnist for *Sovremennik*, a magazine popular among the growing middle class, the intelligentsia. The journal flourished under his leadership after he became its editor in 1856. However, his arrest in 1862 led to complete intellectual isolation. For the rest of his life, he was unable to speak out publicly. The authorities, considering his texts a serious challenge to the status quo, sought to limit his influence by exiling him to Siberia for over 20 years.

While modern readers may find Chernyshevsky's writings verbose and inconsistent, filled with obvious truths and unfounded assertions (Paperno, 1988, p. 25), his contemporaries found his ideas compelling. It is worth revisiting his intellectual legacy not only within the history of literature and critical thought but also as a reflection of the changing intellectual landscape of the emerging Russian middle class and professional intelligentsia during the industrialization of the mid-19th century. This connection is particularly evident in his youthful project of a perpetual motion machine.

Chernyshevsky's diaries from 1848 to 1853 reveal his attempt to design and build such a machine, a working *perpetuum mobile*. The information in the diaries is fragmentary but traces the evolution of his thought and the influence of his social circle and cultural background before he chose literary forms as his primary mode of expression. His interest in perpetual motion began at the Saratov Seminary and gained momentum at St. Petersburg University. A pivotal moment came in November 1848 when he attended lectures at the History and Philology Department. On his own initiative, he transcribed and prepared for publication notes of the lectures of Ismail Sreznevsky on the early history of Russian literature. Already a devoted reader of *Sovremennik*, he obtained copies from friends or public libraries. In the magazine's November issue he encountered a note about a newly designed British device called a "thermometrograph" which recorded temperature changes mechanically. His diary records:

> I read about a thermometer with a clock device, which passes a piece of paper under a pencil, which moves in accordance with the changes of the thermometer; the clock is wound for a week. I had this idea for quite a long time and was constantly thinking up improvements. The main idea [of a clock device] was born, I think, about four months ago, as a result of a random thought about attaching a pencil to a mercury thermometer. (Chernyshevsky, 1939a, p. 175)

The tedious task of transcribing Professor Sreznevsky's lectures sparked his interest in a device that could mechanically record monotonous data. His fascination quickly evolved. Within three weeks, he was no longer focused on improving the recorder but was instead envisioning "his own machine." Its components were designed to rotate and immerse themselves in water: "An idea flashed through my mind to eliminate the unevenness of the weight of the water column [resulting from] different depths during rotation by arranging magnets in a certain way" (Chernyshevsky, 1939a, p. 185).

The widespread circulation of the *Encyclopedia* published by Friedrich Arnold Brockhaus and Ilya Abramovich Efron in the 1890s provides solid evidence of commonly accepted technical knowledge in Russia half a century after Chernyshevsky's diary entries. In 1892, Vasily Lermantov, a laboratory assistant at the Physics Department of St. Petersburg University, defined a perpetual motion machine as "a machine capable of not only maintaining its own motion for an indefinite period of time but also of producing useful mechanical work in addition" (Lermantov, 1892, p. 697). Although Chernyshevsky never used this term in his early diary entries, he had been contemplating such a device since December 1848.

Based on the limited details in his diary from that month, it seems that Chernyshevsky aimed to incorporate all three types of perpetual motion machines known at the time: mechanical, magnetic, and hydraulic. Mechanical perpetual motion machines typically involved a wheel rotating under the weight of unevenly distributed loads. Magnetic designs relied on continuous movement generated by attracting an oppositely poled part to the teeth of a magnetic ring. Hydraulic engines used a column of water pressing on a screw to raise water for self-replenishment (Brodyansky, 2001, p. 24). When Chernyshevsky conceived his engine, he integrated elements from all three types. This approach made his task particularly complex and challenging to realize.

During the winter of 1848–1849 the "machine" existed only as a written description, recorded solely in Nikolai's diary. The intricate complexity of the design allowed the young inventor to overlook the inherent contradictions that pointed to its practical impossibility. After a hiatus of several months, in May 1849, Nikolai resumed his studies with renewed vigor in preparation for his third-year Greek examination. Simultaneously, he revisited his project with fresh enthusiasm. His diary entry from May 22 reflects his readiness to transition from theory to practice:

> This morning, a new idea about perpetual motion came to me – the simplest one, extremely easy to implement, so much so that I am tempted to build a model myself. [...] Thank God, who gave me this idea! (Chernyshevsky, 1939a, p. 279)

The following morning, he elaborated on this "simple idea" and included a detailed drawing: "It would be best to use dense masses instead of these moving pistons, ensuring that on one side they are in water and on the other in air." According to Nikolai, the "lentil-shaped masses," the unbalanced weights of the mechanical engine, were to be immersed in a vessel of precisely the right dimensions "so that the water could not escape," functioning "as in an atmospheric railway [cableway]" (Chernyshevsky, 1939a, p. 280). Unlike a hydraulic perpetual motion machine, Nikolai's design did not rely on water moving through a screw trough. Instead, the water facilitated the movement of the

mechanical wheel by exerting pressure on the immersed section. The inertia of the wheel, supplemented by additional weights, was intended to further increase its rotation.

After further consideration, Nikolai decided to simplify the device even more. Instead of using separate "lentils on spokes" he envisioned a solid wheel:

> So, a wooden millstone [...] enters a slot in a bath, boiler, or tub with perpendicular walls. This slot is hermetically sealed to match the width and length of the belt of the circle (or semicircle) that enters it, ensuring that no water spills out—meaning it is neither wasted nor interferes with the movement of the wheel through friction. (Chernyshevsky, 1939a, p. 280)

As he refined his concept, doubts began to arise. In his diary entry for May 23, he expressed a moment of uncertainty: "What if it cannot spin!" However, he quickly dismissed this concern: "This is nonsense. It is clear that only unbelieving and ignorant people say such things." On May 22, he had thanked God for the idea of the engine; the very next day, he rejected any doubts about its feasibility, perceiving them as signs of ignorance and a lack of faith in both God and science. While he would later develop a more critical stance toward religion, in his youth the belief in God reinforced his confidence in himself, making him more determined to pursue his plan.

Vladimir Lermantov, in his encyclopedia article, made a keen observation, supported by the cumulative experience up to 1892, about the mindset of perpetual motion inventors:

> The history of invention repeats itself with self-taught individuals just as it did in the past. Faced with the complexity of their own design, they find themselves unable to grasp all the details, yet their desire for success is so strong that they resolve doubts in their favor. [...] A passionate longing for success, vague ideas, and a lack of resources to properly construct the mechanism – this pattern recurs throughout the history of almost all inventors. (Lermantov, 1892, p. 698)

Nikolai followed this familiar trajectory. As he worked through the details of his engine, he soon encountered a major obstacle: a lack of funds to build it. To circumvent this issue, he excluded the mechanically complex components of the "machine," such as spokes, lentils, and pistons with liquid. Instead, he resolved to construct the engine "in a distorted, that is, in a simplified form" (Chernyshevsky, 1939a, p. 298). His agile mind found a way to surmount this difficulty, and his optimism returned: "I do not despair of making this machine soon, because it is too simple and cannot be very expensive. It can be made for 2–3 rubles in silver – ah, if only it were possible!" (Chernyshevsky, 1939a, p. 280).

A day after successfully passing his Greek language examination, the inventor decided to entrust his idea to his university friend, Vasily Lobodovsky: "I wouldn't have blabbed if a new turn had not taken place in this idea in the course of three or four days, a turn due to which I am ready to see this machine in my hands any day now" (Chernyshevsky, 1939a, p. 282).

This "new turn" referred to the further simplification of the device. He solemnly declared: "I consider myself destined to [create] remarkable upheavals, and I consider

myself the inventor of a machine that moves by itself" (Chernyshevsky, 1939a, p. 281). A declaration to whom Vasily responded skeptically: "Firstly, this may be impossible."

Nikolai objected that it was "ridiculous" to doubt the possibility of a *perpetuum mobile*, and a heated argument ensued. In defending the validity of his idea, Nikolai articulated for the first time the social significance of the invention, presenting it as an instrument to "liberate the world" from material labor and necessity. While Vasily shared his friend's enthusiasm for improving human life, he rejected the feasibility of a perpetuum mobile and deemed such an invention unnecessary: "The world needs liberation from the moral yoke and prejudices more than from material labor and needs; it is more necessary to develop the heart, morality, and mind than to be freed from material labor" (Chernyshevsky, 1939a, p. 281).

Vasily's remark echoes the sentiment of an Orthodox preacher, emphasizing the superiority of spiritual life over material existence. Later, Nikolai characterized their dispute as "an overly serious conversation in an overly serious tone." Nevertheless, the idea of saving humanity from poverty "through machines," first articulated in this discussion, remained a fundamental belief for him in the years that followed.

On the eve of his twenty-first birthday, July 11, 1849, Nikolai reflected upon his "21 years of life" and outlined his future plans:

> In a few years I will be a journalist and a leader or one of the main figures of the left radical political group [...] and I will be married, and love my wife like my soul; my hopes in general: the destruction of the proletarian class and any kind of material need – everyone will live at least like people who receive an income of 15–20,000 rubles per year, and this will be accomplished through my machines. (Chernyshevsky, 1939a, p. 298)

While confident in achieving his individual aspirations, he acknowledged the public aspect of his vision as a more formidable challenge. His revolutionary "machine" remained a recurring theme in his reflections, standing alongside his academic pursuits, such as compiling an index for the fifteenth-century *Hypatian Codex* for his diploma thesis.

While studying Early History of Russian Literature under Izmail Sreznevsky at St. Petersburg University, Nikolai Chernyshevsky encountered another towering academic figure: the distinguished physicist and electrical engineer of German origin, Emil Lenz. Their first meeting occurred during Chernyshevsky's entrance examination, where his performance left a strong impression on the professor. As Chernyshevsky later recalled: "Lenz was pleased, said 'very good,' and asked where I was educated" (Chernyshevsky, 1949, p. 34). During his first year at the university, Nikolai mentioned in letters to his family that he occasionally attended Lenz's lectures, finding them particularly "useful." His interest in physics, though secondary to his literary studies, was shaped in part by Lenz's teaching and, crucially, by the professor's widely circulated textbook. In 1848, Lenz published a physics manual for military schools, written in Russian which was a noteworthy development since physics had traditionally been taught in German. This textbook provides valuable insight into the state of physics education in Chernyshevsky's academic milieu. The section on *Thermotechnics* includes a detailed discussion of the

Breguet thermometer, which featured a metal spring at its base, as well as experiments demonstrating its function. The thermal properties of metal springs also played a crucial role in Harrison's *thermometrograph*, another key instrument in contemporary experimental physics. These devices, which stood at the forefront of 19th-century scientific inquiry, likely influenced Chernyshevsky's own inventive aspirations.

The textbook's section on *Simple Machines* elaborates on the fundamental principles of mechanical engines and transmissions (Lenz, 1855, p. 81), offering a structured introduction to classical mechanics. Yet, conspicuously absent from both the first and second editions of Lenz's work (the latter published in 1855) is any discussion of perpetual motion. Given that the theoretical impossibility of such a device follows from the first law of thermodynamics – formulated by Julius Robert von Mayer in 1845, three years before the release of Lenz's textbook – one might have expected some acknowledgment of the topic. However, the concept of energy conservation had not yet gained universal acceptance, and Lenz deliberately avoided engaging with what was, at the time, a contentious and evolving scientific principle. Instead, his textbook was designed to present physics in a structured, lucid, and methodically conservative manner. In keeping with the conventions of the period, both editions of this highly respectable volume featured a dedication to the reigning monarch, underscoring its alignment with the prevailing intellectual conservatism of the time.

In their friendly discussion, Lobodovsky had expressed some uncertainty, stating that "building a *perpetuum mobile* seems impossible." The acting designers and mechanics, drawing from experience, were more definitive: "There is friction inside every machine, and therefore, the machine produces less work than is expended on its motion." The frictional force within the device would inevitably absorb the useful part of the energy generated (Lermantov, 1892, p. 698). The omission of this in Lenz's textbook highlights the theoretical ambiguity surrounding the idea of perpetual motion at the time of Chernyshevsky's attempt.

The Tsar's name appeared on the front page of textbooks for future Army officers, such as Lenz's textbook. At the time, discussing fundamental physics in Russian was a significant innovation. Physics was considered a foreign discipline, and university lectures on physics and other natural sciences were conducted in German, as a standardized system of Russian scientific terminology had not yet been established. Professor Lenz himself did not speak the local language and had to seek external assistance to compile the textbook. The manual employed everyday language and neologisms to explain physical laws and phenomena, using terms like "tubes," "pipes," and "points." For example, Lenz explained the operation of the first known hydraulic turbine, the "Segner wheel," as follows: "Water, pouring out of the holes in the tubes, produces pressure on the walls of the tubes opposite the holes, from which the entire device will spin around the points" (Lenz, 1855, p. 167).

A similar roughness in phrasing, characteristic of textbook language, can be observed in Chernyshevsky's diary sections on "machines." He enthusiastically embraced the trend of incorporating everyday words identified in the textbook, using his philological intuition. Terms like "circle belt," "millstone in a slot," and "equilibrium logs" appear in his work. In student notes on the engine, the artificiality of the phrasing

used to describe the construction of the imaginary device is accentuated by the fact that, unlike the textbook author, the inventor did not fully grasp the internal connections between the objects and phenomena studied in physics. The creative aspect of this perpetuum mobile project envisioned by a philology student was undoubtedly influenced by the style of Lenz's groundbreaking textbook.

In the summer of 1849, Nikolai suddenly fell ill. Concerned about his worsening condition, he decided to document "his invention just in case, so that it could not perish," and sent the manuscript to Lenz (Chernyshevsky, 1939b, p. 299). The professor's authority, coupled with the absence of perpetual motion in his influential textbook, motivated Chernyshevsky's decision.

Few theorists of perpetual motion ventured beyond theoretical descriptions to actual construction. Nikolai was spurred to take his first practical steps by a dispute with Vasily Lobodovsky on May 28, 1849. The next day, he attempted to provide tangible evidence of his correctness: "I tried to make a circle and drill it in the middle so that it would not be pulled by either side, and I looked for a way to arrange the vessel into which it should fit." The attempt was thwarted by the impossibility of "transforming [the vessel] so that the water would not leak" (Chernyshevsky, 1939a, p. 282). Two months later, on July 14, at his relatives' dacha, he revisited his experiment:

> I made a rocking shaft, put two balanced wooden blocks on its ends, made a hole in the old lagoon [...]. I put the rocking shaft there, [...] in the center of which I threaded a needle crosswise so that it would not slip, poured water, and the block of wood, which lay on the bottom and sank to it, [...] now, of course, it floated up.

The wooden block's buoyancy lifted his spirits: "The matter is so unusual that one cannot help but doubt everything that pertains to it, and the calculations on which it is based – this [the floating wooden block] made me happy" (Chernyshevsky, 1939b, p. 300).

The young man acted resourcefully, utilizing common household items: "which serve as Marya's chair and to put a cup in which they wash themselves." He was undeterred by the contradiction between the modest materials and the ambitious goal of saving humanity through his invention. He manipulated everyday objects – a needle, a wooden barrel, and a rocker – much as he played with language to describe his idea. Ultimately, financial limitations halted his efforts:

> Yes, about the machine: I cannot say that I am convinced that it is impossible; [...] but only because there are not enough funds for further experiments, I sit and keep silent, and therefore my thoughts are jammed deep into my soul, into my daily feelings. (Chernyshevsky, 1939a, p. 127)

Like many theorists of perpetual motion, he attributed his main obstacle to lack of funds rather than the first law of thermodynamics.

The next attempt to construct an engine occurred in the winter of 1853. This period was relatively carefree for the 25-year-old Chernyshevsky. He had completed his studies at the university in 1850. Following unsuccessful attempts to secure a position at the military gymnasium in St. Petersburg, he reluctantly accepted a senior teaching position

at a gymnasium in Saratov, located next to his parents' home, where his cousins also studied.

In April 1851, following the advice of Professor Sreznevsky, he met the historian Nikolai Kostomarov. Chernyshevsky later recalled, “My acquaintance with him was the acquaintance with a man who loved to talk about scientific and general questions, with a learned man and one with an honest way of thinking” (Chernyshevsky, 1939e, p. 776). Kostomarov, an assistant professor at Kiev University, had organized an illegal group of political activists advocating for a federation of Slavic peoples based on class equality and religious freedom. He was soon captured and exiled to Saratov. That year, at age 36, he served as a translator for the Provincial Government (Kostomarov, 1922, p. 210). In his memoirs, he noted a shift in his intellectual interests in the spring of 1851: he “withdrew from studying history and immersed himself in reading physical and astronomical works” (Kostomarov, 1922, p. 212). Chernyshevsky, in his witty manner, used to mock his new friend’s passion for astronomy and did not share his pan-Slavic ideas. Chernyshevsky was younger than Kostomarov and held a lower position at the university, but he still teased his comrade. The contention did not prevent them from seeing each other “very often; sometimes for months every day, sitting together almost every day” (Chernyshevsky, 1939e, p. 776).

The intellectual rivalry and ample leisure time ignited their perpetual motion machine project. Chernyshevsky’s diary notes that on January 9, 1853 they planned to order a valve for the engine (Chernyshevsky, 1939c, p. 407). The valve was crucial to prevent the overflow of water needed to displace the wooden parts and maintain the rotational movement of the wheel on which these parts would be attached. Both young men, driven by their energy and ambition, were engrossed in the “tests” of the “self-moving machine.” They were temporarily away from their academic environment, were finding solace in their project, which served as an outlet for their energies.

With stable incomes and no families’ responsibilities, financial constraints were no longer an obstacle to building the engine. They decided to order parts from a mechanical workshop, but in order to make an order, they needed to present their designs and calculations to professional mechanicians. Chernyshevsky had still kept the description of the “machine” he had prepared for Professor Lenz in the summer of 1849. However, upon reviewing his earlier notes, Chernyshevsky wrote: “But when I finally thought about it, I became convinced that the machine would not work with such a device (a wheel with lenticular masses), because the water pressure on the incoming mass would be greater than the force of the wheel” (Chernyshevsky, 1939c, 407). At that moment, he “decided to destroy all traces of his mistakes” and “tore up the letter to the Academy of Sciences, the manuscript he had sent to Lenz, […] all the drawings and calculations” (p. 408). This marked a moment of emerging maturity, certainly influenced by his discussions with Kostomarov.

Shortly afterward, at the end of January 1853, he met Olga Vasilyeva, and she agreed to became his wife just three months later. They moved to St. Petersburg, where Chernyshevsky began writing articles and notes for periodicals such as *Otechestvennye Zapiski*, *Moda*, and *Sankt-Peterburgskie Vedomosti*. Chernyshevsky. His collaboration with Nikolai Nekrasov, the publisher of *Sovremennik*, led to an increase in

his contributions to magazines. In August 1856, Nekrasov handed over the editorial rights of *Sovremennik* to Chernyshevsky, and assigned him to manage the "Criticism and Bibliography" section (Chernyshevskaya, 1953, p. 124). This new role allowed the 28-year-old writer to finally overcome his chronic financial struggles and focus on his writing career, leaving behind his experiments with machines and daily diary entries.

There is no evidence that Chernyshevsky attempted to build a perpetual motion machine again. Other intellectuals in his circle, such as Nikolai Dobrolubov or Alexander Pypin, were also dependent on their income from published work. However, while Dobrolubov and Pypin used their free time for hobbies like lathe work or metalworking, Chernyshevsky did not. Although he abandoned the technical aspect of his project, he continued developing the concept in his journalistic writings. In these, he still advocated for saving people from poverty through the increased use of engines, a theme which also appears in "The Fourth Dream of Vera Pavlovna" in his novel *What Is to Be Done?*

The belief that new technologies could resolve deep-seated social issues is a persistent paradigm in modernist thought, later labeled "technological determinism." Langdon Winner, in his seminal article *Do Artifacts Have Politics*, defines this concept as "the idea that technology develops as the sole result of an internal dynamic, and then, unmediated by any other influence, molds society to fit its pattern" (Winner, 1980, p. 122). We argue that Chernyshevsky in his diaries and letters offer valuable insights into his own vision of technological determinism.

This optimism regarding technological progress is evident in the letters Chernyshevsky wrote to his father. In 1848, shortly after arriving in St. Petersburg for his university studies, he wrote excitedly to his relatives in Saratov about the railway and St. Isaac's Cathedral – both considered engineering marvels of their time. Years later, in his exile memoirs, Chernyshevsky reflected on his family's fascination with technical innovations. However, he also noted a paradox: this enthusiasm often coexisted with rigid, conservative thinking. This contradiction, he observed, hindered social progress:

> As far as I have seen, among the people with whom I grew up – old and young – new customs of a substantial nature were accepted easily and quickly […]. But changes consisting mostly of words alone are another matter. Common sense and practice do not show that they make life more convenient, easier, or more fun. (Chernyshevsky, 1939d, p. 575)

While excitement about technological advances was widespread, its intensity, particularly among educated individuals, was perhaps unique to Russia in the latter half of the 19th century. The uneven economic development across regions and the diversity of social strata contributed to this public fascination with technical innovations.

Winner, in his discussion of technological determinism, highlights how technical systems shape social organization: "The thing we call 'technologies' are ways of building order in our world. Many technical devices and systems important in everyday life contain possibilities for many different ways of ordering human activity" (Winner, 1980, p. 127). In mid-19th-century Russia, proponents of technological determinism, like Chernyshevsky, combined their admiration for scientific advancements with sharp critiques of the "irrational" socio-economic order. In 1859, four years after his earlier

reflections, Chernyshevsky (1859/1981) published a scathing article in the satirical magazine *Svistok*, titled *An Experiment in Discoveries and Inventions*, under the pseudonym "Ethiop." This piece was a response to new "temporary rules" for universities issued by Minister of Public Education Evfimiy Putyatin, which effectively increased tuition costs and restricted access for low-income students. The students revolted, and Chernyshevsky's article, brimming with sarcasm, ridiculed the academic elite for failing to foster innovation. His satire targeted prominent figures such as Sergey Solovyov, Boris Chicherin, and Ivan Babst. An unpublished draft of the article also mentioned Emil Lenz whom Chernyshevsky had once admired, mocking his opposition to women attending university lectures. Though Lenz's name was later removed from the final version, its initial inclusion underscores Chernyshevsky's growing disillusionment with his former intellectual role models.

In his characteristic style, Chernyshevsky did not spare himself from mockery. He humorously recounted his youthful attempts at invention, including an ill-fated experiment to create a thermometer: "A series of anticipations of my fame began in my earliest youth when I invented a metal thermometer; three months later I read that this invention had been made much earlier than by me by Breguet" (Chernyshevsky, 1981).

The desire to rationalize the socio-economic order was a prevailing theme in Russian public discourse during the early years of Alexander II's reign. In June 1856, Ivan Babst, a professor of political economy at Kazan University, delivered a speech titled "On Some Conditions That Contribute to the Increase of National Capital." He argued that "a people in which one class is suppressed is like a man with a wounded leg" (Babst, 1857, p. 33). Addressing poverty, Babst advocated for the dissemination of rational economic concepts, asserting that progress required a thorough examination of national wealth distribution, productive forces, and circulation of capital (p. 11). His proposed remedies included capitalization, credit expansion, and improved transportation infrastructure (p. 43). At the same time, Chernyshevsky was heading the "Criticism and Bibliography" department at *Sovremennik* where he published articles on political economy, drawing on his translation of John Stuart Mill's *Principles of Political Economy*. One such article, *Capital and Labor* (1860), argued that the rational organization of workers' economic life should be paired with a fair distribution of labor's results. His economic model was rooted in the development of productive forces through scientific knowledge and technological progress. Yet, his framework remained firmly within technological determinism, assuming that these processes would unfold "autonomously" from social and political factors (Kologrivov & Kuzminov, 1988, p. 266).

Ivan Babst's approach to social inequality was pragmatic, emphasizing economic rationalization and profit accumulation, while Chernyshevsky leaned toward a radical egalitarianism rooted in socialist ideals. However, his ideas remained largely theoretical, reflecting a reluctance to offer concrete, actionable solutions. By the next generation, Russian intellectuals had accumulated both practical and theoretical knowledge from decades of industrialization. Scholars in technical and natural sciences generally abandoned the pursuit of perpetual motion, working instead to educate the public on its impossibility. Figures such as Flegont Danilov, a socialist engineer, delivered lectures to

workers in 1924, explicitly dismissing perpetual motion theories (Danilov, 1924a, p. 2). In his book on invention, Danilov urged workers to focus on understanding the mechanisms they used daily rather than clinging to the romanticized notion of "divine inspiration" that Chernyshevsky had once entertained. Danilov's views aligned with a stronger belief in technological determinism, seeing technological advancements as not merely tools for overcoming natural forces but as direct instruments for addressing socio-economic disparities (Danilov, 1924b, p. 1).

Despite its impracticality, Chernyshevsky's perpetual motion project became part of the intellectual tradition that shaped Russian thought. Soviet historiography, with its ideological investment in Chernyshevsky as a revolutionary figure, contributed to the mythologization of his ideas. In her influential study Irina Paperno (1988) deconstructs this Soviet tradition, acknowledging Chernyshevsky's impact while critically reexamining his heroization. This article seeks to extend her argument by tracing the multiple intellectual currents that intersect in Chernyshevsky's work, revealing how his seemingly radical and impractical ideas were deeply embedded in the technological discourse of his era. His success as a journalist and public intellectual stemmed not only from his theoretical contributions but also from his keen ability to articulate the aspirations and anxieties already present in Russian society. His work stands as a testament to his intuition, creativity, and unwavering audacity.

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