THEOLOGY AND SCIENCE

Volume 13 Number 2 May 2015

Contents

Routledge
Taylor & Francis Group

Theology and Science, 2015
Vol. 13, No. 2, 162–174, http://dx.doi.org/10.1080/14746700.2015.1023526

Cybernetic Immortality and its Discontents

NELSON R. KELLOGG

Abstract *Of all the research programs investigating radical life extension, cybernetic immortality is, by definition, the most ambitious. Several models fall within this category. While some include the possibility of "re-corporealizing" either as machine, biological entity, or hybrid, all models have several essentials in common. They require the ability to construct a non-biological (e.g., electronic) substrate that can model the functioning human brain, including the ability for consciousness (self-awareness) and a means for uploading into this artificial mind the contents of one's mortal life experiences. The individuals who have speculated most comprehensively on this include Ted Chu, Raymond Kurzweil, and Martine Rothblatt.*[1]

Key words: Cybernetic immortality; Supportive matrix; Consciousness uploading; Technological evolution; Time-sense; Meaning-narrative; Embodiment; Emotional valence; Posthumanism; Cybernetic cloud

The leap of imagination

Can humans bootstrap themselves into immortality using only technological means of their own design? Beyond genetic tinkering to make our metabolism more efficient and less prone to producing its own toxic aftereffects, beyond keeping watch over every organ and even every cell and perfecting our own immune systems so that our microscopic guardians never overreach and attack the body itself, beyond finding accelerated defenses against all possible pathogens that might arise, what might be imagined? Replacing our tissues and organs piecemeal with either cloned parts or non-organic substitutes might extend an individual's mortality quite a bit, but there is no escaping that the existence of a physical individual is still just that: a mortality.

To date there is but one scheme that might, without depending upon any higher spiritual intervention, allow an end-run around the temporal limits into which we have all been born. For this plan to make sense, even theoretically, requires a severe distortion of elements and qualities that, humanistically and historically, are considered inseparable from a life experience. For the sake of this analysis, though, we will attempt to engage the concept of technological immortality on its own terms. We will accept the proposition that cybernetic immortality is *not* technically impossible.[2]

Routledge
Taylor & Francis Group

Cybernetic immortality presupposes that consciousness, or the ability to experience and respond to the world and, most importantly, to be self-aware of one's own cognition, is the very definition of an individual's existence. One might even establish a hierarchy of "aliveness" that parallels the degree of experienced consciousness. Furthermore—and most crucially—consciousness is a mental capacity and, to a large degree if not completely, can be considered a product of the living brain. Following the same reductive logic, to have a functioning brain is to have consciousness. The human brain, at any instance during the mortality of a living human being, then, might be considered to be the sum total of its neurological and supportive tissue in all its complexity and configuration, plus the sum total of its sensory and cognitive experiences, which are also encoded as neural interconnectivity. Another way of stating this thesis might be to say that if one could capture every nuance of physical composition and electrochemical potentials of a living person's brain and instantiate all of it in another supportive matrix, then what would appear would be a thinking, feeling, living exact duplicate of the original person. Of course, from that instant onward, if the two beings were to have different inputs and experiences, then their identities would begin to diverge.[3]

The current vision offered by proponents of cybernetic immortality involves creating a supporting frame to replace the biological brain *in silico*, by whatever electronic network would be required to support the data representing knowledge, memories and, perhaps, habits. The instructions for processing new inputs would require some combination of hardware and software. Uploading one's life experiences and conscious predispositions would, at least initially, also be the equivalent of capturing one's personality.

The ultimate ambition is not merely to extend one's timeline, but to make one available to more information and interaction than might ever be had in a normal, individual human life. There need not be a limit to the number of "minds" that might inhabit the same computational substrate, sharing ideas and information with nearly limitless speed and combinations and permutations. Furthermore, such "super-minds" could travel to distant locations at light speed, provided that the requisite receiving stations were previously constructed and in place at the terminus. As much as these ideas stretch credulity, they have already been described sufficiently in other literature. It would be worth our while, therefore, to grant the possibility that such travel might be actualized, rather than dismissing it entirely as technically impossible. Such a consideration allows us to explore the deeper values and implications that would accompany cybernetic immortality. We might begin by asking, is there any reason why such an eventuality might in some sense be considered a moral good?[4]

In defense of cybernetic immortality

This following vignette will be familiar to anyone who has ever tried to impart some moral or ethical insight to a student, especially an adolescent or young adult, using historical examples. The actual example can be almost of any-where

or any-when. The insight might be as simple as the "golden rule," or as complex and nuanced as diplomacy and international commerce. Sooner or later, the inquisitive youth is likely to ask some teacherly authority, "What's the point?"

What indeed! How many wars waged are sufficient to understand, once and for all, that nothing has been accomplished by them that could not have been agreed to without the violence and suffering. How many economic disasters must come from culture-wide practices permitting deceit and graft as the generators of legal wealth before everyone agrees that the privations of one portion of a society due to the manipulations of the privileged is a blight on us all, an insult to our humanity? In other words, the student might say, "Where is the 'human progress' I keep hearing about? You tell me that the greatest principles about how to live and create societies were already written thousands of years ago. Then why do people keep doing the same things to each other? We are no better at living than if we had never heard from the great philosophers!"

How should the teacher respond? Unfortunately, most teachers have no response, besides something glib, like "maybe we'll never know," or "well, that is a great question that philosophy and religion have asked, and we still wait for an answer." These and other, more dismissive and sarcastic, responses are not helpful. Worse still, they reinforce the student's original despair, leading him or her to think there is no point to the procession of generations; so why bother asking?

Perhaps the difficulty between teacher and student could be addressed by changing categories. Progress in human history is not an illusion, but that term must be applied correctly. The most casual observer will quickly admit that the lineages of any technology—and, perhaps less obviously, any empirically based scientific inquiry—*describe* unimpeachable evidence of progress. The great systems of transportation and communication, the breathtaking sight of modern cityscapes, the unimaginable discoveries and visions of everything from the submicroscopic to the cosmic, the number of previously unknown forces and realms we have mastered or visited, far transcend anything offered up in earlier myths and faith stories as proof of the mystical or supernatural. And here we confront the fundamental difficulty, which is central to our analysis and critique of cybernetic immortality. When assessing both human creations *and* the human condition, we need different categories for each.

Consider, for instance, the personal computer. Humans have fashioned physical devices to help in computing, storing, and retrieving data for millennia. From collected pebbles to clay tablets to the abacus we have memory and computational aids. By the seventeenth century we had "Napier's bones," a precursor to the slide rule. Charles Babbage's elaborate mechanical calculator in the nineteenth century was followed by the mechanical tabulators of the National Cash Register Corp. and IBM. For complex dynamical equations, first Vannevar Bush's mechanical difference analyzer was developed at IBM, followed by the early mainframe digital computers in Britain and the United States. Then the wild inventions of the "homebrew" crowd of the 1970s reached its apotheosis with the release of the first Apple computer. However, any computer one might purchase today does not begin its existence as an abacus or ENIAC mainframe. All those previous

computational inventions are part of the heritage of a modern notebook computer, but that notebook is manufactured *sui generis*, as its own entity.

Of course, all technological devices are like this. Each generation is an improvement, gradual or radical, from a previous state-of-the-art device. Yes, one might say that the technology evolves but, unlike biological evolution of the Darwinian model, successive generations are not simply wrought by dint of random variation and selection, from the very materials of the previous generation. In fact, technological evolution (we might say "progress") has very little in common with the "natural selection" elucidated by Charles Darwin.

The "watchmaker" designing technologies is anything but blind. Completely purposive, with a full understanding of the earlier designs and methods, he or she knows the end-goal function of the new item being designed. Compare that with the human organism. We all begin, with some random combinations, with the same instructions, structure, and rough potentials; but these are only potentials. A brand new computer, out of the box and with the correct software, can perform any calculation, visualization or simulation that it will be able to do in a year or ten years. In biological parlance, the technological device is "born" as an "adult." And that very entity, the technological adult, is only an ideational precursor to the succeeding generation, also born as fully capable adults, yet even more capable. A human baby, on the other hand, is born just as helpless as its parents were, going back for innumerable generations. And why should societies—made up of human individuals who each begin from the helpless state with only potential, dependent upon nurturing conditions—be more like successive generations of computers, each one necessarily more capable than the last, and less like wave upon wave of infants, all needing to master the same arts and sciences of living?

From an engineering standpoint, then, the biological evolution of our species, driven by Darwin's random variation and natural selection, is extraordinarily inefficient and undependable. In fact, it seems to produce vastly more failures than successes. And without an exogenous threat to the survival of an entire species, which would leave only the lucky outlier mutations to survive and reproduce, there is no guarantee that any sort of change to the organism—useful or frivolous—will occur at all. Without the pressure of potential extinction, there is no driver for Darwinian evolution. To simply allow this age-old process to determine the future of living species is, to the engineer's mindset—whose entire career is concerned with constant, purposive improvements in form and function—the equivalent of just giving up, of declaring ourselves helpless to effect progress. In short, the ultimate drive of cybernetic immortality is to transfer our long-established genius for tool making to the toolmaker himself. And it is just within imagination that given enough time of conscious awareness, we can become our own successive generations, encompassing the wisdom of many lifetimes, and in the process asymptotically approaching aspects of perfection.[5]

I have intentionally described the cybernetic immortal in the most generous and idealistic manner possible because if I am also to critique this vision, it should not be due to some technical shortfall that might be obvious from the weaknesses of today's technologies, but from the most fundamental philosophical principles available. After all, it is easy (and quite amusing) to imagine everything that

could go wrong if we all suddenly had our consciousnesses uploaded to today's version of the cybernetic cloud, as it is called. One can imagine some principled and adventurous informational "mind" zipping about, picking up new ideas and encountering others and sharing in their insights, only to have some malignant cyber-hacker completely sabotage their operating instructions, turning former friends into foes, or simply making the entire cloud unnavigable. But instead of using this as criticism of the entire concept, let us turn to other qualities and characteristics of cybernetic immortality to see if there aren't basic elements of life missing from the experiment.

It's about time!

How do we make sense of the world and of our lives? There will always be the fundamental mystery of knowing exactly how another individual perceives even the exact same event, of knowing what meaning another attributes to the same encounter with the outside world, of experiencing their exact feeling state. We have certain innate capabilities, most of us, that help us intuit our conscious commonalities; and some are shared with other species. We are referring here to the quality of empathy whereby we become attuned to the emotions of another and have our interior states mimic that of the other. Often, for the eruption of intense emotions such as physical pain, pleasure, affection, loss, or despair, words are unnecessary for those states to be conveyed to another member of our species who is present and attentive.[6] However, if conscious existence were limited to such episodes and the experience of a handful of feeling states accompanying a situation, it would be something like a series of photographs flashed before our eyes without any connectivity or context. Now we see happy faces, now pained or forlorn. Such a decontextualized strobe effect of disparate images and emotional states arriving and disappearing demanding our compliance is, in fact, exactly in line with the postmodern condition described by many observers of contemporary culture. Without great care and safeguards against this onslaught of amplified, random appeals to our attention, the modern citizen can be left with either anxiety or ennui, bereft of meaning or attachment.[7]

We need more than merely the ability to respond to raw emotional states broadcast around us, and we need more communicative subtlety than mere declarative pronouncements of fact. What we need, and what we all hunger for, is meaningful narrative. We need the ability and opportunity to weave impressions and events into stories that give meaning and purpose to lived experience. It is most useful, and no exaggeration, to say that the true advent of modern man arrived, more than any other attribute, with the ability to produce narrative.[8] Consider that within narrative structure we have the ability to revisit the past, to imagine the future. In fact such facility allows us to plan and imagine any "if–then" scenario, to make sense of cause and effect. It is in this realm of story where philosophy and religion have their origin and derive their cultural power.[9] But the essential requisite of narrative, besides the substance of environment in which a character finds himself situated, is the concept of time, of sequence as well as coincidence.

As the renowned theoretical physicist, the late John Wheeler, once said, "time is what you need so that everything doesn't happen at once."[10]

There are also profound human qualities and virtues that only exist through the agency of time. What is a goal or plan without time for its fruition or failure? What is patience or forbearance? What meaning does longing or reunion have? How can one experience tension and release, let alone surprise or, yes, even boredom? All of the performative arts find their life and emotion in and through time. What is musical syncopation than a brief example of suspended time? What is humor without the brief period of time where we are held in one expectation, only to be played upon and released into the unexpected parallel universe of an alternate meaning or expectation?

Do any of these sensations, whether joys or disappointments, make any sense to mutating data processing everything at once in a vast computer cloud?

The body in question (mortality allows gratitude) (infinite time equals no time at all)

Of course simply having the concept of time does little to provide narrative and meaning unless there is a conscious being upon whom time bears significance to experience it. And it would seem (granted, without much else to compare it with) that the mortal human embodiment is exquisitely suited for experiencing materiality and temporality and constructing meaning narratives from them. After all, it is our very corporeality that is the catalyst in generating our complex spectrum of emotions in the first place, which our conscious reflection, over time and further experience, turns into ever finer and more subtle feeling states. In fact, the full palette of emotional experience elaborated above requires not just time, but corporeality. Once primary or complex combinations of emotional states have been experienced and incorporated into a meaningful narrative, they can be recalled and re-experienced without the original conditions and stimuli being present. But it is impossible to imagine the generation of our spectrum of human emotional and qualitative sensibilities without first having embodied experience. And just as the emotional poignancy of experiences can diminish over time, so too it is difficult to imagine an individual consciousness maintaining or refining any keen sense of our passions and higher sensibilities in the long-term absence of direct encounter with those tonalities.[11]

Lest we fall into the logic trap of Descartes and many others of that philosophical lineage, our very best current understanding of human mental operation holds that we are not primarily (as our best selves) rational beings who just happen to be assaulted, when we are not careful, by such lower tendencies as our emotions and animal passions. The reality—that which makes us fully human—is quite the reverse. We are fundamentally passionate, emotional creatures who happen to be endowed with the ability of rational analysis. In fact, as cognitive neuroscientist Antonio Damasio has demonstrated, without any emotional tonality suffusing even our quotidian lives, our analytic capacity serves us not at all. We are fairly helpless organisms.[12]

In sum, our experience of time, as mortal physical beings, gives us our entire range of aesthetics and values. It allows us to generate and understand stories of every kind and adapt them to our own life experiences and duties. Emotion generated and hosted by imperfect and vulnerable bodies allows us to feel the passion of everyday life, but also to find passionate meanings and purposes to which we apply our efforts. Finally, these qualities of our human existence, along with a knowledge of our finite mortality, allow us to foster the most important quality of all: gratitude.[13]

As we return our attention to the imagined goal of cybernetic immortality, what do we have? It is a fairly simple mathematical proposition that *anything* that exists in infinite quantity has no boundaries, externally, and therefore no meaningful subdivisions or locations internally. Having infinite time for existence, therefore, makes no amount of time significant or even identifiable. This is the ultimate situation that prompted our adolescent petitioner to raise his question at the beginning of this essay. Without vulnerability or surprise, without narrative, without mortality, and without any end to the amount of time a single consciousness has to do or accomplish anything, what is the point? In an infinite timeline with no urgencies, tragedies, no stories, no victories or failures, there is no point. Everything and nothing ultimately condense into the same null set. Why bother?

Notice that we have not even argued the issue of whether or not human consciousness can exist without a body, and we have allowed this to go unaddressed because, simply on the merits of the supposition that eternal consciousness *in silico* is possible, would it be a good idea. Is there anything we might identify as desirable to recommend it?[14] The answer given to date by its proponents are very much like saying, "We won't know until we accomplish it." Left without a tangible idea of the desirability of the goal, we are instead supplied with the imperative that we are destined to leave our bodies and mortality in order to exist in proliferating data streams. Is this merely rhetorical flourish, or are we to assume this axiomatically? According to Ted Chu, this is a sensible forecast based upon what he considers to be the most profound truth of existence, *human or cosmic: natural evolution.*[15] For life on earth, evolution is the driving force, Chu maintains, the source of change and all the wonders of the world and civilization. Until very recently in earthly history, evolution by natural selection has operated by its innate potential only. With the advent of technological man, however, the toolmaker has been able to interfere with the environment and fashion a world according to our desires and visions. We are finally at the incipient stages of being able to move beyond remaking the world to the advantage and convenience of the human organism, but remaking the human organism to be fit for any world. The final stage, of course, would be to shed our consciousness of any organic constraints at all.

However, according to the most well-known proponent of post-humanism, Ray Kurzweil, the mission of cybernetic immortality is far grander than just experiencing the limitless knowledge that would accumulate in the cybernetic cloud.[16] Kurzweil is convinced that the human brain can be fully understood and modeled in another substrate (e.g. electronic), providing a permanent operational home for consciousness. Furthermore, a living human being will be able to upload the complete facticity of their mortal life experiences into this cybernetic network,

thus achieving immortality. Then, if one considers the speed and reach of a universal network, the amount of novel learning any one consciousness might acquire becomes limitless. And one would not be alone in this computational cosmos. One could share conjectures and experiences with all the other uploaded "souls" in this brave new virtual world.

Yet Kurzweil is not satisfied with the possibilities of omniscience. For one so convinced of this fantastical existence to come, Kurzweil is not much given to ideas popular among many who long for a future where humanity transcends its current state and Earth-bound homestead. He is unconvinced that any extraterrestrial intelligences exist with whom we will exchange cultures and mysteries. By his estimation of cosmic age, and the requisites for the incubation of a culture, if "they" were out there, we would have heard from them already. Rather, he believes that the physical universe is nothing more than more of the same, elaborations on the dust and rocks we already see. We will not find any other conscious beings out there, no matter where we look or how far we travel. This may sound depressing to most, but not to him. This condition of living in an otherwise inanimate, insensate universe is not a restriction of our future, but an opportunity, an invitation. While for Ted Chu our destiny is to evolve ourselves because it's what we do, for Ray Kurzweil, the real point of evolving is that we, once we become post-human, will spread consciousness to the rest of the universe. We will be the very seed that will allow the cosmos to become aware of itself.[17]

Several months ago, CNN ran a program on the latest themes in trans- and post-humanism. At the end of the hour the program's host, Morgan Spurlock, had an extended conversation with Ray Kurzweil. Spurlock admitted that he had been raised in a moderately church-going Protestant family, but now, in middle age he found that he didn't really have any clear ideas or commitments concerning religion, or even the existence of a divine being. Still, he was interested in Kurzweil's views, and so he asked: "Do you have any thoughts that perhaps God really exists out there?" To which Kurzweil responded very calmly and deliberately, "Well ... Not yet."[18]

Is there anything wrong here?

Many in the readership may chuckle at the audacity of such comments. Surely he jests! Others may find these ideas both spiritually and aesthetically distasteful. But they do not supply reasons to pour into the streets, brandishing pitchforks and torches. If nothing else, these projective flights of fancy give us new issues to consider philosophically, or at very least these themes reinvigorate perennial questions by placing them in a new light. So often the most natural question a human might ask, namely, "Is there meaning to existence and, if so, what might it be?," is simply given as the extreme example of what an uneducated, unsophisticated bumpkin would utter, not realizing how foolish he sounds. Well, at least the transhumanists and post-humanists are allowing the question to be entertained within educated secular conversation, which is a good deal more than mainstream academia has allowed since the Enlightenment.

Furthermore, in the empirical research of the natural sciences since the advent of the Scientific Revolution, the truly remarkable and revolutionary insights about the material world have always followed the introduction of new experimental instrumentation. With our unaided physical senses, our observations can only lead to the classification and organization of phenomena that are already well appreciated. But most of how the physical universe actually works is invisible or insensible to our unaided observations. The microscope and the air pump revealed universes in miniature, on the one hand, and explained the dynamical laws of the very atmosphere, which we hardly notice except during inclement weather. The powers of electricity and magnetism were barely guessed at without the basic laboratory instruments used by Volta, Galvani and Faraday, and now those forces run the modern world.

Today, the medical scanning instruments are beginning to trace the activity of individual neurons in the living brain, and the vast computing power available is able to record these potentials and signals and play them back. No wonder many researchers find it compelling that mental activity, including consciousness itself, may some day soon be understood and artificially reproduced. And even if this turns out to be impossible, because we are searching for the totality of consciousness in the wrong place, how much will we learn about the proper biological activity that attends mental activity? Already cyborg-like developments exist, such as cochlear implants, early-stage retinal replacements, and techniques such as deep-brain stimulation as well as transcranial magnetic stimulation for treating afflictions like seizures and depression. Certainly, much more will come from the laboratories working on all manner of projects from neural mapping to artificial replacements for sensory malfunctions to possible stem-cell regrowth of damaged brain tissue. There have also been early prototypes of brain–computer input/output interfaces.

The history of scientific discovery suggests that several trends will unfold during the course of these endeavors, our newest and boldest foray into the oldest of philosophical imperatives—to understand ourselves. First, our knowledge and technologies will incur both blessings and curses.[19] Every technique that can manipulate anything from inert matter to sentient creature can be used beneficently or harmfully, and we can be assured that a full spectrum of outcomes will occur.[20] Secondly, given the techniques for investigation that have only recently come into being and the governmental and commercial entities that have stated their determination to pursue this research, it will certainly accelerate. Once a line of investigation of the natural (and synthesized) world presents itself, societies of means have never just decided to forgo the pursuit.

Besides the possible misuse of the scientific insights and engineering techniques that emerge, there are other reasons to be concerned even if the stated goals of artificial consciousness, mind uploading, and immortality are never realized. One possible objection, though not considered by this writer to be serious, would be that money spent on this research is money not available for other projects. While the military has substantial interest in this area, and DARPA (the Defense Advanced Research Projects Agency), in particular, devotes substantial funding, the amounts do not really compare with the budget for weapons development

and procurement.[21] Furthermore, as during the Cold War space race, apologists in the aftermath would point to all the commercial, civilian benefits that came from the project, including new chemistry (think super glue and Tang and freeze-dried food) and electronics. It is not a stretch to counter that if we had just gone after those technologies directly, it would have cost the country a lot less money. But the logic of cultural forces, such as the fears of nuclear competition unleashed after World War II are not straightforward or easy to predict in advance.[22]

A more significant consequence may seem paradoxical. While the scientific insights are certain to be profound, life itself may get trivialized, not because we discover that all life consists of just molecular mechanisms. Rather, it may lead some to get careless about the art of living fully. As embodied mortals, time and experience and relationships are precious opportunities not to be wasted or ignored. With embodiment and mortality removed, the importance of each moment is easier to dismiss. Some of the most ardent proponents and fantasists of the life cybernetic seem to be living with this mindset already. It would be tragic if the hype around the possibilities of existing as an avatar facsimile would bring about an even greater indifference to actual living, —as mortals with wonderful invitations to invest ourselves in discovering and realizing meaning and purpose during a finite time—than our culture already fosters.[23]

Endnotes

1 Relevant books include: Ted Chu, *Human Purpose and Transhuman Potential: A Cosmic Vision for Our Future Evolution* (San Rafael, CA: Origin Press, 2014); Michio Kaku, *The Future of the Mind: The Scientific Quest to Understand, Enhance, and Empower the Mind* (New York: Doubleday, 2014); Ray Kurzweil, *How to Create a Mind: The Secret of Human Thought Revealed* (London: Penguin, 2013); Martine Rothblatt, *Virtually Human: The Promise and the Peril of Digital Immortality* (New York: St. Martin's Press, 2014).

2 Of these works, the first, by Ted Chu, is the most concerned with moral complexity, historical lessons, and philosophical underpinnings. Chu is also the most concerned with establishing "evolution" as the one great driving principle of creation, and human-engineered self-evolution as the essential next part of the story of humanity. Kaku is more interested in laying out the sensational technical possibilities than in pursuing ethical or moral "rightness." Kurzweil is often the engineer prophet upon whom other writers depend as their first-order source (especially his previous book, *The Singularity is Near: When Humans Transcend Biology* [London: Penguin, 2006]) and his presumptions go the furthest in terms of the viability and even desirability of the enhanced uploaded consciousness for individual and communal immortality. Rothblatt, finally, follows Kurzweil's model of uploaded consciousness, but is much more fixed upon the maintenance of the original individual consciousness and personality—whether existing as virtual digital information and process, or using this mode to reintroduce a given consciousness into a new physical form.

3 However, several important scholars in relevant fields argue strongly against the likelihood, or even possibility, of artificial, or machine-based consciousness, including U.C. Berkeley philosopher John Searle and Yale computer scientist David Gelernter. For an excellent and brief discussion of the position of these "anticognitivists," see David Gelernter, "Artificial Intelligence is Lost in the Woods," *Technology Review* 110:4 (July/August 2007), 62–70.

4 Many thinkers support the concept that consciousness and self-awareness are products only of the biological brain and its neural firings, both from the neuroscience research community, and also from within the discipline of philosophy, including neurophilosopher Patricia Churchland, *Touching a Nerve: Our Brains, Our Selves* (New York: Norton, 2013) and philosopher Daniel Dennett, *Consciousness Explained* (Boston, MA: Back Bay, 1992). Innumerable articles in respected, popular journals, e.g. Gary Stix, "Jacking into the Brain," *Scientific American* 299:5 (November 2008), 56–61; and the assemblage of articles in the section "The Future of the Mind," *Scientific American Mind* 25:6 (November–December 2014), 29–45, especially the last of these, Larry Greenemeier, "Decoding the Brain," hold that the biologically conscious brain will also be decoded, manipulated, and configured for input/output as digital code, the same as any computer. But others offer strong criticisms of just what is, and even what can be inferred by the mass of correlational studies between internal experience and the torrent of laboratory brain scans even as the instruments become more and more sensitive. See Robert A. Burton, *A Skeptic's Guide to the Mind: What Neuroscience Can and Cannot Tell Us about Ourselves* (New York: St. Martin's Griffin, 2013). Still others suggest that the brain may be an instrument designed to be a receiver for spiritual consciousness that is "out there," and not internally generated. See, for example, Andrew Newberg, Eugene D'Aquill, and Vince Rause, *Why God Won't Go Away: Brain Science and the Biology of Belief* (New York: Ballantine, 2002). See also Jeffrey Kripal, "Visions of the Impossible; How 'Fantastic' Stories Unlock the Nature of Consciousness," *The Chronicle Review* (April 2014), reprinted *Utne Reader* 184 (Fall 2014), 60–69.

5 Chu (in *Human Purpose*) is the writer who struggles most mightily with this question of moral goodness and purpose. In fact, the majority of the book, and the very extensive bibliography, are specifically designed to convince the reader of the moral imperatives of this cybernetic destiny.

6 I conceived this idea of generations of technologies being manufactured as that generation's "adult" about ten years ago during a seminar I was teaching. We were confronting the issue of human moral redundancy versus the patently obvious progress of capabilities in our technological inventions. I "suggested" to the class—this being a secular, public institution—that perhaps one can infer some wisdom from the comparison. While societies and their issues do become more complex, the value of individual lives cannot simply be accounted for by how significantly an individual impresses material progress on the world. I saw something like the "engineer's despair" in biological evolution in Rothblatt, *Virtually Human*.

7 Only in the last ten years or so has empathy finally become a very serious subject for psychological and neuropsychological research, especially through the work of Cambridge psychologist Simon Baron-Cohen and work on the mirror-neuron networks by Marco Iacoboni and many others. However, a good place to start is Daniel Goleman, *Social Intelligence* (New York: Bantam, 2006). On empathy as it occurs in other species, see Frans de Waal, *The Age of Empathy* (New York: Harmony Books, 2009).

8 My favorite depiction of contemporary man living in a world of incoherent sensations is provided in Robert Jay Lifton, *The Protean Self: Human Resilience in an Age of Fragmentation* (New York: Basic Books, 1993). Other good examinations include Walter Truett Anderson, *The Future of the Self: Exploring the Post-identity Society* (New York: Tarcher Putnam, 1997), and Kenneth J. Gergen, *The Saturated Self: Dilemmas of Identity in Contemporary Life* (New York: Basic Books, 1991).

9 Some recent investigations link empathy, theory of mind, and narrative; but they tend to get lost in the argot of literary-critical studies and thus, as writings, fail to reflect the immediacy and power of narrative to common human experience. More compelling, for this author, are the following: Jonathan Gottschall, *The Storytelling Animal: How Stories Make us Human* (Boston: Mariner, 2012); Ernest Kurtz and Katherine Ketcham, *The Spirituality of Imperfection: Storytelling and the Search for Meaning* (New York:

Bantam Books, 2002); and Dan P. McAdams, *The Stories We Live By: Personal Myths and the Making of the Self* (New York: Guilford, 1997).

10 For an analysis of human concepts of time for how we developed narratives about creation itself and the epic of human becoming, see Stephen Toulmin and Jane Goodfield, *The Discovery of Time* (Chicago: University of Chicago Press, 1965). See also William Deresiewicz, "How the Novel Made the Modern World," *The Atlantic* 313:5 (2014), 88–99, and Jeremy Hsu, "The Secrets of Storytelling: Our Love of Storytelling Reveals the Workings of the Mind," *Scientific American Mind* 19:4 (2008), 46–51.

11 Recently, in the speculations of theoretical physics (Ian Barbour) the inability to give "substance" to the concept of time, as well as investigations purporting to show that the concept of time is actually unnecessary for the operations of the fundamental equations of cosmology, some have suggested that, in fact, time is actually just a fiction of human psychology. This has been strongly refuted by theorist Lee Smolin in his book *Time Reborn: From the Crisis in Physics to the Future of the Universe* (Boston, MA: Mariner Books, 2013). See especially his epilogue, "Thinking in Time." Of related interest, see Valerie Ross, "Left in the Past: Our Brain May Not Be Able to Conceptualize Time without a Proper Understanding of Space," *Scientific American Mind* 25:14 (2014), 10.

12 The best single source for understanding embodiment and consciousness is Sandra Blakeslee and Matthew Blakeslee, *The Body Has a Mind of its Own* (New York: Random House, 2008). Also see Alva Noe, *Out of Our Heads: Why You Are Not Your Brain, and Other Lessons from the Biology of Consciousness* (New York: Hill and Wang, 2009). I have also found all of the works by Oliver Sachs significant and provocative on this subject, but particularly *An Anthropologist on Mars* (New York: Knopf, 1995) and *The Man Who Mistook his Wife for a Hat and Other Clinical Tales* (New York: Harper Perennial, 1987).

13 Antonio R. Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (Kirkwood, NY: Putnam, 1994). See especially the very telling clinical example detailed 192–195. See also Edward O. Wilson, *The Meaning of Human Existence* (New York: Norton, 2014), 169, 180.

14 For a sublime analysis and contemplation of the sources, dimensions, a gifts of gratitude, see Brother David Steindl-Rast, *Gratefulness, the Heart of Prayer: An Approach to Life in Fullness* (Ramsey, NJ: Paulist Press, 1984).

15 Of the authors mentioned in the abstract, only Martine Rothblatt attempts to specify what we might actually be doing during immortality. This includes "reading books ... watching movies, writing poetry, creating art, chatting with friends, making virtual ... love, playing sports and games, learning new things, going to virtual parties ... and just 'seeing what happens next.'" Rothblatt, *Virtually Human*, 294. Personally, I find Kurt Vonnegut's prediction of what humans might do, once they learned to free themselves of their bodies, more imaginative. See his short story "Unready to Wear" (1953), from *Welcome to the Monkey House* (New York: Dell, 1968), 229–243.

16 Chu, *Human Purpose*.

17 Kurzweil, *How to Create a Mind*.

18 Kurzweil's logic depends upon his "law of accelerating returns" (LOAR), whereby the power of computational networks (hardware and data flows) keeps increasing exponentially according to the famous proposition known as "Moore's law." "Over time we will convert much of the suitable mass and energy in our tiny corner of the galaxy [producing knowledge/intelligence] to computronium [matter and energy organized for computation]. Then, to keep the law of accelerating returns going, we will need to spread out to the rest of the galaxy and universe." "In either scenario [whether or not we figure out how to transcend the speed of light or not, that is], waking up the universe, and then intelligently deciding its fate by infusing it with our human intelligence in its nonbiological form, is our destiny." Kurzweil, *How to Create a Mind*, 281 and 282.

19 CNN, "Futurism." *Inside Man*, with Morgan Spurlock, April 20, 2014.

20 For an excellent survey of current experimental techniques, and the questions and manipulative capabilities being explored, see the series of articles under the special issue title "Hacking the Soul: New Technologies That Look inside the Mind Will Make it Possible to Change What we Think, Feel and Remember," *Technology Review* 117:4 (2014): 20–67.
21 An excellent discussion of what might really go wrong with the technologies that we are now developing and which would be necessary on the way to cybernetic immortality (transhuman, not post-human) are discussed in Joel Garreau's *Radical Evolution: The Promise and Peril of Enhancing our Minds, our Bodies—and What it Means to Be Human* (New York: Broadway, 2005), especially chapter 5, "Hell."
22 Ibid. Garreau introduces some of the DARPA-funded work already underway a decade ago.
23 For a much more reasoned and humanistic and humane conception of mortality by an educator and researcher who is fully aware of the capabilities of medical technology, see Ezekiel J. Emanuel, "Why I Hope to Die at 75," *The Atlantic* 314:3 (2014), 74–81. At the close of the essay, Emanuel (who is an oncologist, bioethicist, and vice provost of the University of Pennsylvania) does admit to retaining "the right to change my mind and offer a vigorous defense of living as long as possible." (81).

Biographical Notes

Nelson R. Kellogg, PhD, is emeritus professor of Interdisciplinary Studies at Sonoma State University (CSU). His doctorate, from Johns Hopkins University, is in the history of science and technology.