

Artificial Intelligence, Networks, and Spirituality

with Mark Coeckelbergh, "The Spirit in the Network"; Lawrence Tamatea, "Online Buddhist and Christian Responses to Artificial Intelligence"; Robert M. Geraci, "The Popular Appeal of Apocalyptic AI"

THE POPULAR APPEAL OF APOCALYPTIC AI

by Robert M. Geraci

Abstract. The belief that computers will soon become transcendently intelligent and that human beings will "upload" their minds into machines has become ubiquitous in public discussions of robotics and artificial intelligence in Western cultures. Such beliefs are the result of pervasive Judaeo-Christian apocalyptic beliefs, and they have rapidly spread through modern pop and technological culture, including such varied and influential sources as *Rolling Stone*, the *IEEE Spectrum*, and official United States government reports. They have gained sufficient credibility to enable the construction of Singularity University in California. While different approaches are possible (and, indeed, are common in Japan and possibly elsewhere), this particular vision of artificial intelligence and robotics has gained ground in the West through the influence of figures such as Hans Moravec and Ray Kurzweil. Because pop-science books help frame public discussion of new sciences and technologies for individuals, corporations, and governments alike, the integration of religious and technoscientific claims made by their authors should be clear and open for public and scientific debate. As we move forward into an increasingly robotic future, we should do so aware of the ways in which a group's religious environment can help set the tone for public acceptance and use of robotic technologies.

Keywords: artificial intelligence; Ray Kurzweil; Hans Moravec; religion; robotics; science; Singularity University; transhumanism

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[*Zygon*, vol. 45, no. 4 (December 2010)]

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www.zygonjournal.org

The rapid deployment of robotic technology into industrial and commercial spheres over the past decade and, as expected, into the coming years means that we must appreciate the social role played by robotics and artificial-intelligence (AI) research. At present, popular-science books written by Hans Moravec, Ray Kurzweil, and others significantly influence cultural perceptions of these fields in the United States and elsewhere. Such pop-science books have powerful religious underpinnings, advancing traditionally Judaeo-Christian aims of freedom from worldly constraints, acquisition of eternal salvation, and the resurrection of the dead. First Moravec, and later Kurzweil and others, argued that cultural and technological evolution would lead inevitably to supremely intelligent machines that could take over the universe, and human beings would join this cosmic destiny by uploading their minds into machines and thereby living forever. Although such promises may seem fantastic, they help structure public discussion of robotics and therefore are of considerable importance, whether or not they are plausible. And many experts believe them to be so.

Because pop-science books help frame public discussion of new sciences and technologies, the use of religious claims within them should be open to public debate and explanation. Insofar as we allow cryptotheologies to drive public discourse around robotics and AI, regardless of whether those theologies make accurate predictions, we necessarily accede to particular reasons for funding robotics (publicly and privately) and situate robotics and the hypothetically intelligent robots of the future within social networks as defined by the religious logic of pop science.

The theological aspects of Apocalyptic AI (defined below) are not always camouflaged. Kurzweil argues that this work is a “spiritual quest” (1999a, 185) and refers to the need for a new religion (Kurzweil 2005, 374; see also de Garis 2005, 104–5). Whether hidden or explicit, such religiosity is lost by commentators who miss the intellectual honesty with which the Apocalyptic AI authors advance their spiritual claims.¹

As our technological powers expand, we should be aware of the ways in which a group’s religious environment can help set the tone for public acceptance and use of robotic technologies. Different religious environments promote different ways of thinking about robotics and public life. In shaping our futures, and in seeking to guarantee the ethical use of robotic technology, we should attend to our religious environments and carefully consider how those environments offer diverging perspectives on technology. The diffusion of apocalyptic theology throughout fictional, professional, and government policy descriptions of robotics and AI and the financing of and popular publicity for Kurzweil’s Singularity University demonstrate the power that religious discourse has in technological progress.

RELIGIOUS SYSTEMS IN POPULAR ROBOTICS

The Western World—Apocalyptic AI. Although we should always hesitate before assuming that any system of belief or practice is monolithic across even one culture, much less many, it remains observably true that an apocalyptic theology prevails in recent pop-science books on robotics and AI. The pop-science authors almost uniformly reject the existence of the Judaeo-Christian God, but they use Judaeo-Christian themes of salvation to provide their books with cultural authority (Geraci 2007; 2010, 56–82). This kind of pop science, which advocates immortality through the uploading of human consciousness into machines and the “resurrection” of the dead through high-fidelity replication of their personalities, has been labeled Apocalyptic AI for its close structural and ideological parallels with Jewish and Christian apocalyptic movements (Geraci 2008; 2010).

Ancient Jewish and Christian apocalyptic movements (as explored, for example, in 2 Baruch, 4 Ezra, 1 Enoch, the letters of Paul, and the Book of Revelation) share the basic understanding that God intends (imminently) to defeat the forces of evil that presently cause good people to suffer. This defeat will end with God’s establishment of a transcendent new kingdom purified of all evil. Because human beings are tainted with sin, they will attain glorified, angelic bodies in which to eternally inhabit this kingdom (Geraci 2008). In the apocalyptic worldview, such changes are preordained as part of God’s divine plan.

The principal texts of Apocalyptic AI are Moravec’s pioneering books *Mind Children* (1988) and *Robot* (1999) and Kurzweil’s massively influential *The Age of Spiritual Machines* (1999a) and *The Singularity Is Near* (2005). These texts gain support from additional authors, such as Marvin Minsky (1994), Kevin Warwick ([1997] 2004; 2003), Hugo de Garis (2005), and, to a lesser extent, David Levy (2006). Although there is some diversity in the exact course of the future according to Apocalyptic AI authors, their historical position offers a course that profoundly parallels that of ancient Jewish and Christian apocalypticism. Moravec and Kurzweil argue that evolution will defeat (very soon!) the bodily limitations that currently alienate human beings. We are slow to learn, quick to forget, and have only a few decades in which to think before life is stolen away from us. Fortunately, the evolution of technology will produce a new world, a virtual world of cyberspace inhabited by transcendently intelligent machines and human minds “uploaded” into machine bodies where they will live forever as “software” (Geraci 2008; 2010).

Apocalyptic AI dualism leads directly to a sense of alienation in the authors’ worldview. They believe that mind and body are separate, with the former being valuable and the latter a drag upon it. The physical makeup of bodies limits individual learning in terms of acquisition, memory, and computation. Indeed, eventually the body will fail and the individual will die. The “wanton loss of knowledge and function,” asserts one author, “is

the worst aspect of personal death” (Moravec 1988, 121). The limitations upon learning and the inevitable dissolution of human minds causes despair among the Apocalyptic AI advocates. Protein-based life forms, they say, will never think as well or (obviously) as long as immortal machines will in the future (Moravec 1988, 74; 1999, 148–49; Kurzweil 1999a, 4; 2005, 8–9; Minsky 1994; Warwick [1997] 2004, 178; de Garis 2005, 103).

Inevitable progress in technology, Moravec and Kurzweil argue, will rescue humanity from the depths of its alienation. They believe that evolutionary history moves inexorably toward a “Singularity” when machine intelligence very rapidly surpasses humankind’s and it simultaneously becomes possible to upload human consciousness into a machine (Moravec 1988, 108–12; 1999, 142–43; Kurzweil 1999a, 126; 2005, 374; Minsky 1994; de Garis 2005, 77–78). One author even suggests that the rise of supremely intelligent machines may be inherent in the laws of physics (de Garis 2005, 175; see also Kurzweil 2005, 390). Drawing upon the success of Moore’s Law, Moravec and others claim that machine intelligence will improve at an exponential rate, resulting in a moment in our near future when such progress proceeds at a truly spectacular pace, causing changes in our society that we cannot predict. Kurzweil believes that Moore’s Law is but one element in a larger Law of Accelerating Returns that demands exponential growth in orderly systems, such as human culture (Kurzweil 1999a, 13–30; 2005, 7–21). As machines become transcendently intelligent, Moravec and Kurzweil argue, we simultaneously will gain sufficient understanding of the brain to permit copying a mind from it into a robot.

It bears noting that a few of the Apocalyptic AI authors disagree on this point. Warwick believes all human beings will become cyborgs, adding computers to our brains rather than forsaking our bodies (Warwick [1997] 2004; 2003). Levy does not precisely describe whether or how human beings will either upload minds or become transcendently intelligent cyborgs (Levy 2006) but expresses an underlying sympathy for Moravec’s and Kurzweil’s position (Levy 2009).

Uploading human minds into machines supposedly will produce a new paradise. Such minds will be freed from the limitations of the body, learning everything they desire to learn and living immortal lives thanks to their own replicability. Uploading our minds thus will resolve the alienation caused by the apocalyptic dualism. At first, such minds will exist within robotic bodies, but eventually even these will be disposed of. We “don’t always need real bodies. If we happen to be in a virtual environment, then a virtual body will do just fine” (Kurzweil 1999a, 142; see also Moravec 1992, 18–20). Rejecting the preeminence of physical reality, the Apocalyptic AI authors believe that cyberspace will be the realm where we fully realize our new potential. With enough computing power at their disposal, postapocalyptic minds will even “resurrect” the dead, simulating them with sufficient resolution as to make them near-perfect or perfect replicas

(Moravec 1988, 122–24; Moravec 1999, 167–68; Kurzweil quoted in Kushner 2009; Kurzweil in Ptolemy 2009). According to Moravec and Kurzweil, because identity is based upon a neural pattern rather than an individual body, the replica will be as good as the original. With our minds enhanced and our dead brought back to life, we shall explore the cosmos and transform it into an enormous, thinking computer. The movement of robots across the universe will be a “physical affair. . . . But it will leave a subtler world, with less action and even more thought, in its ever-growing wake” (Moravec 1999, 163). Kurzweil refers to this as the universe’s awakening, like Moravec arguing that “the ‘dumb’ matter and mechanisms of the universe will be transformed into exquisitely sublime forms of intelligence” (Kurzweil 2005, 21). This transition from the biological and physical world of our present to the transcendent mechanical and virtual world of the future is not just inevitable, according to Apocalyptic AI authors, it also is morally good (de Garis 2005, 13–15, 84; Moravec quoted in Chaudhry 2000).

Japan—Implicit Religiosity. The apocalyptic agenda in Western pop-science books is not the only possible hybrid of religious and scientific thought. Although religion does not have the explicit and obvious presence in Japanese culture that it has in the (especially American) West, traditional Japanese religious beliefs continue to affect the development and reception of robotics in Japanese culture. Over the past three decades there have been examples of robots engaging in sacred roles and participating in cosmic salvation history. These features are tied to the ways in which the Japanese welcome robots into public life (Geraci 2006).

Despite appearances, religion remains influential in Japanese culture, including technoscientific culture. Ian Reader, a well-known scholar of Japanese religions, explains that although the Japanese people he meets regularly assure him that no such thing as Japanese religion exists anymore, “religious ideas, concepts and activities are socially and culturally imbibed without necessarily being explicitly recognised as religious by the performers” (Reader and Tanabe 1991, 12). The presence of Buddhist and Shinto ideas in the public perception of robotics (and, of course, in pop-science books about Japanese robotics) demonstrates this relationship.

Shinto, an indigenous Japanese religious tradition in which spiritual power (*kami*) can be found distributed through natural and supernatural entities, has affected the deployment of robotics in Japan. *Kami* is much like the “sacred” in Western religious traditions; it is that which stands apart, that which deserves reverence. It can be found in natural objects such as trees, rocks, and rivers but also in manmade objects, human beings, and, of course, divine beings. Many elements of the natural world continue to possess this sanctity, even if industrialization sometimes makes it difficult to see (Earhart 1982, 195). Few if any Japanese would label

themselves Shintoist, but the religion persists in Japanese approaches to the natural world (McFarlane 1967, 20).

Although *kami* is much like what we call the sacred, there are differences in the way it reveals a relationship between nature, religion, and science often absent in the West. According to H. Neill McFarlane, “Shinto acknowledges no necessary contradiction between animism and modern scientism” (1967, 26). Indeed, as one commentator has noticed, in Japan, “where the native religion sees *kami* . . . in all the myriad manifestations of nature, it follows naturally that a robot would have a spirit as well” (Reiji 2003, 18). Minoru Asada, cofounder of RoboCup and Professor of Mechanical Engineering at Osaka University, believes that the “animism” in Japanese culture explains why “Japanese people think everything has a mind, everything has a soul. This glass, or the walls, everywhere. People think: ‘This is not a machine, but a friend or partner’” (quoted in Hornyak 2006, 132).

Japanese religion permits an explicit technological sanctity absent in the West, where in recent years the sacred elements have all been camouflaged.² For example, Masahiro Mori has claimed that “robots have the Buddhature within them—that is, the potential for buddhahood” (Mori [1981] 1999, 13). This statement, however popularly repeated by the press, says less than it might appear. Mori himself has denied that we can be sure a robot will ever attain consciousness (King 2007). Thus, it is not at all clear he means that robots will become monks, start meditating, or take on any of the other traditional activities of Buddhism. The buddhahood of robots depends upon the fact that the buddhanature is all-encompassing. Annual rituals exist in parts of Japan that promote a similar sanctity for other technological objects, such as printing blocks (Reader and Tanabe 1991, 46). Robots may not ever become conscious, but in Mori’s account they are a part of the cosmic salvation history of Buddhism.

Both Buddhism and Shinto allow—in some sense—for natural and technological objects to be sacred or to participate in sacred activities. This was perhaps most apparent in the early days of industrial robotics, when the introduction of robots to factories often included rituals performed by Shinto priests and offerings of flowers given by factory workers (Schodt 1988, 196). The interaction of the sacred and robotic technology was apparent even as early as 1928, when Makoto Nishimura’s golden automaton—built for the public celebration of Emperor Hirohito’s ascension to the throne—closely resembled a Buddhist sculpture and was so affective that some Japanese offered prayers to it (Hornyak 2006, 37). Given the easy way in which robots fit within the religious heritage of Japanese culture, it is not surprising that popular books about Japanese robotics take note of the connections between religion and robotics (Hornyak 2006; Mori [1981] 1999; Schodt 1988). The authors of such books are not themselves necessarily driven by religious impulses the way the Apocalyptic AI

authors are, but they recognize the connection between religious life and robotics.

The case of Japan reinforces our belief that religious practices and beliefs directly affect the production and reception of science and technology in a culture. It also shows that alternative narratives to Apocalyptic AI are possible. Which narratives we should embrace and employ, however, remains an open question.

PUBLIC AND POLITICAL INFLUENCE OF APOCALYPTIC AI

Apocalyptic AI in Popular Culture. American pop culture has absorbed the promises of Apocalyptic AI. Although mind uploading and digital resurrection are not yet household words, and they are not yet widely assumed to be true, they appear in popular science fiction books and even in mainstream media. Thanks to his eloquent and enthusiastic advancement of the Apocalyptic AI community's principles, Kurzweil in particular has become a media sensation, attracting attention almost everywhere he goes. The growing presence of Apocalyptic AI contributes to a new religious system, transhumanism, thus reshaping religious practice in contemporary culture.

Many of the chief aspects of Apocalyptic AI have entered the public imagination through science fiction. Such ideas generally drive the plot and therefore are more ambiguous than they are in Moravec's or Kurzweil's books. When science fiction authors such as Charles Stross (2005; 2006) or Cory Doctorow (2003) discuss the Singularity, supremely intelligent machines, or mind uploading, they look for ways in which those things can be problematic rather than purely good. Moravec argues that the expansion of machine intelligence will provide humankind with a "comfortable tribalism" akin to the Garden of Eden (Moravec 1999, 136–37) and then, after we upload our minds, with a meaningful, immortal cyberspace existence (Moravec 1988, 116; 1999, 167). He believes that in the future "antisocial software would sell poorly" (1999, 77) and that it will "soon cease being manufactured" (1992, 52). Stross (2005), however, describes selfish and domineering postsingularity machines (some of them even use uploaded human intellects as currency in their own degenerate economy), and Doctorow (2003) makes mind uploading the linchpin of a mysterious murder committed by perpetrators who wish to transform Disneyland from an animatronic wonderland into a virtual-reality experience. Such authors, despite their refusal to play cheerleader for the postsingularity apocalypse, nevertheless help spread Apocalyptic AI by making its promises familiar and comfortable for their readers.

These science fiction stories normalize (within the framework of the future) new ways in which individuals may see themselves with respect to technology. Literature can justify social structures, of course. According to

no less serious a source than the Association for the Advancement of Artificial Intelligence, science fiction offers “a window to the future [and] a mirror for the present” (AAAI 2007). This sometimes is viewed in an evangelical light. Isaac Asimov, for example, actively hoped that his series of robot novels ([1953] 1991; [1956] 1957; [1983] 1991) might promote a future in which human beings and robots form a joint society. Evangelism clearly is Kurzweil’s intention for his film adaptation of *The Singularity Is Near*, which was accepted by the Sonoma International Film Festival in 2010. Today’s authors may not be taking a political stand or advocating transhumanism; nevertheless they create a worldview that many readers find highly plausible or desirable.

Apocalyptic AI is increasing its standing outside of science fiction. *Rolling Stone* magazine, one of the United States’ premier venues for music and cultural news, profiled Kurzweil in its February 2009 issue (Kushner 2009). The author does not subscribe to Kurzweil’s position and quotes several persons who oppose it, but he gives Kurzweil yet another venue by which to present his argument and gain adherents. The *Rolling Stone* article was promptly quoted in the *Chicago Tribune* (Keilman 2009), another mainstream media assessment of his ideas. He has been favorably discussed in *The New York Times* (Tierney 2008) and has been published in *Scientific American* (Kurzweil 1999b), the opinion section of *The Christian Science Monitor* (Kurzweil 2008), and elsewhere. A biographical film about Kurzweil, *Transcendent Man*, was among only 24 films accepted (out of more than 2,200 submitted) by the 2009 Tribeca Film Festival in New York City. By the time tickets were available to the general public, they were sold out (though some tickets were held to sell to those who lined up early the day of each showing). Apocalyptic AI is rapidly becoming prevalent in pop culture. There is an enormous gulf between Moravec’s first publication about mind uploading in *Analog* magazine (Moravec 1978) and the twenty-first-century reality that such beliefs are so commonplace that they find a home in science magazines, professional journals, and mainstream news media.

The pop-culture presence of Apocalyptic AI has even reshaped religious life and practice. Apocalyptic AI is one genre of a broader category of religious and philosophical viewpoints: transhumanism, the belief that human limitations in lifespan and physical and mental ability can be overcome by rational thought and technology, particularly biotechnology or digital technology. Apocalyptic AI authors tend to shy away from biotechnology in their long-term predictions, though they occasionally reference it as likely to deliver intermediate gains in lifespan and health before human beings use robotics and AI to free themselves from their biological bodies forever. Transhumanism is experiencing solid, if not rapid, growth in membership and the number of believing communities. The links between transhumanism and pop science are deep. As a consequence, such groups have

included Apocalyptic AI luminaries such as Kurzweil and Minsky in the directorship of their organizations.

Groups such as the now-defunct Extropia Institute, the Institute for Ethics and Emerging Technologies, the World Transhumanist Association (now Humanity+), and, most recently, the Order of Cosmic Engineers all advocate transhumanist ideals drawn explicitly, though not exclusively, from Apocalyptic AI. Through these groups, Moravec's and Kurzweil's ideas have been extended into the twenty-first century. The groups generally consider themselves "philosophical" and "scientific" rather than "religious," but they fit within a reasonable definition of religious practice (Geraci in press). Historian of religions David Chidester has defined religion as "the negotiation of what it means to be human with respect to the superhuman and the subhuman" (2005, vii–viii). Transhumanist groups have beliefs and practices engaged in exactly this kind of human meaning-making, all with reference to superhuman states allegedly attainable in the future. The Apocalyptic AI thread of transhumanism is a clear example of what Chidester calls an "authentic fake": a fraudulent set of practices that nevertheless does authentic religious work—providing a sense of transcendence, developing meaning for human activity, establishing communities, and so forth (2005, vii).

Transhumanism is a growing, if still relatively small, movement. The efforts of Apocalyptic AI authors explicitly advance the transhumanist agenda, and the inclusion of transhumanist ideas in science fiction and mainstream media normalizes it. This was an expressed goal for one of the earliest transhumanists, Robert Ettinger, who wrote: "Perhaps some poets and novelists will be moved to make these ideas more particular and dramatic in the next few years, helping to pave the way for superman and create a more active demand" ([1971] 1989, 152). The more familiar and comfortable transhumanist beliefs become, the easier it will be for people to adapt to them and even join transhumanist groups. Such believers would expect robotic technologies to provide godlike powers—perhaps even robotic gods themselves, as de Garis (2005, 104) argues—and the satisfaction of long-standing religious goals such as immortality and the resurrection of the dead. Such expectations would profoundly affect funding priorities and public expectations for robotics.

The transhumanist agenda of Apocalyptic AI has entered our public life and modern religious pluralism and thereby has become an element within contemporary ethics. Indeed, transhumanism must be considered a religious movement with the potential to challenge traditional religions for adherents (Amarasingam 2008). Some commentators have criticized this kind of religiosity as dangerous to human life insofar as it discourages believers from valuing human bodies and lives and directs our focus away from the problems of contemporary life (Hayles 1999; Herzfeld 2002a, b; Horgan 2008; Joy 2000; Lanier 2000; 2010; Nordman 2008). Advocates of

Apocalyptic AI argue that many of our chief ethical and practical dilemmas will be solved in the future. Whether Apocalyptic AI will prove subversive of social justice and environmental movements remains to be seen, but computer specialists, ethicists, social theorists, and theologians already have begun to weigh in on the matter. Apocalyptic AI has a solid presence in our culture, and its influence in the mainstream is growing rapidly alongside the more traditional science-fiction audience.

Apocalyptic AI in the Culture of Robotics and Artificial Intelligence. For the most part, Western research in robotics does not and cannot depend upon the religious promises of Apocalyptic AI. Nevertheless, such beliefs are relatively well known among robotics enthusiasts. Clearly, faith in immortality through mind uploading has little to do with the creation of educational hexapod robots or firefighting robots or hobby humanoid robots. Despite the fact that Apocalyptic AI has no bearing on the details of robotics research, however, it does have a presence among the wider robot-using and -designing communities.

Oddly, the apocalyptic imagination maintains a low profile despite permeating many robotics communities. For example, when I visited Carnegie Mellon University's Robotics Institute, many there said they had never before discussed Moravec's or Kurzweil's claims. Many of the older faculty knew Moravec, however, and many had read *Mind Children*. Although most of the graduate students had come to CMU after Moravec's departure, quite a few were familiar with Apocalyptic AI promises through science fiction.

A survey I conducted shows widespread popularity of Apocalyptic AI books in hobby robotics communities. The survey, promoted by *robots.net* and elsewhere, indicates that fully 30 percent of robotics enthusiasts have read at least one Apocalyptic AI book, with Moravec and Kurzweil by far the most popular authors. With such wide readership among robot enthusiasts, many of whom claim substantial knowledge of the field, Moravec and Kurzweil have a clear avenue to influence how these people perceive the role of robotics.

In artificial-intelligence communities, faith in the Singularity appears more widespread than among roboticists. Well-known virtual reality pioneer Jaron Lanier bemoans the popularity of Apocalyptic AI, claiming that "Singularity books are as common in a computer science department as Rapture images are in an evangelical bookstore" (Lanier 2010, 25). Likewise, philosophers who study cognition and artificial intelligence hold conference sessions devoted to concepts surrounding the Singularity, including the Society for Machines and Mentality (now a special interest group of the International Association for Computing and Philosophy), which in 2007 and 2009 hosted conversations about the Singularity, and the European Association for Computing and Philosophy, which issued a call for papers on "Technological Singularity & Acceleration Studies" in 2010.

Apocalyptic AI in the IEEE. Further proof of the growing significance of Apocalyptic AI appeared in the June 2008 issue of the *IEEE Spectrum*, which produced a “Special Report” on the singularity. The *Spectrum* is the flagship publication of the Institute of Electrical and Electronics Engineers and has a circulation of more than 385,000 professionals worldwide. Most of the authors in the report suspect that the Singularity is at best a long way off and probably impossible altogether. Nevertheless, the mere fact that the *Spectrum* considered a report on the Singularity to be worthwhile indicates the growing presence of Apocalyptic AI in digital technology and engineering circles.

Contributors to the *Spectrum* report include well-known scholars in neuroscience, robotics, philosophy, and economics. Most of them agree with Moravec and Kurzweil that the human brain is a computer and that, in principle, it could be equaled by a computer. They almost uniformly believe, however, that this feat is centuries away at the earliest. Some of the contributors oppose all talk of a Singularity (Horgan 2008; Nordman 2008) while others think it enormously premature (Adee 2008; Brooks 2008; Jones 2008; Zorpette 2008). According to Kurzweil, this kind of doubt hinges upon a linear understanding of history rather than the exponential view of history explained by the Law of Accelerating Returns. The report also includes two essays advancing faith in the Singularity (Hanson 2008; Vinge 2008). Although the report does not advocate belief in the Singularity, and the majority of the essays oppose it, that the *Spectrum* ran the report demonstrates that its editors view the topic as worthy of scientific debate and consideration. It shows that Apocalyptic AI is not “merely” science fiction or the plaything of the technologically illiterate. It is a movement taken seriously by scientists and engineers.

The IEEE is not a transhumanist organization, but its interests increasingly have intersected with transhumanist ideals. Soon after its analysis of the Singularity in 2008, the IEEE announced its intention to build an artificial intelligence in the virtual-reality community of *Second Life* (SL), an online environment where users can create avatars (virtual bodies) and then roam around meeting and talking to others from all over the world. Apocalyptic AI has a strong presence both among transhumanists in SL and, as a general ideology, among many other members of the community (Geraci 2010), so SL is an appropriate venue for the IEEE’s introduction of AI into public life. The IEEE hopes that its island in SL will promote public understanding of artificial intelligence (Korolov 2010), not create a venue for mind uploading. Given the *Spectrum’s* Special Report, however, the overlap between SL, transhumanism, and AI cannot be ignored, especially considering that SL’s founder, Philip Rosedale, is himself committed to creating an AI in the environment, a project that has been directly connected to the Singularity (Au 2010).

Apocalyptic AI in Politics. Despite the gulf between state-of-the-art robotics and postsingularity promises, Apocalyptic AI authors have begun influencing policy decisions. The United States government sponsors conferences that feature apocalyptic promises and references those same promises in Congressional reports. If not yet worldwide, Apocalyptic AI nevertheless bridges the Atlantic; policy makers in Europe also have referenced it recently and addressed transhumanism in their debates. Just as Apocalyptic AI has gained currency in public conversations and scientific debates, so it has entered our policy world.

Conferences sponsored by the United States National Science Foundation and Department of Commerce have been greatly influenced by the belief that human beings will upload their minds into machines or become cyborgs, integrating advanced computers into their brains to become transcendently intelligent. In the introduction to the published version of the 2001 conference (Roco and Bainbridge 2003), Mihail Roco and William Sims Bainbridge argue that enhancing human performance should be a national priority at all levels of education. Such improvement, they argue, should draw upon the same convergence of nanotechnology, biotechnology, neuroscience, and information technology that underlies Kurzweil's singularity prediction (Kurzweil 1999a; 2005). In a second volume (Roco and Bainbridge 2006), Roco and Bainbridge argue that such technologies will solve the problems of human need. Bainbridge separately implies that technology will eventually offer immortality and freedom from fear and confusion (Bainbridge 2006, 206). Indeed, the products of science and technology will subsequently banish religion from human practice by providing real rewards rather than the psychological compensations that Bainbridge attributes to religion (p. 208).

Bainbridge and many other participants in the conferences openly accept Apocalyptic AI promises and believe that they should actively seek the fulfillment of them through technological progress (Geraci in press). Bainbridge himself is a founding member of the newly formed Order of Cosmic Engineers, a group organized to "engineer and apply consciousness preservation means enabling mind uploading and personality reconstruction" (OCE 2008). These individuals hold powerful positions in the government: Roco is Senior Advisor for Nanotechnology at the NSF, and Bainbridge is a Program Director for the NSF's Information and Intelligent Systems programs.

The influence of such government activities can be quite tangible. When the United States government debated the 21st Century Nanotechnology Research and Development Act (signed into law December 3, 2003), concern over human cyborgs and hyperintelligent machines entered the debate and were written into the final bill. While considering the National Nanotechnology Initiative, Congress invited Kurzweil to speak on behalf of the bill. Given this opportunity, Kurzweil declared to Congress, "I would

define the human species as that species that inherently seeks to extend our own horizons. We didn't stay on the ground, we didn't stay on the planet, we're not staying with the limitations of biology" (quoted in Hughes 2006, 298–99). Nanotechnology advocacy by Kurzweil and others led to Congress doubling its spending on nanotech research.

More recently, the Joint Economic Committee of the U.S. Congress released the report "Nanotechnology: The Future Is Coming Sooner than You Think," which references Kurzweil, discusses the Singularity, and asserts that, as a consequence of the potential for a Singularity, "it is difficult to overestimate nanotechnology's likely implications for society" (U.S. Congress Joint Economic Committee 2007, 6). In a strange twist on the political influence of Apocalyptic AI, former counter-terrorism expert Richard Clarke even wrote a novel, *Breakpoint* (2007), involving transhumanist technologies, including mind uploading.

European governments also have taken notice of Apocalyptic AI promises. An Ipsos MORI document prepared for the United Kingdom Office of Science and Technology takes seriously the possibility of intelligent machines, although it considers them unlikely (Ipsos MORI 2007). That report was dismissed by some scientists as uninformed and irrelevant but nevertheless prompted them to a public discussion of it in April of 2007 (Henderson 2007). Meanwhile, at a 2008 roundtable on nanotechnology, "Transhumanism, the T word, was 'in the air' . . . it was evident that the transhumanist worldview cannot be ignored in today's policy debate" (Prisco 2008). A 2009 technological literacy exhibition in Germany illustrated technological research in a "Science Express" train that included the convergenist technologies of Roco and Bainbridge's conferences and the claim that scientists are breathing life into robots (though without assurance that intelligent robots are an inevitable outcome of scientific progress).³ The vocabulary of converging technologies has now become a vital part of European technological assessment (Coenen 2009). In Europe, as in the United States, Kurzweil's tireless championing of the apocalyptic future, the Singularity, is reaping increased dividends in policy conversations.

Kurzweil's political star seems unlikely to dim in the immediate future. Belief in the Singularity, or at least its public relevance, appears to be on the rise in politics. Alongside Bainbridge, Roco, and the policy analysts at the In Nano Veritas nanotech roundtable, a university (described below) founded on the principles of Kurzweil's ideology has attracted policy advisors who advise Shimon Peres of Israel and the Prime Minister of Canada (Dean 2010) and other government policy representatives (Terdiman 2009). Apocalyptic AI clearly has a role to play in contemporary politics. By reaching into funding agencies, policy forums, and government deliberations, advocates of the movement will contribute to future policy decisions regardless of whether a singularity ever occurs.

The Singularity University. The most recent, and in many ways most dramatic, proof of how powerful Apocalyptic AI has become is Kurzweil's new Singularity University. Founded at NASA's Ames Research Park in California with funding from Google and several entrepreneurs, Singularity University claims that it will prepare the next generation of our world's leaders to address "humanity's grand challenges" (Singularity University 2009a). The University is a collaboration of several key figures in the American scientific establishment with funding from major sources. A home in NASA's campus and backing from Google demonstrate the University's successful networking and the degree to which Apocalyptic AI is influencing powerful government and corporate interests. The University's founders intend to bring corporate managers, CEOs, academic leaders, and public-policy makers to California and shape their expectations for the future (Young 2009). According to Peter Diamandis, Chairman and CEO of the X PRIZE Foundation and Vice-Chancellor of Singularity University, the university aims to provide CEOs and executives with "the forward looking radar they need to determine how these key technologies might transform their companies and industries in the next 5–10 years" (Singularity University 2009b). Using Kurzweil's books as textbooks means that both teachers and participants work under the presumption that future business success will depend on a company's ability to anticipate and engage the AI apocalypse.

Singularity University offers nine-week-long graduate studies programs and ten-day-long executive programs. Such courses attempt to provide usable knowledge in ten fields: (1) future studies and forecasting, (2) networks and computing systems, (3) biotechnology and bioinformatics, (4) nanotechnology, (5) medicine, neuroscience, and human enhancement, (6) AI, robotics, and cognitive computing, (7) energy and ecological systems, (8) space and physical sciences, (9) policy, law, and ethics, and (10) finance and entrepreneurship (Singularity University 2009c). This approach already has gained widespread publicity, including within financial sources (Gelles 2009), tech circles (Doctorow 2009; Terdiman 2009), and even the *Chronicle of Higher Education*, which suggests that the future advanced by Kurzweil and Singularity University may cause a rethinking of traditional university structures (Young 2009). Shortly after Singularity University ran its initial graduate program, *Popular Science* ran an article rejecting the idea that the school's participants are "cultish," labeling them "stunningly sane brainiacs out to change the world" instead (Dean 2010). The article, as most articles about the Singularity, wavers between curiosity, admiration, and criticism. Its significance lies not in any wholehearted support for Singularity University but in its reflection of the school's popular significance. The University's media exposure and substantial cultural cachet (more than 1,200 individuals applied for the first graduate program, which accepted only 40) led to a similar program launched at Rutgers University in 2010 by computer scientist Ben Goertzel and his father, Ted

Goertzel, a sociologist at Rutgers. Their online course features Web chats with many of the Singularity luminaries associated with Singularity University, with which Ben Goertzel is involved.

Singularity University and the financial support it has garnered represent faith in the powers of technology, especially digital technology, to save humankind. Kurzweil believes that information technology can solve the major problems of the world and has persuaded enough people that the Singularity and mind uploading are inevitable elements of our future that they have supported the development of the school. Whether or not one supports the Singularity agenda (or even believes it is meaningfully possible), Singularity University illustrates the powerful place such beliefs have in modern culture and demonstrates the mainstream success that Apocalyptic AI has in twenty-first-century life.

CONCLUSION

The public presence of Apocalyptic AI, which has steadily grown over the past three decades, implies that we must take into account the religious background of our technological culture. Although we certainly could not have predicted that human beings would want to upload their minds into robots through a study of ancient Christianity, we can clearly see how that desire arises from the historically influential traditions of apocalypticism. Given that such apocalyptic agendas have gained a voice (if sometimes tenuous) in engineering societies, government policies, literary genres, and the religious pluralism of modern life, and have led even to the creation of a private university, we should think about their ramifications alongside the promises of postsingularity life. The popular claims of Moravec, Kurzweil, and others are influential in the way that Western cultures, especially in the United States, see robots and machine intelligence, which means that religion plays an often unsuspected role in the ways in which the public understands and adopts technology. The integration of robots into Japanese religious beliefs demonstrates that alternatives to the Apocalyptic AI position exist. There are likely better and worse religious viewpoints to adopt with regard to robotics. Thus, understanding the religious influence in public discussions of robotics is a significant factor in our cultural analysis.

While the influence of Apocalyptic AI becomes more apparent with each passing year, we remain profoundly ignorant of how other religious traditions might play into the public role of robotics. We have no idea how the religious traditions of India, for example, might affect the design, development, and deployment of robotic technology there. Tentative first steps at understanding this have taken place with regard to Japanese robotics, but these require considerably more data. The potential and promises of robotics require that while we continue our technological development of robots and artificial intelligence, we also promote additional ethnographic research into the public relationship between robotics and religion.

NOTES

1. An important exception here is Stefan Helmreich (2000), who identified the religious aspects of research in AI and Artificial Life during the 1990s.
2. The sacred was not always camouflaged in Western technology, which often developed through religious endeavors, such as in Christian millenarianism (Noble 1999), a desire to regain the perfection of Adam (Noble 1999; Schaffer 2002), or the expectation of divine providence in American expansion (Nye 2003).
3. The exhibition can be seen at <http://de.expedition-zukunft.org/>.

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