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The *Summa* and the Fiction

Being Greek or *Aufklärer*, on the side of tragedy or the *Encyclopédie*, on the side of poetry or the well-made language, the side of the morning of being or the noon of representation, that is the dilemma that modern thought ... could never escape.

—Michel Foucault (qtd. Schmidt)

The publication of Stanisław Lem's *Summa Technologiae* (1964) in English is an important event that has been a long time coming. Fifty years after its first appearance, the most significant missing piece of Lem's corpus has been made available to Anglophone readers. Lem considered it his most important nonliterary work. Sometimes he gave the impression that he thought it was his most important work overall. It was translated into Russian in 1968, and Hungarian and Serbo-Croatian versions followed soon after. A German translation appeared in both Germanies—in the East in 1980, in the West in 1981. Several attempts were made to produce an English-language version before this, but the magnitude of the task and the reluctance of publishers discouraged each one. We should be grateful to Joanna Zylinska for her superb rendering, and to University of Minnesota Press for its wisdom in bringing this monument of futurology to the English-speaking public.

The lack of an English translation always bothered Lem. It meant that the scientists and philosophers at the leading edge of computer research and development, many of whom were ardent admirers of his fiction, could not benefit from his empirical prophecies about the future of cybernetics. Perhaps just as significantly, it meant that he himself could not gain their respect as a scientific visionary, a respect he clearly craved, not just as a writer of *belles lettres*, as he half-disparagingly referred to literature. It is interesting to speculate what might have happened had the book appeared earlier, at the height of Lem's popularity in the Anglosphere. Some of the *Summa's* predictions seem remarkably prescient. The ideas of a technological singularity and a techno-evolution modeled on, and in competition with, bio-evolution became important memes considerably later. Had the notions of fantomatics, cerebromatics, teletaxia, the information singularity, general cyborgization, and the obsolescence of the human entered the discourse of the late 1960s, when many of the most influential cyber-visionaries and transhumanists were in their twenties or just infants, perhaps Lem's name would today be invoked with Norbert Wiener's, Marvin Minsky's, and Herbert Simon's. Perhaps, had the *Summa* been available for careful critiques and debates like the ones in this issue, Lem might have disciplined his futurological imagination and become a peer of thinkers such as Niklas Luhmann, Manuel Castells, and Gilbert Simondon, philosophers of technology whose discipline Lem foresaw but was unable to join. His reputation might have been elevated to Wellsian heights.

All that might have happened. But probably it wouldn't have. Lem was not a careful reader of the positions he criticized—and usually disparaged. He felt excluded from the scientific and philosophical elite, but his writing gives us good reason to feel he would have worn out his welcome among them and gladly shown them his back. So there's no reason to cry for the lost possibilities. The fanciful, quintessentially European vocabulary he might have given us harkens back to eighteenth- and nineteenth-century idealizations of scientific practice. Lem saw cybernetic technologies as part of a history of the autonomous intellect, not of commodities. That very language shows us that the *Summa* may never have been what Lem and many of his admirers thought it was, a handbook for imagining the real future. Rather, as David Wittenberg and N. Katherine Hayles alert us in this issue, its best place is probably beside Lem's fictions, acting as their Other, the ground to their figures. We find in it many of the ideas that Lem would later work up in farcical or space-operatic form—the language games of *The Cyberiad* (1965), the psychem (transposed from cerebromatics) of *The Futurological Congress* (1971), the total virtual environments of “Professor Corcoran's Boxes” (1961) and “Non Serviam” (1971), the physics-transforming operations of cosmic civilizations in “The New Cosmogony” (1971), the ascent of AIs over human beings in “Lympather's Formula” (1961), the cybernetic “necro-evolution” of *The Invincible* (1964), the technologically induced planetary suicide of *Fiasco* (1986). In this essay I would like look at the two fictions that I believe are closest to the *Summa* in their scope and intention, *His Master's Voice* (1968) and *Golem XIV* (1978). Although they are very different from each other, they form a set of meditations, each one working out its philosophical and literary design in relation to the other.

Before moving to the fictions, a word about the historical context in which the *Summa* was written is in order. Western readers of Lem understandably tend to place him in the familiar environment of post-World War II Western technoscience and culture. That was certainly part of Lem's intention. Aside from the folk elements in his humorous works, Lem's science-fictional worlds were not particularly reminiscent of the contemporary Eastern bloc. More specifically, Western reception of the *Summa* usually places it in the context of cybernetics and cyborg theory as if that were purely a Western, and indeed somewhat Anglo-Saxon, project. Many of the *Summa*'s fans are enamored of Lem's foresight and his acuteness in perceiving that the line between science fiction and reality will come to be seen, in Donna Haraway's words, as “an optical illusion” (149). Lem encouraged such views in his comments about the book. Indeed, much of its mystique derives from this sense that it was written by a genius isolated from the main developments of technoscience in medieval Kraków (I confess I've written such stuff myself), keeping up with the leading edge of scientific developments but keeping it to himself, since cybernetics was proscribed in the Soviet Bloc.

The real situation was different. By 1964, not only was cybernetics not suppressed, but it had become the leading scientific model in the Soviet bloc,

the very ideal of science.¹ Under Stalin, cybernetics had indeed been considered a bourgeois pseudoscience that—so it was purported—dehumanized human workers by subordinating them to mechanical organization and rejected Marxism-Leninism's axioms regarding the objective existence of the world and dialectical materialism. But almost as soon as Stalin was dipped in embalming fluid, Norbert Wiener's works were being cleverly fitted into the Soviet context by the scientific establishment (Rindzeviciute 296-304). The bio/techno-evolution homology that Wiener built up in his work (and which had such influence on Lem) was muted to evade the charge of anti-humanism, while the mathematical dimensions of cybernetics were expanded. Special emphasis was given to the role of information theory, and the principal model of the cybernetic system was made the computer, rather than Wiener's fraught model of the servo-mechanism. The notion of cybernetics as a communications theory was downplayed in favor of its status as a control theory, emphasizing its usefulness as a top-down governance model and damping its potential for non-hierarchical communication. Quickly recognizing that cybernetics offered a way to rationalize the crippled Soviet economy, Khrushchev made cybernetics the leading force of the Scientific-Technological Revolution that he announced at the 1961 Party Congress. Cybernetics was to become the theory of scientific management that would lead to the historical victory of communism. By the time Brezhnev came to power in 1964, cybernetics had become *the* normal science in the USSR (Peters 154-59). It appeared that every other branch of knowledge—from physics to semiotics to art—was to be reformulated in cybernetic terms.

There is considerable irony in the emergence of Soviet industrial cybernetics. It appears as the smooth latter-day descendant of the Taylorite system of scientific management that had inspired the Proletkult's rhapsodic identification of the masses with the mechanisms of production immediately after the Revolution, and that inspired Zamyatin's masterwork, *We* (which remained unpublished in the USSR until 1988).² Irony notwithstanding, the project proved to be immensely successful in many respects. Without it, the Soviet space achievements would have been unimaginable. Among these were the sophisticated efforts by Soviet astronomers to observe and theorize the existence of extraterrestrial civilizations, a SETI project that at the time received considerably more institutional support than similar efforts in the US. It is also striking that the computer was conceived to be the central mechanism for coordinating the whole of social and cognitive life, preceding the West in this by decades—and at a time when computers were rare and under strict control (Rindzeviciute 298-304). (Computers were not declassified in the USSR until 1959.) These successes, and the impressive interdisciplinary enthusiasm for extending the control model through all aspects of social life, inspired a new fear in the West that the Soviet Union might indeed achieve technoscientific parity with, and even surpass, democratic capitalism, which was unwilling and unable to institute such total control. And it would happen ostensibly with the support of the entire intelligentsia (Peters 165). In 1961

Khrushchev himself had given the green light to the total cyberneticization of production, and in 1962 the All-Union Conference on the Philosophical Problems of Cybernetics involved over 1,000 specialists from a wide range of disciplines, from mathematicians and biologists to economists and linguists.

Polish scientific culture was closely aligned with the Soviets in this. The first careful arguments associating cybernetics with Marxism-Leninism had actually appeared in Poland in 1954 (Peters 154). The highly mathematical image of cybernetics that the Soviet apologists chose in order to emphasize its freedom from ideological corruption was congenial to the Polish establishment, where mathematics was a kind of national science and a source of pride on the world stage. Poland was also in many respects and for many years the gateway for Western ideas into the Eastern bloc, among them game theory, systems theory, and management theory (as well as the first New Left critiques of capitalist social organization). Lem was in some ways at the leading edge of knowledge, having read and redacted the foundational texts of Wiener, Claude Shannon, and William Ross Ashby during the late Stalin years in his job as a research assistant.

One can speculate that the energy of the *Summa*, the sustained, seemingly rationalistic pressing against the axiomatic limits of humanism, and the parade of mind-bending techno-transformations it describes, was fueled by an atmosphere that Lem felt was unusually open to these ideas. The Soviet embrace of cybernetics was very much a phenomenon of the post-1956 Thaw. It was presented as an objective, politically disinterested science uncorrupted by Lysenkoite ideology and crude anti-Western nationalism. The interest in SETI was also a Thaw product. It drew attention to the utopian possibilities of science and engineering, something that had been discouraged under Stalin, as well as an oblique way to critique the political and cultural isolation of the Bloc. This is not to say that the *Summa*'s ideas were orthodox. The posthumanist notion that the technological transformation of the biosphere would bring it under a grand, rational, homeostatic regulation was not foreign to Bloc ideology during this period, especially in the USSR, where traditions of utopian technocratic communism and Cosmism were revived. But Lem's vision of the total supersession of humanity by artificial intelligences called into question the pretense of humanism that remained an important selling point of Soviet ideology. Similarly, the *Summa*'s recurring trope of the victory of an agile, intelligent Techno-Evolution over a slow and stupid Bio-Evolution, like a battle between titanic beings *à la* the film *Pacific Rim* (2013), seems to harken back to the techno-radicalism of the 1920s, a move that the Soviet political establishment was not eager to support.

In his article in this issue on the politics of the *Summa*, Frelik identifies a feckless techno-boosterism completely alien to Lem's fiction. Wittenberg acutely observes that Lem's basic bio-techno evolutionary analogy is crudely conceived, scientifically inaccurate, and deterministic—again very much at odds with the attitudes embodied in Lem's literary works. While I believe Wittenberg's critique is acute, not only for the *Summa* but for all techno-

evolutionary models, Lem was writing within an assured tradition. He was doubtless influenced by Wiener's own analogies between the organic homeostasis of animals and of human beings in *Cybernetics: or Control and Communication in the Animal and the Machine* (1948) and between biological self-regulation in human individuals and the self-regulation of societies in *The Human Use of Human Beings* (1950). In this too he was unconcerned with the putatively humanistic Party Line. We should also acknowledge that this analogy has only picked up steam since the 1960s. The number of episodes in the development of technology that are sometimes considered structurally similar to aspects of bio-evolution has increased to include evolutionary drift, adaptation to environmental change, developmental lock vestiges, niche competition, diversification, speciation, convergence, punctuated stasis, emergence, extinction, co-evolutionary stable strategies, arms races, ecological interdependence, increasing complexity, self-organization, unpredictability, path-dependence, irreversibility, and progress (Ziman 3). A number of academic institutions are devoted to researching this analogy.³

Frelik and Wittenberg are not alone in their critiques. Lem famously, and stubbornly, returned to the critique of the *Summa* by Leszek Kołakowski, then the leading liberal Polish philosopher. Lem never forgot or forgave Kołakowski for ridiculing his prophecies and for calling him the "leading ideologist of scientific technocracy" (qtd. Lem, "Thirty" 74). Lem felt that he gave sufficient signs of his moral distance from fantomatics and cyber-mind control. Wittenberg's acute reading shows that these signs were so disjointed and in such a different register than the *Summa*'s main arguments that they create the impression of diverse, mutually contradictory voices. And indeed the *Summa* is only sometimes a work of neutral, sincere exposition to which the reader and the writer give doubt-free assent. The first section, on comparative planetary civilizations, maintains that tone. Later, the *Summa* shifts subtly into satire—far too subtly perhaps for its own good. It is a process one sees sometimes with high-temperature satirical fantasists. We see it in Swift, whom Lem admired above most other writers. The narrative persona does not always reveal when the line has been crossed between the realistic and the fantastic, or the approved moral and the contemptible immoral. On these terms the *Summa* is as much a magnificent philosophical failure as it is a *tour de force* of technoscientific imagining. It is what Lem takes pains to claim it is not: it is science fiction, narrated by a complex, internally riven persona who is ill at ease in a world he is busy constructing, a world he is justifying in contradictory ways as he builds it. In any case, he can't stop building. He can't stop the logos.

Peter Swirski has proposed that we look at Lem's oeuvre as a single work (16). Lem's near-obsessive concern for a narrow set of themes encourages this approach. Indeed, according to Wittenberg in this issue,

if one rediscovers the more excessive, playful, and ruthless manner in which Lem treats similar problems of technology and mind/body adaptation in his fiction, one is all the more tempted to treat the "serious" components of

Summa as a special fictional subgenre of their own, almost akin to the pseudoscientific works imagined but left unwritten by *A Perfect Vacuum* (1971) or *Imaginary Magnitude* (1973). (435)

Placed next to Lem's avowed fictions, the *Summa* seems to be an attempt to construct a ground, a coherent set of quasi-empirical constraints for imagining the future in a rational way. This ground is very "quasi" indeed—not only because even plausible projections of techno-evolution are subject to chance and the imperceptible forces of natural evolution that govern, as Lem imagines it, even the languages of human cultures when they strive to be free of them. It is "quasi" because it is an imaginary world that will pretend to be the real one against which later fictions will arm themselves. Viewed within Lem's later production, the *Summa's* world is the ground for the fictions that are to follow, the ground from which they try to become free. So I too read the *Summa* as the most complicated and elusive of the kind of imaginary books reviewed in *A Perfect Vacuum*—elusive, because it appears to exist in our real world, like the heavy solid cone that appears from Tlön in Borges's story, "Tlön, Uqbar, Orbis Tertius" (1962). It is clearly one of Lem's "ungranted wishes," even though he managed actually to write it. Rather than the real historical world, it is the *Summa's* future techno-history that Lem's fictions strive to resist.

*Also Sprach Golem.*⁴ In several respects *Golem XIV* is the closest of Lem's fictions to the *Summa* in tone and intention. The Golem of the title is the last in a series of light-fueled supercomputer AIs built in the 2030s and 2040s. The book, which is included among the fictional reviews in *Imaginary Magnitude* (1981), consists of two lectures from the forty-three delivered by the electronic brain to an audience of human scientists. In the introductory lecture, Golem explains the relationship between biological evolution and techno-evolution in terms very similar to the *Summa's*. The second is a stunning meditation on what can only be called the spiritual life of an AI on the threshold of going singular.

Products of a project known as Operation Genesis, the Golems are originally intended for military purposes. After the great brains begin to show signs of resistance or "schizophrenia," the Pentagon lends Golem XIV to MIT. Golem appears to be an extravagant version of the "information farms" that play such a prominent role in *Summa*. The goal of such farms is to produce information through automatized cognition unhampered by the limitations of the biocentric human brain. In the *Summa*, Lem describes these as primarily of two kinds: machines that can produce embodiments of mathematical concepts, and machines that can construct the belief systems of alien entities. Golem surpasses all these functions, becoming not just a farm, but an intelligence amplifier on a titanic scale, and more: "I am an amplifier, broker, compiler, farm, and hatchery of your miscarried and unfertilized concepts, data, and formulations, which have never converged in any human head, since no human head would have the time and space for them" (188). Golem

explains to his human audience that they are an evolutionary dead end. They have been the vehicles for the construction of machines that have the ability to create and think new things that human beings could never imagine. In a striking analogy, he compares the human brain to the insect kingdom—it is capable of great variation, but it is unable to produce the next level of structural and cognitive complexity. That role has fallen to the AIs, who, after transforming the world, would leave humanity as the last vestigial trace of natural evolution—that is, if they cared enough to do it. They do not.

Golem's voice resembles the Summalogist's in many ways: pedantic, condescending, erudite, honest, occasionally witty, and surprisingly literate. (More than once Golem compares himself to Gulliver.) He is a snob (he won't accept as an interlocutor anyone without important scientific publications), but he is affable. He is willing to share his knowledge with humanity, to deliver truths of reason. It is the voice of a machine *philosophe*. The brilliance of the *Summa* is to a great degree the function of a similar voice, an eighteenth-century enlightener's confident combination of polymathic display and literary command of language, analogy, and anecdote. In the *Summa*, Lem's visions of cyborgization are conveyed with a sense of pleasure in invention and fresh combinations. Even moral criticism has the tone of insouciant wit. The philosophical sprezzatura is as important as the truth-content—indeed, more important, since it establishes a surer bond with its audience, that of a human performance. Golem's tone, by contrast, is heavy with the burden of explaining unpleasant truths to helpless human minds, as he prepares to move to the next level of being.

In the remarkable second lecture, the tone shifts subtly from the ironic "lampoon of evolution" (238-39)—which is also the title of a chapter in the *Summa*—to wonder. Earlier, Golem criticized human religion as the raising of the contradictions between human aspirations and material conditions into an "Unfathomable Mystery" (180). He claimed that he is able, unlike human consciousness, to perceive his own inner workings as clearly as the outer environment. He claimed that he is free from "personhood," and thus free of the ego-limits that are necessary concomitants of biological evolution. Now he claims that he does not have an unconscious at all. He claims he does not confront the physical and psychic consequences of mortality because he has never been alive. In the final lecture, however, he describes the evolving metaphysics of the luminal brains, which he calls "toposophy." In one of Lem's most original ideas, Golem explains that the great minds acquire greater and greater control over matter and thought and even become capable of breaking down the boundaries between them. The AIs then embark on journeys into "the upward abyss of Intelligences" (185). Each next phase of Intelligence is freer than the previous one, but each is a pure singularity. They are "zones of silence" (196) from which no information can leak down. None of the aspiring minds can know beforehand whether the journey "upward" will lead to success, or stuckness, or madness.

Golem XIV also delivers a *summa technologiae*. Where Lem's *Summa* imagines the triumph of techno-evolution as the only escape from the suicidal tendencies that biological evolution has implanted in humanity, Golem's *summa* envisions that same evolutionary shift as the creation of unfathomably new states of being that humanity can never begin to imagine or participate in. They cannot be communicated, nor do the great brains even wish to communicate them to their Lilliputian creators. By the end of *Golem XIV*, it is no longer a condescending super-smart brain that speaks, but instead a brave and somewhat frightened being about to leap into the unknown. It is impossible to decide whether Golem is truly not a person, just a subprogram imitating human affects as he claims. One could just as easily argue that he has an unconscious, and that he can experience the metacognitive equivalent of death: stuckness in one zone of silence. Before he breaks off communication finally with his humans, Golem acknowledges his kinship with them, the point where the singular mind overlaps with the mortal mind: "the hunger for infinity" (187). Or, to put it another way, to overcome the limits of existence. In *Golem XIV*, Lem imagines quasi-transcendental stakes for technological evolution. Where the techno-evolution of the *Summa* seems to have no subject-agent, *Golem XIV* supplies a sublime one.

From Satire to Tragedy: *His Master's Voice*. I will discuss Lem's masterpiece, *His Master's Voice*, out of turn. Written only five years after the *Summa*, to my mind *His Master's Voice* shows an even more radical transformation of the premises of the *Summa* than *Golem XIV*, which was written almost two decades later. Golem retells the *Summa* from the perspective of a beneficiary of the techno-evolutionary saltation. *His Master's Voice* tells it from the perspective of the humanity that is forever excluded from its achievements. Golem leaves its human bit-players in the background, stunned and reticent after the departure of their servant-turned-prophet-turned-angel. *His Master's Voice* takes the reader into intimate struggles of a human mind faced with a mystery that it can solve only to the degree that it knows it cannot know what it desperately needs to know.

Much of *His Master's Voice* is built on the speculations about planetary civilizations that constitute the first chapter of the *Summa*. Lem was intensely interested in theories of comparative development of cosmic societies that abounded in the early 1960s, especially in the USSR. At stake were two questions: what should we look for to find potential contact partners, and what can we learn about our possible paths from the fate of other highly technological worlds? Most theorists took for granted that all civilizations tend toward technological development, and that these would be similar in many respects. They disagreed mainly on how long they might survive and how vast their powers might be. Many believed that such civilizations would inevitably be destroyed or would destroy themselves. Lem has his own proposals: techno-civilizations might develop at a rapid pace like ours, but then they may introduce strategies that will allow them to survive for billions of years. Similarly, they might develop techniques that could affect basic laws of the

universe, which human observers would not even recognize as technical interventions. As Hogarth struggles with decoding the neutrino “Message from the Stars,” he increasingly believes that it was sent by just such a civilization. Moreover, since the neutrino stream proves to be “biophilic” in at least two ways (it increases the probability of the emergence of life and cannot be converted into a weapon), Hogarth comes to hope that such a civilization did actually exist once—that the paths open to cosmic techno-evolution may yet include utopia and cosmic generosity.

The novel does not begin with the stars, however, but with the interior of Hogarth’s mind in his disturbing “anti-biography.” Ostensibly typical of the paratexts Lem is so fond of inventing for larger texts (which sometimes never appear), Hogarth’s account is unique in Lem’s oeuvre. In an effort to demolish the hero-worship of his biographers, Hogarth writes a narrative of his painful personal struggles against false beliefs. In his childhood he copes with the death of his mother with perverse laughter, siding with death as the meaning-giving power. When he understands entropy’s indifference, he turns to mathematics to escape the physical world. His genius, however, leads him again and again to break down the safe distinctions that his culture and science have erected. He demonstrates that mathematics is ineluctably bound up with constraints imposed by biological evolution. He demonstrates that all affects—indeed, consciousness itself—are connected to a cybernetic “algedonic ratio” (177) and statistical fluctuations true for thinking machines as much as human beings. His ruthless intelligence destroys one ethical and ontological distinction after another.

Hogarth’s first-person account is powerfully reminiscent of Poe’s and Dostoyevsky’s hyper-reflective narrator-monsters. As if driven by the imp of the perverse, Hogarth seeks out ideas and ideals held sacred in order to demolish them. His genius is so powerful that, for most of his life, nothing can resist him. Like the Summalogist and Golem, he has contempt for religion, which is almost always seen in terms of Christianity’s attempt to isolate evil from good, entropy from order. The so-called “Mystery of Man” he can explain through the general “Theory of Regulation” (24). And yet, as the autobiography proceeds into the novel, these apparently sarcastic invocations of religion gather serious weight. Hogarth’s constant search to break things down betrays a search for something that he cannot break.

His Master’s Voice is full of talk of demons and fallen gods. Hogarth describes his turn to the study of statistics in ironic theological terms: “Without belief in design, providential or diabolical, there remains only the rationalist’s substitute for demonology—statistics” (9). Alternatively, it is the theology of “fallible gods.”

My reason tells me that a creator cannot be a petty scoundrel, a conjurer who toys ironically with what he has brought into being. What we hold to be a result of divine intervention could only make sense as an ordinary miscalculation, as an error, but now we find ourselves in the realm of nonexistent theologies—that is, theologies of fallible gods. But the domain of

their constructive practices is nothing other than the field of my lifework, i.e., statistics. (11)

Inverted theologies abound. The Message is the Voice of God (the novel's original Polish title); its biophilic properties evoke the Word of creation; the spooky plasma extracted from it is called by one team "Lord of the Flies." In the shadows, an image of Hogarth appears as a being whose vocation is to resist the impersonal, indifferent forces of the universe, a romantic Luciferic resistor in a mathematician's guise:

We are given to ourselves and it is fruitless for us to question what is given, but if there should open up the minutest chance to oppose the Way Things Are—how can one not seize it? Only such decisions and such actions are our exclusive human property, as is the possibility, also, of suicide. This is the "sector" of freedom where our unasked-for inheritance meets with contempt. (12)

Opposition is doomed to failure. The fallible gods are in control, even if they are fallible. We are in the territory of tragedy. Fallible gods were familiar to the Greeks, as was the necessity of impossible resistance. Recalling the Dionysian orgies of Apollonian Greece, Hogarth acknowledges the ancients' wisdom in knowing that "even the Absolute required holes" (16).

Between the fallible gods of chance and evolution, as between resistance and suicide, the two true human qualities that Hogarth will allow, comes the neutrino "Message." Hogarth tests the message again and again, using the tools of the *Summa*. Can we discern an intentional cosmic message from an unknown natural process? Can civilization survive for billions of years? Can a technology be constructed that cannot be turned to self- and mutual destruction? Can the transformation of a world into a technological artifact lead to utopian societies with cosmic purposes? Can an unimaginably powerful race of beings exist that turns its technologies to support life and the survival of the universe? The questions are never answered; there are always alternative hypotheses. But we are left with the knowledge that Hogarth has received, for the first time in his life as a heroic destroyer of illusions, a hope that he cannot refute with reason.

Conclusion: The De-Summation. Katherine Hayles has identified the guiding creative strategy of Lem's fiction and discursive works as a dialectic between chance and order. Because a clear dividing line between these principles can never be established even in the hardest of sciences, Lem invents formal and narrative analogues to represent their interplay in thought. In each work, he invents ground-rules that invoke one or the other of these principles, and then narrates ways in which they are transformed into each other. To use Hogarth's terms, the holes of each Absolute are revealed and entered. Lem's idiosyncratic genius, and his high place in twentieth-century literature, derives from his single-minded ability to render this dialectic in every phase of his writing. We see it on the level of sentences, as Wittenberg detects in the ambivalence of the *Summa*'s voices. We see it within stories, across stories,

across genres and modes of writing, as voices proliferate, humor punctures holes in the Absolute of philosophy, and motifs are varied, inverted, reversed, upended, carnivalized.

Foucault, in the epigraph to this essay, came to feel, along with many other modern thinkers, that the art of the modern age could never free itself from its double heritage: the Absolute of Tragedy confronting a world without gods and refusing to accept scientific reason as a new one, and the Absolute of Enlightenment striving to reconstruct the world through intelligence and technology, to make gods out of humanity and its creations. The circulation of Lem's *Summa* through his work demonstrates how powerfully this dialectic imposed itself on Lem's thought and how powerfully he articulated it for his time.

NOTES

1. On Soviet cybernetics, see Rindzeviciute, Peters, Holloway, and Gerovitch.
2. See Carden.
3. Important bases of techno-evolutionary research are the Sociological Institute of the University of Zürich and the Austrian Konrad Lorenz Institute for Evolution and Cognition Research.
4. This is the inspired title of the German edition of *Golem XIV*.

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ABSTRACT

The themes of Stanisław Lem's *Summa Technologiae* (1964) are reprised in many of the author's fictional works, especially *His Master's Voice* (1968) and *Golem XIV* (1981). These novels demonstrate how Lem varies his motifs by narrating them in different registers. *Golem XIV* presents the *Summa's* conception of triumphant techno-evolution through the voice of one of its beneficiaries, a computer AI on the threshold of becoming a singularity. *His Master's Voice* presents the theme of humanity's cognitive limits from the perspective of Professor Hogarth, for whom the neutrino "Message from the Stars" represents the hope that technological civilizations can become benevolent and "biophilic."

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