Science Fiction’s Imagined Technologies

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IN ALGORITHMS WE TRUST: MAGICAL THINKING, SUPERINTELLIGENT AI AND QUANTUM COMPUTING

*by Nathan Schradle*

*Abstract.* This article analyzes current attitudes toward artificial intelligence (AI) and quantum computing and argues that they rep- resent a modern-day form of magical thinking. It proposes that AI and quantum computing are thus excellent examples of the ways that traditional distinctions between religion, science, and magic fail to account for the vibrancy and energy that surround modern technologies.

*Keywords:* artificial intelligence; magic; quantum computing; religion and science; technology

The eschatological enthusiasm that surrounds artificial intelligence (AI) in the twenty-first century is often headline grabbing. Silicon Valley en- trepreneur Anthony Lewandoski’s Way of the Future Church, officially registered with the IRS as a religious organization, is a prime example. Lewandoski claims to be devoted to, “the realization, acceptance, and wor- ship of a Godhead based on Artificial Intelligence (AI) developed through computer hardware and software” (Harris 2017). Though Lewandoski’s church has faded from the headlines since its creation, similar eschatolog- ical enthusiasm is invested in AI by other wealthy tech elites like futurist and Google Director of Engineering Ray Kurzweil, who asserts that the relatively imminent arrival of the Singularity, a single global networked consciousness composed of all individual organic and carbon-based in- telligences, will be tantamount to the creation of a God and signal the end of human suffering (Kurzweil 1999, 2005, 2012). The undeniably

religious idiom employed by many influential figures at big tech firms is so prevalent that it has long since caught the eye of scholars seeking to demonstrate the affinity between such utopian technological prognosti- cations and centuries-old Christian millenarian movements and monastic traditions (Noble 1999; Geraci 2010). Erik Davis, for one, insists on the spiritual significance of such endeavors, writing that “regardless of how secular this ultramodern condition appears, the velocity and mutability of the times invokes a certain supernatural quality that must be seen, at least in part, through the lens of religious thought” (Davis 2004, 4).

In this essay, I take up Davis’s injunction to examine the enthusiasm that surrounds AI and quantum computing “through the lens of religious thought,” but in a way that I have not encountered in scholarship on the issue. Specifically, I propose that popular scientific thinking about AI and other algorithmically afforded technologies (most recently quantum com- puting) represents a modern version of what religious studies scholars have long associated with magic and magical thinking. I am wary that equating AI with magic may seem facile, given that Arthur C. Clarke’s famous “third law” stating that “any sufficiently advanced technology is indistinguishable from magic” has become a well-known, almost clichéd reference point in this kind of work (Clarke [1962] 2000, 36). Still, the following analysis opens creative pathways for reconsidering what scholars have made of the intersection of magic, religion, and science in modernity, especially as it pertains to the theoretical and conceptual delineations made between the three spheres of thought.

Of course, the boundaries between religion, science, and magic are not

the only ones being blurred in contemporary society. Especially when it comes to prognostications about the future of technology, the easy dis- tinctions between fact and fiction start to similarly collapse. This is espe- cially true in the contemporary mediasphere, where movies, books, and television shows are constantly discussed and dissected by critics and fans. As one example, a simple Google search for “why is everyone so obsessed with Zombies” will turn up endless hits for online articles published on be- half of entities ranging in seriousness and political leaning from Mashable to NPR and the Federalist analyzing the sheer volume of zombie-based entertainment and tying it to deeply serious concerns about the state of politics, climate change, and other large-scale threats that are percolating in the contemporary zeitgeist. The marketing for movies and television shows often plays on this modern development. For example, the creator of the dystopian technology anthology television series *Black Mirror* ini- tially promoted his now popular show as a set of one-off stories about, “the way we live now—and the way we might be living in 10 minutes’ time if we’re clumsy” (Brooker 2011). *MIT Technology Review* publishes stories about the impending climate disaster by science fiction authors like Paolo Bacigalupi alongside its more straightforward reportage about

technological innovations meant to combat climate change (Bacigalupi 2019). While the idea that art and works of fiction might have some- thing to say about the real world is certainly not a new concept or only true of the twenty-first century, it is undeniable that modern mass me- dia entertainment such as television is more available to a broader pub- lic and more intensely analyzed by a larger mass of critics and schol- ars than ever before. It is also undeniable that AI has currently cap- tured the cultural imagination to such an extent that it appears in nearly every form of media constantly, even relentlessly. Focusing on the current cultural enthusiasm for AI opens up a means of examin- ing the blurring boundaries between fiction and fact and the produc- tion of a collaborative fictive disposition toward AI, quantum com- puting, and the many technologies that announce, in the apocryphal words of acclaimed cyberpunk author William Gibson, “the future is already here.”

This fictive disposition collapses boundaries between fact and fiction,

reason and imagination, procedure and creativity. By exploring the notion of cutting-edge technology as “magical,” I hope to demonstrate how pub- lic perceptions of the brave new world we are creating through AI and other innovations chafe against longstanding conceptions of the relation- ship between modernity and rationality in spite of the pseudo-scientific vernacular in which they are couched.

# Magic and Modernity: A Brief Genealogy from Religious

Studies

The myth of a disenchanted modernity was based not on banishment of religion from the world but rather of magic. Religion was certainly thought more and more to be a private matter of one’s personal belief, but magic and belief in magic were outright expelled from what was supposed to be the modern worldview. Many scholars have pointed out that Max Weber’s famous statement about the “disenchantment of the world” is probably more accurately translated from the original German as “the de-magic-ing of the world.” As Jason Josephson-Storm (2017, 4) writes, “if there is one thing we’ve been taught to take for granted, it is that the contemporary, industrial, capitalist societies of Western Europe and North America have lost their magic, and that it is this absence that makes them modern.” Josephson-Storm is not alone in this analysis. Randall Styers has previ- ously argued that, “one common feature throughout these debates [about modernity] is that magic is an archetypically nonmodern phenomenon. Magic has offered scholars and social theorists a foil for modern notions of religion and science and, more broadly, a foil for modernity itself ” (Styers 2004, 8).

This line of argument is compelling. In the decades leading up to We- ber’s famous declaration, scholars in the nascent social sciences seeking to delineate between religion and science often saved their most sneering criticism for what they considered to be magic or magical thinking. In the intellectualist tradition, early anthropologists Edward B. Tylor (1871) and James G. Frazer ([1900] 1951) considered magic to be a primitive mode of understanding, one that was superseded by religious belief and ultimately by scientific knowledge as cultures evolved into more and more complex forms. The evolutionist model these thinkers employed has ob- viously long since been discredited, but I want to focus on Frazer’s articu- lation for a moment, since we will return to it briefly in the next section. Magic, Frazer argued, was based on the magician’s faulty assumption that “things act on each other at a distance through a secret sympathy,” one that was typically referred to as “an invisible ether” (Frazer [1900] 1951, 54). Of course, in Frazier’s view such talk of “secret sympathies” gave way to the more sophisticated explanations of theology, and then ultimately to scientific description and explanation.

Many other early twentieth century anthropologists and sociologists

sought to develop their own delineations between science, magic, and re- ligion, including such landmark figures as Emile Durkheim and Sigmund Freud. However, the particularities of those delineations do not really con- cern us here, since by the latter half of the twentieth century and extend- ing into the present day discerning religious studies scholars do not really consider the boundaries between these categories to be so hard and fast. This acknowledgment can be said to begin with Claude Lévi-Strauss, who argued that the distinction between magic as a fundamentally subjective practice and science as objective did not hold since, as Styers explains, “magic is based on the fundamental belief that humanity can intervene in the natural world to modify or add to its system of determinism” (Styers 2004, 9). Or, as Lévi-Strauss (1966) himself wrote:

Religion consists in a *humanization of natural laws and magic in a natural- ization of human actions*—the treatment of certain human actions *as if* they were an integral part of physical determinism. The anthropomorphism of nature (of which religion consists) and the physiomorphism of man (by which we have defined magic) constitute two components which are always given, and vary only in proportion. As we noted earlier, each implies the other. There is no religion without magic any more than there is magic without at least a trace of religion. The notion of a supernature exists only for a humanity which attributes supernatural powers to itself and in return ascribes the powers of its superhumanity to nature. (220–21)

Ultimately, it is this insight of Lévi-Strauss’s that leads me to assert that our modern relationship to technology is inherently magical. As we shall see in the next section, what are the popular science advocates of AI discussing

if not “the physiomorphism of humanity” or “adding to nature’s system of determinism?”

# AI Innovators’ Magical Thinking: The Promises of ai and

“The Religion of Technology”

Beginning in the mid-1970s, as personal computers first became avail- able and the technologies that would form the backbone of the original “world wide web” were being developed, enthusiasm for this new-found digital technology reached new heights. The blossoming of information theory and cybernetics reshaped the physical and biological sciences, as well as providing a communicative and ontological bridge between the natural world and the engineered world of machines. Computers could be encoded via algorithm the way that humans and all living things were encoded via their DNA. One could be either constructed or treated as a facsimile of the other. Inspired by an earlier generation of cybernetic thinkers such as W. Ross Ashby and Norbert Wiener, researchers began to act upon the idea that machines (especially computers) were both the means of better understanding and improving upon human biology, es- pecially as it pertained to human intelligence. Computer models would enable more accurate modeling of the brain and advances in technology would enable scientists to build artificial brains that lacked the foibles and imperfections of the actual organs. A vocal cadre of AI researchers cast themselves as the harbingers of a new era in which humans could escape the fleshly entombment of the body via mind uploading, the con- struction of artificial replacements for failed organs, and other postulated techniques.

Hans Moravec was one of the first to prognosticate that these digital

technologies would fundamentally reshape the human experience both biologically and intellectually. He argued that the ability to transfer hu- man minds into computers would result in the practical attainment of immortality, through a process in which human intelligence learned to “constantly [improve] and [extend] itself, spreading outwards from the so- lar system, converting non-life into mind” (Moravec 1978, 6). Scientists’ ability to discern the patterns of the brain, he said, would allow them to perfectly (albeit artificially) replicate those patterns. This would theo- retically lead to what Moravec called the “Age of Mind,” in which hu- mans occupy a perpetually networked mental space known as the “Mind Fire.” This process, Moravec argued, would “leave a subtler world, with less action and even more thought, in its ever-growing wake” (Moravec 1999, 163). Most significantly, Moravec promised that the era of hu- man existence overseen by the Mind-Fire would be one in which hu- mans finally have control over their evolutionary future (Moravec 1999, 158–59).

Already, one can easily see how this type of thinking might be described as “magical” in the sense highlighted above. “Nature’s system of deter- minism” had been discovered to be informational and thus subject to the kinds of rules of feedback, regulation, and communication that likewise governed the virtual world of computers. Thus, the knowledgeable could use these new computerized machines to unlock the mysteries of both the cosmos and the human mind. To translate this directly into Levi-Strauss’s terms, the human action that constituted an “integral part of physical de- terminism” was the capacity to shape and model previously uninvestiga- ble natural processes using computerized technology. The reward for this process would be the “physiomorphism of man,” as human increasingly integrated with machines and joined Moravec’s “Mind Fire.”

It is therefore unsurprising that Moravec argued that the “inhabited por- tions of the universe will be rapidly transformed into cyberspace…where

every bit will be part of a relevant computation or will be storing a use- ful datum” (Moravec 1992, 15; 1999, 166). “Once boring old Earth is swallowed by cyberspace,” Moravec asserted, it will be free to “host as- tronomically more meaningful activity” (Moravec 1999, 167). To follow Moravec’s argument to its conclusion, the Mind-Fire will converge into a “final bubble of Mind,” such that our traditional notion of time will col- lapse, and “entire world histories,” and other, more traditionally religious promises, specifically the resurrection of the dead, will be made possible by the global mental-collective-as-computer-processor (Moravec 1999, 167). Ray Kurzweil likewise emphasizes mind-uploading and melding via technological means (what he has referred to throughout his career as “the Singularity”) as the ultimate goal of technological innovation in his own work (Kurzweil 1999, 260; 2005, 487). In an explicitly religious idiom, he imagined it will “ultimately infuse the universe with Spirit,” and, in so doing, make life “truly meaningful” (Kurzweil 2005, 389). This, of course, leads to any number of happy circumstances that humans will experience once their minds are allowed to roam free as part of the Mind-Fire, in- cluding the end of all need, the end of nationalism and war, immortal- ity, and the infinite expansion of intelligence (Geraci 2010, 36). In other words, the Mind-Fire will bring about an end to the most directly felt limitations and hardships experienced by modern bodies, both individ- ually and collectively. For these reasons, Moravec argued that roboticists were and are leading us in the final phase of evolution (Moravec 1988, 2). Danny Hillis (2001) refers to the AI revolution as, “one of those rare times in history when humanity transforms from one type of human soci- ety to another”—Levi-Strauss’ “physiomorphism of man” once again (29– 30). Kurzweil (with his typical bluster) goes even further, arguing that, “the emergence in the early twenty-first century of a new form of intelli- gence on Earth that can compete with, and ultimately significantly exceed,

human intelligence will be a development of greater import than any of the events that have shaped human history” (Kurzweil 1999, 5).

Despite this affinity with magical thinking, these thinkers reach for the idiom of religion, long associated with notions of salvation and tran- scendence, to describe their ideas. Given the monumental and virtually miraculous nature of these imagined shifts, it is little wonder. One of the few (and certainly the most thorough and forceful) academic works to highlight the religious elements of these prognostications, Robert Geraci’s *Apocalyptic AI* (2010), deals with exactly these issues. Geraci’s genealogy of “Apocalyptic AI” draws on the work of Moravec, Kurzweil, and so on to compare these AI researchers’ claims about transcending the body and entering into a state of “pure mind” with the mind-body dualism of first and second century Christian and Jewish apocalypticists. Specifically, he suggests that “Apocalyptic AI promises to resolve the problems of dualism and alienation in a radically transcendent future where we forsake our bi- ological bodies in favor of virtual bodies that will inhabit an omnipresent and morally meaningful cyberspace” (Geraci 2010, 9).

In so doing, he argues, “Apocalyptic AI sets up values and practices

designed to transport the human being from a state of ignorance, embod- iment, and finitude to a state of knowledge, immateriality, and immor- tality” (Geraci 2010, 139). Geraci also locates this scientific pursuit in a broader pop-cultural frame, particularly in the pages of *Wired* magazine, in which founding editor Kevin Kelly and frequent contributor Margaret Wertheim have advocated a “Nerd Theology” that imagines cyberspace as the means of fulfilling a “psychological, religious void” (Wertheim 1999, 30) and the programmers of computerized worlds as the gods of their own theological systems (Kelly 1999, 389).

Geraci’s argument is compelling precisely because it identifies religion in a movement that is not always quick to embrace that label even as it co- opts its thematic language. William Sims Bainbridge, for example, imag- ines that improved cognitive sciences based on AI innovations will squeeze out the last of our religious superstitions (Bainbridge 2006, 207–08), even as he sends National Science Foundation funding to Hans Moravec and the Carnegie Mellon Robotics Institute. However, Kurzweil, a former em- ployee of the Institute, has not only proclaimed the spiritual significance of the Singularity, but likewise written that he believes intelligent machines will in fact be *more* spiritual than human beings, and that, in the future, these machines will gather in both real and virtual houses of worship for re- ligious purposes (Kurzweil 1999, 153). Hence, Kurzweil argues, we “need a new religion” to enhance morality and encourage the spread of knowl- edge (Kurzweil 2005, 374–75).

The broad spectrum of attitudes toward traditional religion and AI’s re-

lationship to it is best represented by the juxtaposition between Hugo de Garis’ work in *The Artilect War* (2005) and the incredibly influential work

of Marvin Minsky, the founder of the Computer Science and Artificial Intelligence Lab at MIT. De Garis imagines “the Artilects” (his phrase for the super-intelligent robots connected via a hive mind that humans are on the verge of building) as literal gods, worthy of reverence and worship. He describes faith in the “Artilect mission” as a “powerful new religion” (de Garis 2005, 105) that should, in due course, supplant the “superstition of older religious systems by providing its faithful with incontrovertible evidence (de Garis 2005, 94). Minsky (1985), on the other hand, is per- petually dismissive of religion, claiming that the various beliefs regarding souls manifest in religious modes of thought throughout history are, “all insinuations that we’re helpless to improve ourselves” (41). In his science fiction novel, *The Turing Option*, Minsky reiterates that souls do not exist, and that belief in gods of any kind is an “invalid” superstition (Minsky 1992, 386).

These two positions toward religion could not be more diametrically

opposed. However, these views are not really so different, but instead are using the term “religion” for different rhetorical purposes. Whether it is imagined that AI will bring about a “new religion” to supplant the false superstitions of the old one or eliminate the need for religion entirely, “religion” as a category is being employed in all these views as an epis- temological mode that addresses the existential concerns of people who lack the intellectual resources (cultural or personal) to fully recognize and grapple with the reality of the situation. The falsity of these traditional religions is proven in AI researchers’ minds by their failures to make good on any of their promises—the end-times have not come, there is no proof that Heaven exists, much less of eternal life through an immaterial soul, and so on. When these AI apocalypticists go so far as to describe the ‘new religion’ that will emerge as a result of the blossoming of the Mind- Fire/Singularity/Artilects, it is proposed in the sense that, at long last, sci- ence’s capacity to radically re-frame human experience and intelligence through artificial means will bring about the revelation long hoped for but never received. Even the dupes who practice religion, it seems, will be forced to recognize the vastly improved human circumstances produced by these technologies in the face of the monumental, landscape-shifting evi- dence to come. However, by setting themselves up as the progenitors of a science so powerful it will fulfill the previously empty promises of religion, these men either blithely ignore or remain unaware of the resemblance of their ideas about the promise of deliverance through technology to earlier magical notions in the Levi-Straussian vein.

Geraci argues that the researchers and advocates he analyzes, whether

consciously or not, adopt the language of religion as a kind of appeal to the public. Geraci writes, “apocalyptic AI advocates have been more suc- cessful… in part because they use religious categories to heighten the al- lure of their subject matter…[it] will not likely appeal to the traditionally

religious faithful, but it finds a ready audience among the religiously dis- affected who might find a ‘powerful new religion’ and a new kind of god to worship in the movement’s promises” (Geraci 2010, 61–62). He moves from there to point out how drumming up religious levels of enthusiasm for AI research is a clever way to drive the enthusiasm that leads to in- creased levels of funding, which he suggests may be the ultimate goal.

# AI and Cutting-Edge Technology as Magic

This is where Geraci’s otherwise brilliant and articulate argument goes slightly astray. On a practical level, it elides the realities of the broader careers of these AI researchers. Put simply, none of these men are desper- ately in search of funding given the current financial enthusiasm for AI, nor will they be should the more bombastic elements of their prognostica- tions fail to come to pass. Rather than being a central, defining element of their careers, most of their bold prognostications have little to do with the work for which they have been formally recognized. In Kurzweil’s case, he has been lavished with public praise for his more practical research. He was both named one of PBS’ “Revolutionaries Who Made America” and hailed as “Edison’s rightful heir” as one of the “most fascinating” entrepreneurs in the United States by *Inc.* magazine. In both instances, his work with optical- and speech-recognition patterns leading to machine learning in- novations and not his popular scientific writings earned him such praise. The story with Minsky is quite similar—he was the inventor of the first functioning neural network (the Stochastic Neural-Analog Reinforcement Computer, or SNARC) in 1951, as well as some of the first programmable robots. He was also a major innovator in machine learning, and founded and ran the MIT Artificial Intelligence Lab for 15 years. As such, both men have engaged in continuously self- and investor-enriching work dur- ing nearly every step of their careers. In so doing, he aims to call into question the distinct boundaries between the categories of “religion” and “science” and to challenge prevalent narratives that associate the modern world with disenchantment. This is a worthy goal, but one that can be even more productively explored by re-installing the category of “magic” alongside those of “religion” and “science.”

To further explore this link, a detour through the dawning era of quan-

tum computing is necessary alongside a reexamination of AI There is no more curious example of the collapsed boundaries between the categories of magic and science than quantum theory. The quantum realm forms a kind of “invisible ether” through which the observable world of classical physics moves. Quantum entanglement dictates that things, in this case electrons or photons, act on one another at even unimaginable distances. Even the world’s most knowledgeable scientists are still sorting out the process, what one might call a “secret sympathy” if Einstein had not so

famously dubbed it “spooky action at a distance.” In short, Frazer’s theory of magic developed at the turn of the twentieth century maps onto one of the most advanced scientific theories that modern science has devised. At the same time, the leaders of major companies and research teams work- ing in the field invoke exactly the kind of magical thinking that the earlier generation of AI researchers engaged in.

# Pulling Rabbits out of Black Boxes: The Current State of

AI and Quantum Computing

On October 23, 2019, as I prepared the original draft of this article, the Google AI Quantum team published an article in the journal *Na- ture* announcing the achievement of “Quantum Supremacy,” the act of building and programming a quantum computer that can quickly com- plete a task that a classical computer simply cannot complete in any practical amount of time. In this particular instance, the quantum com- puter, dubbed “Sycamore,” took a mere 200 seconds to accomplish what the Google team estimated would have taken 10,000 years on a super- computer composed of roughly 100,000 classical central processing units (Arute et al. 2019). Google’s claims may be a bit overblown—IBM claimed on their research blog on the very same day that the Summit supercom- puter it installed at the Oak Ridge National Laboratory last year could actually store all of the relevant data generated on its immense hard drives and simulate Google’s results in a mere two and a half days. How- ever, whether or not Google has actually achieved “quantum supremacy,” this announcement is undoubtedly a major milestone in the history of computing.