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Betrothal and Betrayal: The Soviet Translation of Norbert Wiener's Early Cybernetics

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"Traduttore, traditore."

(*Every translation is a betrayal*, or *the translator is a traitor.* ~ Italian)

In the wake of World War II, the brilliant mathematician and polyglot Norbert Wiener formalized first-order cybernetics as the study of "information communication and control." [1] Although later discovered that the term had already been used in the 19th century, Wiener coined *cybernetics* in 1947 from the Greek for "steersman" (a predecessor to the English word *governor*) to signify a discipline concerned with "the problems centering about communication, control and statistical mechanics, whether in the machine or in living tissues" (Wiener, 1961, p. 16). By the late 1950s, cybernetics had blossomed on both sides of the Atlantic into state-sponsored projects developing mainframe computers, wartime robots, satellite surveillance projects, the Russian spaceship Mir, and even Reagan's Star Wars project. In each of these early attempts to graft human action on to grids as well as to bind mechanism to human intelligence, we see the essence of early Cold War cybernetics: the blending of human, mechanical, and natural phenomena on a common canvas. During World War II, Wiener was pulled between the desire to publicize his work on behaviorist probability and the desire to reserve it only for the few mathematicians that could understand it. On one hand, as he wrote at the end of his key work, *Cybernetics*, "The best we can do is to see that a large public understands … this work" (*ibid*., 29). On the other hand, in his mind the inscrutable abstractions of mathematical theory allowed him and his colleagues "the advantage of looking down on [their] subjects from the cold heights of eternity and ubiquity." That is, Wiener posited that an omnivorously intellectual scientist in a metadiscipline of math could somehow observe the world without influencing his (and invariably *his*) observations. According to this belief, first-order cybernetics observations somehow did not run the risk of becoming "an artifact of [their] own creation" (*ibid*., 164). With the natural scientist as steersman, his work promised to help centralized organizations such as bully states and military industries navigate, simplify, and unify the noise, chaos, and multiple meanings associated with transatlantic wartime politics.

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However, discredited by nearly every academic since Heisenberg, Wiener's dream of a natural science, capable of converting all the shades of behavior into a common language of information packets, prefaces the Cold War tragedy of first-order, or early, cybernetics. (Second-order cybernetics, which incorporates the scientist as an actor within her information system model, still flourishes in much of the former Soviet Union today.) The promise of objectivity made cybernetics an ideal and ironic fit with the closed world of Cold War academics, for the scientific hope for objective truth (paired with its obvious antithesis: falsehood) readily avails itself for hijacking into a binary vocabulary of black and white, good and bad, East and West. This article investigates these and other ironies of Wiener as an actor within the information system of the Cold War.

In 1942, the Applied Mathematics Panel (AMP) within the National Defense Research Committee was formed as a clearing house for military projects. The panel employed world-class mathematicians such as John von Neumann, Richard Courant, Garrett Birkhoff, Oswald Veblen, and Norbert Wiener to work on the question of how the few can control the many — a concern central to the World War I and II experience with propaganda and weapons of mass destruction. Engineer Claude Shannon, neuropsychiatrist Warren McCulloch, neurobiologist Arturo Rosenblueth, polymathic genius Walter Pitts, and many others joined Wiener in developing the cybernetics, and von Neumann in developing information theory. Later, at the postwar Macy conferences (1946-1953) on cybernetics, these theoretical and natural scientists were joined by representatives from the human sciences such as Lawrence K. Frank (social science), Margaret Mead (anthropology), Gregory Bateson (social science), and later Paul Lazarsfeld (sociology), Kurt Lewin (psychology), and Roman Jakobson (linguistics) (Heims, p. 12). At these gatherings, some of the world's top minds gathered to study and confront the message — be it encased in a warhead or an advertisement — as the unit for controlling and communicating. As a direct response to a quarter decade of wartime messages, the cybernetics group meant to help, as David Mindell argues, "recast military control in a civilian mold," to give control to the many (Gerovitch, 2002, p. 54). If war was the product of aggravated entropy and information loss at the hands of the military, then a regulated informational environment would be a peaceful one. So was the hope at least.

The AMP Group asked key questions of anti-aircraft gunnery as part of a larger project to improve rocket, bombing, and gunfire accuracy: namely, how can gunner and gun account for the unpredictability of an approaching enemy aircraft? (Edwards, 1996, pp. 113-146). Stemming from his mathematical model of uncontrolled motion of minute particles immersed in fluid — which is still known in Brownian motion studies as the "Wiener model" — Wiener derived a general theory of information control that led to a central supposition of cybernetics (Galison, 1994, pp 228-266): that under the certain intense circumstances of battle, the enemy pilot, ally gunner, and ally bullet would all respond more or less predictably (Wiener, 1954, pp 61-63). That is, at near instantaneous intervals, human reaction on the battlefield becomes as predictable, even mechanical, as a bullet's behavior. This central insight made it possible to deduce response patterns in battle and thus, to control for some of the stochastic chaos of war by accounting and controlling for all behavior — be it human, machine, or natural — as a probabilistic problem.

Probability reduces decision errors resulting from inaccurate assessments of an environment. Its power lies in letting a mathematician know how much she does not know, or more specifically, how likely it is that one observation will apply to another. The expansive self-conceptualization of the metadiscipline as a bringer of peace depends on this probabilistic turn, as probability makes all behavior calculable and subsequently animates a statistical equivalent for a state of harmony and peace, or "information homeostatis." This fundamental vision — with science as the steersman ready to navigate the world out of chaos — underpins the historical resonance of cybernetics during the World and Cold Wars. Although employed to control war, Wiener meant it to usher in peace. With a new behavioral calculus in hand, the dance of death between gunner and aircraft became a matter of calculation.

With mathematics as the common language, the interdisciplinary science subsumed a wide range of keywords and fields. Consider a few in passing: *information*, *signal*, and *noise* from communication engineering, *feedback* and *control* from control engineering, *reflex* and *homeostasis* (again, a near synonym for *peace* in social contexts) from physiology, *purpose* and *behavior* from psychology, *entropy* and *order* from thermodynamics, *teleology* from philosophy, and *extrapolation* from mathematics. These and other terms united for the first time under Wiener's tutelage into a full-service discipline capable of describing human, machine, and natural behavior into a common metadiscipline. Protein-based genetic code transmission, heredity, fertilized eggs — all were interpreted as integrated control systems of feedback loops and control signals. The field was a metadiscipline, a Foucauldian "episteme," that bounded with "punctuated leaps" from the study of matter, to energy, to information (Kay, p. 84). With the publication of Wiener's popular summary of cybernetics, *The Human Use of Human Beings*, American scholars across the board — from neurology, to endocrinology, biology, political science, economics, anthropology, and linguistics, among others — turned enthusiastically to the new metadiscipline and harbinger of peace.

To the dismay of Wiener and his pacifist peers, the military investment was high and the theories fit military applications perfectly. Their pacifist work tended to end up, Wiener dismayed, "in the hands of the most unscrupulous" (Wiener, 1961, p. 29). In *Cybernetics,* Wiener detested "the large and the lavish" State institutions, passing strict sentence on cumbersome governments: "Like the wolf pack … the State is stupider than most of its components" (Wiener, 1961, p. 162). Yet while ideally developed within small, sharing, and open groups of researchers such as he enjoyed at MIT and Columbia — the cybernetics group work found support at the behest of the military. His autobiography, *I am a Mathematician* (1964), novel *The Tempter*, and the conclusion of *The Human Use of Human Beings* each resonate with a deep disappointment with the formal successes of his cybernetics projects and his personal failures as a pacifist. He writes "There is no homeostasis [read: peace] whatsoever. We are involved in the business cycle's boom and failure, in the successions of dictatorship and revolution, in the wars which everyone loses, which are so real a feature of modern times" (Wiener, 1961, p. 161).

My analysis of Wiener's pessimism is based on an extension and gentle correction of Geof Bowker's theory of cybernetics universality (1993) — namely, a simple and under-explored assertion: cybernetics can only be as universal as it is international. While Bowker grounds his understanding of cybernetics universality in its capacity to content-shift and pirate freely from other disciplines, I look to the context of one pair of articles in 1955 as an analytical lens for focusing on the Cold War as an international information environment itself. Without the international context, historical analysis fails to live up to the cybernetics ethic: to consider the other side as one's own.

Although the accommodating character of cybernetics is easily understood — mathematics lends itself to a wide range of applications — too little attention has been paid to its internationalizing nature. This article investigates how the work of Norbert Wiener was translated into Soviet academia (1955) as an analytical lens for focusing and trying the ironies of early cybernetics' international character. I treat the first two articles in the Soviet academic press to cover Wiener's works as a kind of conceptual "translation" — by which I mean less a literal translation of his written works into Russian equivalents than the assimilation of his work intellectually and ideologically into Soviet academic and military institutions. In order to have his work translated into the Soviet research literature, Wiener entered, if unwittingly, into a negotiated compromise, a kind of Faustian bargain of part cooperation and part cooptation, part transatlantic betrothal of scientific minds, part betrayal of ideological binaries that supported their livelihood. His personal relationship with the Soviets simultaneously fulfilled the accommodationist nature and underminded the pacifist purpose of cybernetics. As the article's epigraph illustrates, meaning becomes multiple in translation.

In the following analysis, I first treat the text that was widely thought to introduce cybernetics into the American imagination: Norbert Wiener's *Cybernetics: or Control and Communication in the Animal and the Machine* (1948). Then I read the first two Soviet articles to ever treat cybernetics in a positive light, which appear side-by-side in the July-August 1955 edition of *Questions of Philosophy* (*Voprosi Filosophy*), easily the trend-setting Soviet academic journal of its time. The first is an original articulation of a Soviet cybernetics discourse, "The Main Features of Cybernetics" ("Osnovnye cherty kibernetiki") by Sergei Sobolev, Anatolii Kitov, and Aleksei Liapunov and the second, an ideological support piece, "What is Cybernetics?" ("Shto takoe kibernetika?") by the well- known Czech philosopher living in Moscow, Ernest Kolman. (All translations are the author's unless otherwise noted.) The two Soviet articles set the stage for the revolution of cybernetics in the Soviet Union, from — as the fourth edition of the *Concise Dictionary of Philosophy* put only one year earlier (1954) — an "imperialist, reactionary pseudo-science" to a dominant research discipline. As a testament to cybernetics structural fit in (post-) Soviet society, cybernetics proportionally occupies more attention in contemporary Russian-language scholarship than in English.

The title of Norbert Wiener's first book, *Cybernetics: or Communication and Control in the Animal and the Machine* — first published in 1948 and revised in 1961 — was all that most Soviet critics knew about cybernetics for the first half of the 1950s. Before the 1955 articles and amid American accolades, the Soviet press poured insult on Wiener; in 1950, for example, *Literaturnaya Gazeta* (*The Literary Newspaper*) called Wiener one of those "charlatans and obscurantists, whom capitalists substitute for genuine scientists." (In fact, it was not until Khrushchev's thaw was in full effect in the early 1960s that the Soviet press hailed it as a "science in the service of communism" (Gerovitch, 2001). In the same year, 1950, the American *Saturday Review of Literature* proclaimed that it was "impossible for anyone seriously interested in our civilization to ignore [Wiener's *Cybernetics*]. This is a 'must' book for those in every branch of science" (Gerovitch, 2001, pp. 548 & 547). Despite the differences in press opinion, elite scholars on both sides of the Cold War began to read *Cybernetics* as a rich toolbox of ideas and techniques for shaping the future of computers, information communication and control. However, few Soviet scholars had the military clearance to pursue cybernetic research in the early 1950s, which exacerbated the growing gap between American and Soviet computerized military initiatives based on cybernetic scholarship (Gerovitch, 2001, pp. 562-568).

As a text itself, *Cybernetics: or Communication and Control in the Animal and the Machine* is a programmatic tour de force. Intended for the scientist with interdisciplinary interests and clear technical capacity, *Cybernetics* warns in the language of logic, formulae, and functions of an impending second industrial revolution that "embraces technical developments with great possibilities for good and for evil" (Wiener, 1961, p. 28). Wiener concludes the introduction with the bleak observation:

> *As we have seen, there are those who hope that the good of a better understanding of man and society which is offered by this new field of work may anticipate and outweigh the incidental contribution we are making to the concentration of power (which is always concentrated, by its very conditions of existence, in the hands of the most unscrupulous). I write in 1947, and I am compelled to say that it is a very slight hope.* (Wiener, 1961, p. 29)

Here Wiener decries the involvement of military power in the development of cybernetics, calling instead for intercommunication of humans, machines, and academic fields, even for many new fields "most far from war" that would help wrest away the militant supports from a global cybernetics discourse. In the same breath, he belittles the tendency "of the sciences to develop such a degree of specialization that the expert is often illiterate outside his own minute specialty," instead lauding future cyberneticists or "individual[s] with an almost Leibnizian catholicity of interest" as necessary forgers between human knowledge and mechanical classification (Wiener, 1961, p. 158).

The structure of his work *Cybernetics* suggests something of this catholicity: with chapter titles ranging from "Newtonian and Bergsonian Time," to "Computing Machines and the Nervous System," to "Gestalt and Universals," to "Information, Language, and Society," and in the 1961 revision, to two additional chapters, "On Learning and Self-Reproducing Machines" and "Brain Waves and Self-Organizing Systems" (a supplement to the machine-mind analogy developed by Liapunov), one understands why he knighted cybernetics to become "a whole discipline for the engineer, for the physiologist, for the psychologist, and for the sociologist" (Wiener, 1961, vii). The emerging discipline of information control and communication attempted to marshal together sub-disciplines into a whole study of universals that added up to more than the sum of its parts (cf. the Gestalt chapter). The central chapters make the important connection between the order and disorder of machines and minds, while drawing from the first few chapters' emphasis on a new statistical coordination of time and space in which, with a gesture to Willard Gibbs, time could no longer be reversed as posited in Newtonian physics. Wiener argues with a genealogy from Pascal to Leibnitz, Cantor, Russell, and Rashevsky, to Turing's work on reasoning machines and logic, to Heisenberg on statistical uncertainty that the consequence of freezing time's arrow toward the future will be that "the modern automaton exists in the same sort of Bergsonian time as the living organism, and hence there is no reason in Bergson's considerations why the essential mode of functioning of the living organism should not be the same as that of the automaton …." (Wiener 1961, p. 44). From chapter one, as Bergson dissolves the classical Newtonian time, Wiener blurs the boundaries between human and automaton.

In sum, *Cybernetics* raises the very issues necessary to understand cybernetic discourse on an international stage: its ironies and insights seem eminently applicable to the Soviet situation as to the American. Wiener's critiques of top-heavy, cumbersome American society apply equally well to Soviet

society. In fact, there may be nothing more cybernetic than the Soviet model of society with its attempts at a universal system of centralized information control (cf. Moscow-based bureaucracy), feedback (cf. socialist democracy), and noise reduction (cf. censorship). Clearly too, the Bergsonian twining of the modern laborer with an automaton would have resonated well with the janus-faced Marxist ideology of Stalin's era which, in theory, decried modern capitalism's enslavement of laborers to corporate means of production while, in practice, was supremely concerned with developing a better centralized calculus for organizing masses of Soviet laborers. The translation of Wiener's ideas into Russian was little more than a recuperation of ideas already well understood. His work may have been most at home abroad.

Put another way, Wiener's first-order cybernetics reflects exactly the top-down, centralized power of the Cold War military research complexes. Cold War militaries were not only the enemies of cybernetics' pacific vision — they were its most natural institutional fit. Such a tragic fit was primarily the consequence and combination of the accommodationist conceptualization of the science itself and the historical circumstances of mid-20th century militarized sciences. Cybernetics' strategic value was lost as it flexed to meet all (ally and enemy) demands placed on it; and its pacifist potential was squandered as only warring enemies turned to employ its methods.

General Secretary Joseph Stalin's death in 1953 came as a relief to many academics on both sides of the Atlantic but probably no where more so than in Moscow, the epicenter of his tyranny. The subsequent softening of anti-Western ideology offered the possibility of exploring previously forbidden intellectual horizons. Since 1948, Stalin began closing down venues for international scientific exchange and silencing any but the most biting critiques of the American metadiscipline. However, by 1955, conditions had improved enough generally to allow an early attempt at rehabilitating the science: public mourning for Stalin had largely passed and there was already whispers of General Secretary Nikita Khrushchev's official denunciation of Stalin's crimes and cult of personality that would come in 1956 from the 20th Congress of the Communist Party of the Soviet Union.

The success of the first Soviet article, "The Main Characteristics of Cybernetics" largely hinged on the fact that all the coauthors, Aleksei Liapunov, Sergei Sobolev, and Anatolii Kitov, were well-positioned authorities in the Moscow military academy itself. Like Wiener, their success as early cyberneticists depended on academic positions supported by the military. Liapunov, reputedly "the father of Soviet cybernetics," was a wide-ranging and luminous mathematician who taught at the Military Artillery Engineering Academy and the Department of Computational Mathematics at Moscow University (Gerovitch, pp. 173-175). His chair, Sergei Sobolev wielded almost inestimable weight as Deputy Director of the Institute of Atomic Energy — the man with a hand on the atomic bomb. Lastly, Anatolii Kitov, a former gold-medallist student of Liapunov at the Military Academy and a young World War II veteran, quickly rose to become Deputy Head of the then still nascent Computation Center 1 of the Ministry of Defense. Kitov would go on to publish the first textbook on computer science in the Soviet Union (*Digital Computing Machines* (Moscow: Soviet Radio, 1956)) as well as spark a flurry of activity around the idea of using computers to streamline the Soviet economy with a letter to Khrushchev in 1959 (Malinovsky, chap. 2). Again, this troika of Soviet scholars was uniquely positioned in the military-industrial complex to attempt salvaging the metadiscipline (Gerovitch, pp 179-183): like in America, early Soviet cybernetics was not only concerned with, but was also made possible by, the influence of the few on the many.

According to the personal reminiscences of Viktor Glushkov, the brilliant Ukrainian academic and, later, a founding scholar of Soviet cybernetics, Anatolii Kitov obtained a copy of Wiener's *Cybernetics: Control and Communication in the Animal and Machine* (1948) in 1952. In a personal interview with *Computerra* (No. 43, 18 November 1996), Kitov himself reported that "…having read it, I came to the conclusion that cybernetics was not bourgeois pseudo-science, as it was officially displayed that time, but on the contrary – a serious and important science. It was the year 1952." Kitov and Lyapunov circulated and drafted the article for three years in conferences and seminars before publishing it as "The Main Features of Cybernetics," along with Ernest Coleman's "What is Cybernetics?" (Malinovsky, 2006).

The article itself, "The Main Features of Cybernetics," dances a deliberate two-step: it first attempts to upgrade cybernetics to the equal status of other natural disciplines, building a coherent theory almost exclusively from Wiener's work. The second step was to retool the conceptual vocabulary into a uniquely Soviet style. Historian Slava Gerovitch compares a few of these phrase translations: "What Wiener called 'the feedback mechanism' they called 'the theory of feedback;' 'basic principles of digital computing' became 'the theory of automatic high-speed electronic calculating machines'; 'cybernetic models of human thinking' became the 'theory of self-organizing logical processes'" (Gerovitch, p. 173; see also Sobolev, p. 136). The three authors used the word "theory" six times in the following definition of cybernetics to emphasize the theoretical nature of the new science (theory being a key to the Soviet conception of scientific truth and supposedly antithetical to American pragmatism). In their upgrade, the metadiscipline held three main categories together:

> (1) Information theory, especially the statistical theory of processing and transmission of messages.
>
> (2) The theory of automatic high-speed electronic calculating machines as the theory of self-organizing logical processes similar to the processes of human thought.
>
> (3) The theory of automatic control systems, especially the theory of feedback, including—from a functional perspective—the study of the nervous system, sensory and other organs in live organisms. (Sobolev, p. 136)

This Soviet articulation embraced and expanded upon Claude Shannon's information theory and Wiener's organism-machine analogies (cf. Edwards, chap. 6 & 9). Kitov's "doctrine of information" took on wholesale the task of universalizing information control in machines and minds, preferring the unfortunately named "automatic high-speed electronic calculating machine" (i.e., computer) to Wiener's servomechanism as the archetypal analogy. Computer algorithms added a layer of technical complication to Wiener's feedback mechanisms, just as their analogy of neurons as electronic switches made human-computer projects that much more thinkable (Gerovitch, p. 178). The computer-mind analogy was, in more ways than one, a fitting contribution to and reinterpretation of Wiener's work. By formulating the science in terms of computers, the coauthors also took on the task of comprehensively theorizing

computers, an essential political move in establishing cybernetics in the vanguard of the escalating space race. To this day, the Russian word for *cybernetics* remains nearly synonymous with the *study of computing*.

In fact, a short tracing of the term *computer* during Wiener's lifetime (1894-1964) may illuminate some of the ironies of Cold War cybernetics. At first the term applied to mathematicians in World War I who — like Wiener, Kolmogorov, or later Akushky — developed stochastic models for predicting ballistic trajectories. Later during World War II, as the volume of calculations grew by orders of magnitude, hundreds of women *computers* were lined up in life-size circuit formations along factory floors to compute by hand-crank calculating machine and abacus the ballistic firing tables for anti-aircraft gunners. Only after World War II were large centralized calculating machines endowed with bits of re-recordable memory and dubbed mainframe computers. The social gender of computers began as the elite male, became the many unnamed females, and remain today as androgynous machines. In this sense, the term *computer* is a sort of second-order Frankenstein. By this I must first explain how *Frankenstein* is a sort of Frankenstein itself: while the term now means a creature that has consumed its maker, it originally referred to the maker itself, Shelly's protagonist Doctor Frankenstein. Just as the monster destroyed the original Frankenstein, the name has consumed its original meaning. Regardless of whether it refers to humans or machines, the word *computer* too has transformed from the elite male creator-scientist into the sterile tools that brought about the demise of the creator's creative projects. In a strong sense, the early Cold War history of the computer is the story of the transformation of Frankenstein from the pacifist Doctor Wiener into the Soviet military machine. The modern-day personal computer was a foreign concept to both early cybernetics and Soviet society. By today's terms, we usually mean little more than a node in a network of distributed computing power. The centralization of political power in Moscow and the organizational design of mainframe computers are inversions of the distributed computing power in the emerging contemporary networked information economy. Coincidentally, the ARPANET — predecessor to today's Internet and, perhaps unsurprisingly, product of the U.S. military's interests in protecting computer networks against strategic air strikes — came into existence the same year that Wiener died (1964), a watershed year in the passing of centralized to distributed computing power.

Kitov's translation of the English "computer" into "automatic high-speed electronic calculating machine," thankfully, never caught on, although the computer clearly plays a central role in the coauthors' interdisciplinary vision of the field:

> *In the doctrine of information cybernetics unites general elements of various spheres of science: the theory of communications, the theory of filters and anticipation, the theory of tracking systems, the theory of automatic regulation with feedback, the theory of electronic calculating machines, physiology, and others . . .*

Sobolev et al. make an effort to keep their language technical and functional, even stating at one point that the cybernetic mind-machine analogy was to be viewed "from a functional [and not philosophical] point of view." They also adopt technical use of terminology such as "homeostasis," "signals of feedback," "entropy," "reflex," and "the binary digit." Other familiar arguments include that of stochastic processes as the preferred mechanism-medium for converting behavioral patterns into abstract

logical systems as well as a call against disciplinary isolationism. The authors also offer a complete section elaborating Wiener's mind-machine analogy, with special emphasis on the central processor as capable of memory, responsiveness, and learning (Sobolev, pp. 141-146).

The authors also enthuse about the field's future, without mentioning Wiener's teleological term *information homeostasis* in its pacifist sense. Interestingly throughout Soviet society, only the state publicly employed the word *peace*, such as in the naming of large cybernetic projects such as the Mir-1 (1965) and Mir-2 (1968) computers and the Mir space station (1986-2001). As Vaclav Havel writes in his elegant "Anatomy of a Reticence," "perhaps the first thing to understand is that, in our part of the world, the word *peace* has been drained of all content" (1985, p. 293). Riddled for decades with slogans such as "Building up our homeland strengthens peace," "The Soviet Union, guarantor of world peace," and "For the even greater flowering of the peaceful labor of our people," Havel argues that in the Soviet Union the word *peace* signals militant obedience to the policies of anti-Western ideology. As mentioned above, the organizational design of such a policy is cybernetic in nature, demanding obedience to the signals of the centralized body (cf. Moscow) responsible for processing information (cf. supervision and surveillance), supervising automatic control systems (cf. censorship and single-party democracy), and controlling and communicating the Party message (cf. policy and propaganda). In this sense, the Soviet state is irreparably cybernetic in organization. Cybernetics then served the Soviets as a functional mode for fighting the enemy in the open as well as a fitting metaphor for studying themselves in secret. Wiener's work was a foreign formulation of a world too familiar for many Soviets.

The only direct quotes or citation in the first article come from Wiener's *Cybernetics* itself. One quote in particular bears repeating: "information is information, not matter and not energy. Any materialism [read: Marxist dialectical materialism] that cannot allow for this cannot exist in the present" (Sobolev, 147). Behold, the political mandate for a Soviet cybernetics. In these few ritual words, Wiener and cybernetics were wedded to Soviet ideology: the success of Marx depends on the Soviet understanding of information as information.

As proof that Wiener can be read just as easily (if unfairly in both cases) as a Soviet as he can as an American, their last page summarizes and stylizes Wiener's "sharp critique of capitalist society," his pseudo-Marxist prediction of a "new industrial revolution" arising out of the "chaotic conditions of the capitalist market," and his likely overstated fear of "the replacement of common workers with mechanical robots" (*Ibid.*, p. 147). In Russian, the literary impact of this last quote exceeds that in English as the root of the Russian word for worker, or rabotnik, differs from the nearly universal word *robot* (from Karel Chapek's 1927 Czech for *forced labor*) by only a vowel transformation.

The coauthors also buttressed Wiener's ideas of neural processing with reference to the great Soviet scientist Pavlov — whose original theory of conditioned reflexes[2] in human psychology was notably

[2] Note that the English term for Pavlov's "conditioned reflex" ("obuslovannyii refleks" in Russian) comes from a mistranslation of the original "conditional reflex" (Pavlov's "uslovnii refleks"). Not unlike those of cybernetics, the ostensibly Pavlov-derived Western ideas of conditioning and behaviorism trace their genealogy back across generations of mistranslation.

derived from an electronic switchboard — and the mere juxtaposition of whose names probably helped secure cybernetics from lash back of name-calling (cf. cybernetics had been called a "idealistic pseudo-science" only one year earlier) (Sobolev, 147). Finally, the coauthors conclude in a flourish of Soviet Orwellian newspeak, calling for a battle against the capitalists who "strive to humiliate the activity of the working masses that fight against capitalist exploitation. We must decisively unmask this hostile ideology. Automation in the socialist society will help facilitate and increase the productivity of human labor (*Ibid.*, 148)." Here again, we see the basic fear motivating everyone from Sobolev's play on the word *robot*, to Leninists Luddites, to Bergsonian cyberneticists, to Shelley's Frankenstein: that, in the words of John Durham Peters and Peter Simonson, "The first industrial revolution replaced the hand with the machine; the second, [Wiener] fears, will replace the human mind with the intelligent machine" (2004, p. 243).

Despite all the rhetorical flourishes of hostile ideologies and support from monolithic figures such as Pavlov and Marx himself, the article's greatest defense lies in the article that followed. Ernest Kolman — a loyal Bolshevik, an active ideologue, and a failed mathematician — followed up the coauthors' piece with his own ideological support piece "What is Cybernetics?" ("Shto takoe kibernetika?"). Kolman's role in translating Wiener into a respected figure is ironic since it was his very screeching diatribes that kept the brilliant mathematician Andrei Kolmogorov from beating Wiener to formalizing the link between biology and mathematics.[3] It is ironic both that Kolman preferred the foreign Wiener to the home-grown equivalent stranger, and that the same man whom the historian David Joravsky once called "one of the most savage Stalinists on the front of science and technology" also wrote the first Soviet-friendly history of cybernetics (Joravsky, p. 361). It seems Wiener has Kolman to thank on a surprising number of fronts.

Kolman begins his 11-page history by outlining a century of international cybernetics begun with the French mathematician, physicist, and philosopher Ampere in 1843 and "Russian and Soviet scientists, [such as] Chernishwev, Shorin, Andropov, Kulebakin, and others" (Kolman, pp. 148-149). On only the second page, however, Kolman goes on to dwell largely on social implications of Wiener's popular work, *The Human Use of Human Beings*. He supports one of Wiener's theses — that "cybernetics is the analytic study of isomorphism of the structure of messages in mechanisms, organisms, and societies" — with a quote from a correspondence between Marx and Engels about statistics as a means for predicting economic conditions. Kolman also beneficently makes note, without further explanation, that in *Cybernetics* "Wiener cites the work of the Soviet academics Pavlov, Kolmogorov, Krilov, [and] Bogoluibov" (Kolman, 140). He also did not bother to point out that Wiener mentioned the last three only in passing — with no more depth than did Kolman. Wiener's *Cybernetics* was still banned, after all, and few would have the clearance to challenge Kolman's scholarship until cybernetics no longer needed the ideological defense. Continuing on page two, Kolman calls Wiener in what amounts to a veritable Soviet shout of praise in 1955 "one of the most visible American mathematicians and professor of mathematics at Columbia University" and the one who "definitively" formalized cybernetics "as a scientific sphere" (*Ibid.* p.

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[3] Kolmogorov and Wiener's correspondence during World War II culminated in Wiener visiting Moscow in 1946 for the first time, which visit he spent entirely conversing with Kolmogorov and Israel Akushsky, (whose work on punch-card arithmetic and ballistic calculations Kolmogorov had introduced Wiener to) and lecturing on cybernetics at the Steklov Mathematics Institute (Malinovsky, 2006).

149). The fact that Wiener occupies the sixth through the ninth paragraphs of Kolman's ideological support piece signals that Wiener, despite whatever Western biases, had been adopted into the vanguard of Soviet cybernetic historiography.

With an inventive short Soviet history of technology, Kolman anticipates and cuts short the question of whether the work of foreign capitalist should be adopted, offering in its place the question of whether cybernetics should be rehabilitated from a longer history of Soviet intellectual work. Kolman's narrative accommodates the germ of cybernetics into the work of a long line of thinkers leading from Ramon Llull in 1235, to Pascal in the mid-1600s, the engineer Wilgott Odhner of St. Petersburg (and conspicuously not Stockholm, his native city), and the late 19th century Russians A. N. Krilov and P. L. Chebishev's work on early calculators. He then discusses how the Soviet mathematicians A. A. Markov, N. C. Novikov, N. A. Shanin, and others had been advancing the last hundred years' of cybernetic work (*Ibid*., pp.150-157). Kolman's internationalism allows two people west of Berlin to creep into his history: namely Nikolai Rashevsky, a Russian émigré at the University of Chicago and the first Pavlov-inspired bio-mathematician, and Norbert Wiener. (In fact, while far from representative, Kolman is not incorrect to emphasize the Eastern European origins of cybernetic thinkers. For instance, John von Neumann was a Hungarian émigré; Roman Jakobson, a brilliant linguist, Russian émigré, and collaborator in the Cybernetics Group; Stefan Odbleja, the largely ignored Romanian whose pre-World War II work prefaced cybernetic thought; Szolem Mandelbrojt, a Jewish-Polish scientist, uncle of fractal founder; Menoit Mandelbrot, and organizer of Weiner's collaboration with the French on harmonic analysis and Brownian motion; and, of course, Weiner's own domineering and brilliant father, Leo, who emigrated from the Pale of Settlement.) Moreover, Kolman's article fills the irony of the Cold War: like the military industries that housed peaceful intentions of cybernetics, only the cuttingly one-sided history of a fierce ideological hit man like Kolman could co-opt Wiener's work as a point for transatlantic cooperation.

As David Holloway has observed, "the hostile image of capitalist society which had played an important part in the early attacks on cybernetics, was now turned to its defense" (1994, p. 316). The pre-1955 criticism of and then the post-1955 cooptation of his work offer two distinct military tactics: if at first you cannot dismiss, then imitate the enemy's advances. Yet the choice to adopt Wiener is a hard bargain for Soviet ideology, as it introduces a foreign element as a bridge between two otherwise polarized societies of the Cold War. In other words, Wiener's work was compromised in part by the fact that a universal discourse of cybernetics offers the enemy, "Other," the same tactical choice as the ally, "Self." If realized internationally, the science of cybernetics would be incapable of conferring upon either the United States or the Soviet Union a tactical advantage. Early cybernetics cannot occupy a bipolar world. Like the militaries it inhabited, it yearns for a single, complete, and centralized system of information control.

Conclusion

The story of the Norbert Wiener's translation into the Soviet military academic nexus amounts to little more than a footnote in the history of 20th century communication thought — a footnote that nonetheless should interest communication theorists, historians of science, and students of culture. The article's primary assertion of Wiener's Soviet translation as a negotiated compromise will surprise few

conversant with contemporary cultural studies or anthropology scholarship. Yet even a footnote can usefully signal how little English-language scholarship knows about foreign spheres of cultural thought. This article suggests that our knowledge of cybernetics to date suffers from the political deformation of English-language centrism.

The article's secondary assertion — that accommodating or universalizing disciplines must be understood internationally — rests on the third: that cybernetics assumes in its universal embrace of the scientific mind a capacity to think like the enemy. Because mathematicians share the same language regardless of their home country, they share a patterned capacity for thought. Peter Galison speaks to the capacity for such Enemy Think in his evidenced history, "The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision", which shows the rational, intelligent Other to be more like ourselves than not (1994).

The idea of the enemy Other deconstructed in terms of the ally Self founds the fourth conceptual argument: namely, that translation — by which I mean here more the adoption of Wiener as a figure into the Soviet academy discourse than the literal translation of his English-language works into Russian—is a language act of part cooperation and part cooptation, part ideological betrothal and part betrayal. Translation transforms conversations as much as it transfers content. It introduces new variables of interpretation and mediation, as well as complicates author analysis: when reading a translated word, one cannot be perfectly sure whose voice is whose: when systems of thought are applied across different linguistic, political, social, or cultural environments, the cybernetic translator analytically blurs the distinction between author and audience, human and machine, friend and foe, intelligence and ideology.

The story of the Sovietization of Wiener's cybernetics is full of ironies illuminated in the particular historical circumstances of the Cold War. The initial irony of military industries hijacking the work of pacifist thinkers into promoting wartime machines is accompanied by a second, more subtle structural irony of Wiener's thought: namely that first-order cybernetics functions as an accommodationist philosophy built to envelop instead of resist foreign systems of thought. Yet, the same accommodating structure of the science that allows for interdisciplinary composition also, ironically, compromises the viability of any of its varying political purposes. As a vehicle for military development, an interdisciplinary and international accommodationist science subverts any possibility of one side gaining tactical advantage over the other, for there can be no advantage to thinking like the enemy when the enemy can think like you. As Galison's deconstruction of the enemy Other into the Self develops, the World Wars and Cold War supply the necessary historical circumstances for envisioning enemy and ally in common terms, something Edwards calls "cyborg discourse" (178). Yet as an ally of everyone, early cybernetics is too accommodationist to even be called, in voter vernacular, a swing science. After all, swing voters eventually choose sides. Instead, by availing its tools to all interested parties, cybernetics breaks down the binary choices it depends upon: built upon the ambiguities and circularities of "stimulus and response, input and output, purpose and outcome, organism and machine," the science blurred even its subjects as it spread internationally: the Soviets and the Americans, the Self and the Other, human intelligence and artificiality (Kay, p. 82). Thus simultaneously betrothed to both American and Soviet military complexes, Wiener's work was to betray that dichotomy.

A penultimate irony: as one of the few highly lauded Westerners in the Soviet academic canon, Wiener could not maintain the "cold heights" of a removed observer of the world. Rather, his translation into Russian internalizes him into the very world that his first-order cybernetics demanded he remove himself from. Wiener in translation is also strategically and ironically foreign. If cybernetics as a Soviet project failed, he could take the bulk of the blame while his Soviet translators could move on quietly to other projects. As Bonnie Honig argues in *Democracy and the Foreigner* (2003), many political narratives have an iconic foreign founder, an alien recuperated for a project he or she unsettled. The Kingdom of David has its grandmother Ruth, a Moabite; Oz has its Dorothy of Kansas; and Soviet cybernetics has its Wiener, at once one of their own . . . a Diaspora of one, and a critic and compliant of Cold War societies.

And to finish the irony, accommodating enough to envelop foreign founders, the metadiscipline was too much so to be able to fulfill its own pacifist mission. Even the technical equivalent of peace was weakly formulated: as little more than the absence of conflict, *homeostasis* pales in comparison to a robust definition of peace. The term in physiology derives from the Greek for *similar* plus the verb *to stand* and refers to self-regulating organisms that maintain a constant internal environment independent of external conditions. While the term promotes an enriched sense of an information system as organism — a metaphor with clear cybernetic resonance, the core concept of balance does nothing to challenge the ideological deadlock of Cold War opponents. Quite the opposite, in fact. The metadiscipline enabled and escalated military conflict. In other words, the peace achieved by the politics of mutually assured destruction is also almost perfectly homeostatic: each system was contained within itself by its opposite.

To paraphrase Martin Luther King, Jr., a fuller-bodied peace demands not just the absence of war, but the presence of justice. But noting as Wiener did that "the whole nature of our legal system is that of conflict," the metadiscipline's means of peacemaking — i.e., universal probabilities calculated by removed observers — are politically celibate (Wiener 1954, p. 105; cf. Hayles, chap. 5). The very ethical controls for instituting justice through positive legal or social mechanisms paradoxically involve conflict. Backlit by the early 20th century tradition of scientist-pacifists such as Einstein and Sakharov, Wiener's work abstained from the very political spheres necessary to advance its own end goal.

In summary, like the larger history of 20th century communication devices and computing, the study of cybernetic accommodation must be understood not only interdisciplinarily but internationally. As an irreducibly cross-cultural artifact, the mid-20th century history of cybernetics — or communication theory more generally — can only be as universal as the analytical lens and languages allow. Much more work on the topic in many more languages will need to follow. Early Soviet cyberneticists such as Liapunov, Sobolev, and Kitov gestured to a foreign founder whose vision of cross-national cooperation challenged the cybernetic birthplace among, and applied use by, the fomenters of World and Cold Wars. This irony can be read doubly: as a tragedy and betrayal of a vision of peace by domestic and international militaries, or perhaps more interestingly as the result of a structural flaw of a metadiscipline too plastic for the closed world it engaged. The translation of the metadiscipline would leave the founder fittingly and irreparably pulled between two competing spheres of the world that, in Wiener's eyes, knew too little about one another to know how computably compatible they could become.

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