Journal of EVOLUTION & Technology

A peer-reviewed electronic journal published by the Institute for Ethics and Emerging Technologies

ISSN 1541-0099

20(2) – December 2009

Transhumanism, Progress and the Future

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Journal of Evolution and Technology - Vol. 20 Issue 2 –December 2009 - pgs 49-69
http://jetpress.org/v20/verdoux.htm

Abstract

This paper argues that one can advocate a moral imperative to pursue enhancement technologies while at the same time rejecting the historical reality of progress and holding a pessimistic view of the future. The first half of the paper puts forth several arguments for why progress is illusory and why one has good reason to be pessimistic about the future of humanity (and posthumanity). The second half then argues that this is entirely consistent with *also* championing the futurological vision of transhumanism. The claim is that, relative to the alternatives proposed, this vision actually offers the *safest* route into the future, even if it also entails an increase in the probability of self-annihilation.

1. Transhumanism and progress

Transhumanism is a recent philosophical and cultural movement that has both descriptive and normative components: (1) the descriptive claim is that current and anticipated future technologies will make it *possible* to radically alter both our world and persons, not just by "enhancing" the capacities that we already have but also by adding entirely new capacities not previously had.[1] (2) The normative claim is that we *ought to* do what we can to foment and accelerate the creation of such "enhancement" technologies, thereby converting the possibility of a "posthuman" future into an *actuality*.

A primary focus of the present paper is the notion of *progress* that one often finds wrapped around the theoretical and programmatic core of transhumanist philosophy.[2] For example, the World Transhumanist Association (WTA), founded by Nick Bostrom and David Pearce in 1998, lists "technological progress" as one of four fundamental conditions necessary for realizing the transhumanist project (Bostrom 2005a); and the extropian Max More specifies "perpetual progress" as one of seven basic "Principles of Extropy" (More 1998). Similarly, the singularitarian Ray Kurzweil[3] situates the idea of progress center-stage in his theory of cosmic history, which identifies exactly six historical epochs through which the universe

develops in both a linear and exponential fashion (i.e., through a fixed sequence of stages according to the "law of accelerating returns"). As these examples suggest, the transhumanist literature is saturated with talk of a kind of technology-driven progress, one ultimately leading to a posthuman future populated by superintelligent AI systems and biotechnological hybrids.[4]

Focusing on the *progressionism* championed by most transhumanists,[5] this paper puts forth a mosaic of arguments in support of a peculiarly anti-progressionist and pessimistic version of transhumanism. This variant is based on two distinct theses: first, it argues that the progressionist conception of history as "a record of improvement in the conditions of human life" (Mazlish and Marx 1998) is highly problematic, both empirically and methodologically. On the one hand, not only does the evidence here reviewed – both futurological and anthropological – *not* provide epistemic support for progressionism (according to these data, history actually appears to be *regressive* in many respects) but, on the other, the historiographic method often employed by transhumanists in characterizing history is flawed and tendentious. The literature on transhumanism, in contrast, often manifests a strong proclivity for discussing and thinking about technological progress in a highly uncritical manner. For one, there has been no attempt (that I know about) to provide a constitutive *analysis* of the concept (What exactly does progress *mean*?), and in addition no transhumanist has yet offered a robust empirical argument for the historical reality of progress.[6] As Robert Nisbet observes in his *History of the Idea of Progress*, the existence of absolute progress was assumed as an "axiom or dogma" by most progressionist theorists during and after the Enlightenment – that is, "the idea was as self-evident as anything in Euclid" (Nisbet 1994, 7). Given transhumanism's intellectual continuity with this Enlightenment tradition (Bostrom 2005b), it is thus no surprise to find that most transhumanists today similarly accept progress as a "central dogma" of their technocentric worldviews. For empirical and methodological reasons, I argue that this is a serious problem.

But one need not champion the triumphant "march of progress" conception of history to endorse the *core* descriptive and normative claims of transhumanism. This leads to the second thesis of the present paper: despite the failure of technology to bring about absolute progress throughout human history, the "futurological program" of transhumanism *still* provides, comparatively speaking, the *best* road map for how we humans ought to navigate the future. The idea here is that, relative to the alternative maps, programs and prescriptions that have been proposed by futurist policy makers, including broad relinquishment, the steady-as-she-goes option (Walker 2009) and the comprehensive relinquishment route of anarcho-primitivism, the transhumanist imperative to both world-engineer and person-engineer actually offers the *safest* route. Thus, my position makes explicit that one can be an antirealist about progress, adopt a pessimistic view of technology and its (negative) influence on the common existential plight of Earth-originating life, and *still* endorse transhumanism (that is, as defined above).

This position is, in fact, suggested by the work of several notable transhumanists, such as Mark Walker (2009) and Nick Bostrom, who recently suggested that transhumanists eschew "progress" for a more axiologically neutral term like "technological development." Why? Because "it is far from a *conceptual* truth that expansion of technological capabilities makes things go better. [And] even if empirically we find that such an association has held in the past (no doubt with many big exceptions), we should not uncritically assume that the association will always continue to hold" (Bostrom 2009; cf. Bostrom 2005a).[7]

I attempt to formalize the resultant version of transhumanism in this paper – a pessimistic and anti-progressionist position that I call (for lack of a better term) *rational capitulationism*.[8]

2. Three anti-progressionist arguments

The aim of this section is to convince the reader that progressionism is highly problematic: not only do the futurological and anthropological data strongly suggest that progress is *not* an historically real phenomenon, but the progressionist conception of technology as triumphantly solving the many problems impeding human well-being is typically based on a flawed and tendentious historiographic method. I conclude that transhumanism ought to eviscerate the notion of absolute progress from its philosophical body. The result is a more robust philosophy of technology and orientation towards the future, one that both maintains its moral imperative to person-engineer using the advanced technologies of the genetics, nanotechnology and robotics (GNR) revolution, *as well as* recognizing that our worsening existential plight is primarily the result of our technological activities. I first enunciate a futurological argument, then an historical one, and finally close this section with a review of the pertinent data from anthropology.

Futurological argument: Bostrom defines "existential risk" (a term of his coinage) as "one where an adverse outcome would either annihilate Earth-originating intelligent life or permanently and drastically curtail its potential" (Bostrom 2002).[9] In his modified 2008 typology, Bostrom and co-author Milan Cirkovic classify existential risks as being both *transgenerational* in scope (vs. global, local, and personal) and *terminal* in intensity (vs. endurable and imperceptible) (Bostrom and Cirkovic 2008). Furthermore, a crucial fact about the nature of existential risks is that virtually all are *anthropogenic* – or, more specifically, *technogenic* – in origin.[10] As Bostrom puts it, "the greatest risks now turn out to be those generated by technology itself," especially "from anticipated future technologies that we have only recently begun to understand" (Bostrom 2002). Indeed, historically speaking, "there were probably no significant existential risks […] until the mid-twentieth century," when the U.S. produced and detonated the first hydrogen bomb (Bostrom 2002; Bostrom and Cirkovic 2008). The only notable risks prior to 1945 fell within the category (or categories, depending on how one groups risks together) of "a species-destroying comet or asteroid," which is in fact "an extremely rare occurrence" (Bostrom 2002). As this implies, then, there are two important and distinct dimensions along which one can assess existential risk types and tokens: one is *numerical* and the other is *probabilistic*.

With respect to the numerical, Bostrom enumerates a total of 23 categories of mostly technogenic existential risks that have emerged or are expected to emerge within the next few decades, as the GNR revolution unfolds. Such categories include the misuse of nanotechnology (either through *error* or *terror*), "unfriendly" AI systems, genetically engineered pathogens capable of wiping out *Homo sapiens*, and four "catch-all" categories labeled "something unforeseen." Now, (i) if Bostrom is correct in counting the categories of risks today as 23 and those prior to 1945 as 1 or 2, and (ii) if we take the relevant increment of time to be 100 years (between 1945 and 2045, when Kurzweil predicts the GNR revolution will culminate),[11] then the following proposition follows: *in only 100 years, human technological activity will have resulted in a 12- to 23-fold increase in the number of existential risk categories*.[12] This is quite an extraordinary fact, even if technology has succeeded in simultaneously mitigating smaller-scale risks (Bostrom and Cirkovic 2008, 27). The reality is that there are more ways for Earth-originating intelligent life to terminate today – that is, for our species to self-immolate – than there were for any living species to go extinct in the past 3.5 billion years.

That said, consider the second dimension of existential risk assessment, namely that of probability. This particular dimension poses special problems, since probability estimates of existential risk scenarios are necessarily *subjective* in nature. (It is of course true "by definition" that no existential risk has yet occurred, or else we wouldn't be here to worry about them.) Nonetheless, one can reasonably assume that as the *number* of existential risks increases, so will the *likelihood* of a risk actualization event, although the relation here is one of contingency rather than necessity.[13] If this assumption is sound, it follows that the probability of an existential risk happening has, along with the numerical growth of existential risk

types and tokens, *also* significantly increased within the centennial increment specified above. Again, this is quite an extraordinary fact – one worth taking seriously when thinking about technology and progress.

A more robust argument for the very same conclusion can be formulated by taking into account the probability estimates of several authorities on the matter. As I attempt to show, these data suggest a nontrivial *rising* trend in the probability that an existential risk will be actualized in the near future – especially as increasingly powerful GNR technologies, exhibiting the characteristic-of-technical-artifacts property of *dual usability*, are developed. To begin, as Bostrom notes above, the probability of an asteroid or comet impact (the only noteworthy pre-1945, non-anthropogenic existential risk) is negligible: an impactor 1 kilometer in diameter, for example, "might be expected every half a million years or so" (Napier 2008, 225). Second, recall President Kennedy's famous estimate, in 1962, that there was a 33 to 50 per cent change of an "all-out" nuclear war during the Cuban missile crisis. And third, consider three recent estimates by leading futurists concerning the probability that (post)humanity will survive its own technological progeny: the philosopher John Leslie argues that the probability of extinction within the next 500 years is 30 per cent. Bostrom suggests the chance of self-annihilation in the next 100 years should be no lower than 25 per cent; and Sir Martin Rees, in his book *Our Final Hour* (2004), estimates a 50 per cent probability that intelligent life will not make it through the century.[14] (One is reminded here of Russell and Einstein's dispiriting report in 1955 that "the men who know most are the most gloomy.") Thus, from this set of data emerges a fairly unequivocal *upward* trajectory in the probabilistic likelihood that an existential risk will be actualized in the proximate future, even if there might have been a transient decline after the Cold War ended. The world is by all accounts not getting *safer*, nor will it get any safer – that is, relative to the past and present – as the GNR revolution gains momentum.[15]

The trend that emerges from the above analysis is enough to make the futurologist – primed by Kurzweil's singularitarian extrapolations of observed historical trends – wonder about the possibility of what might be called an *existential risk singularity* (ERS). There are, I believe, two possible arguments for the ERS hypothesis: the first is *inductive*, and as such uses the aforementioned increases in existential risk number and probability to predict a similar trend in the future. In contrast, the second argument is *deductive*, and goes as follows:

> *Premise 1*. the gravest existential risks facing present and future (post)humanity derive most significantly from technologies of the GNR revolution.
>
> *Premise 2*. the development of GNR technologies is accelerating at an exponential rate (according to transhumanists).[16]
>
> *Conclusion*, the gravest existential risks facing present and future (post-)humanity are also growing at an exponential rate.

This is, of course, not to ignore the fact that the development of defense technologies will most likely accelerate, too, but it *is* to point out the fact, often overlooked in the transhumanist literature, that new existential risk types and tokens will likely be created at an extraordinary rate. After all, the GNR revolution is, so to speak, the parent of such risk progeny. Consider Kurzweil's own observation that the *benefits* of the GNR revolution are undergoing "an exponential expansion" (Kurzweil 2005, 396) – *so why not the dangers as well*? Both benefits and dangers are indeed "deeply intertwined" (as Kurzweil puts it), since both have their origin in the *dual usability* of these neoteric artifacts. If the potential of one use increases, then so does the other: benefit and danger are *twin siblings*, growing up together in a family of "promise and peril."

In sum, the ERS argument posits a future point at which *the creation of new existential risks becomes so rapid and so profound that it constitutes a violent rupture in the fabric of human history* – a definition

that syntactically parallels Kurzweil's explication of "the Singularity" (Kurzweil 2001; see also Anissimov 2006). This is the first argument against the progressionistic conception of history as a record of improvement, and indeed it recapitulates one possible solution to the Fermi paradox: in order for creatures like us to become – as some overly utopian transhumanists have put it – *Homo perfectus*, we must simultaneously become *Homo annihilātus* ("man the annihilator"), due to risk-engendering artifactual properties like *dual usability* (see Hanson 1998).

Historical argument: I should begin by pointing out that my intended focus is less on history *per se* and more on (what I claim are) a few bad habits that transhumanists get into when characterizing history in progressionistic terms. In other words, I make a more *historiographic* than *historical* point. Integral to this point is the articulation of an "error theory" that has as its explanandum the "progressionist illusion" that history *is* in fact a record of improvement. The explanation that I give points to the manner in which progressionists in general, and transhumanists in particular, *present* the history of technological development, which I show is tendentiously asymmetrical in its focus on technology's problem-solving capabilities (although this is generally an unconscious bias).

My first claim is that, using a kind of medical metaphor, progressionists very often focus exclusively on the *treatment* of problems impeding the acquisition of human well-being rather than on their *etiology*.[17] By fixating on only one half of the story – that of *treating* or *solving* the well-being-impeding problems of history – a pattern of technology-driven progress does indeed emerge from the historical mist. In other words, from this *treatment-oriented historiography* the past takes the form of a series of problem-solving episodes in which *unsolved but technologically solvable problems* are given increasingly sophisticated technological solutions. And the faster the wheels of innovation turn, the more progressive history appears, since progress is intuitively measured in terms of the number of problems solved in a given increment of time.

But there is a second and equally important constellation of questions to be asked, namely: *What about the causal origin of these problems?* and *What enables or requires the wheels of innovation to turn at all*? As I discuss below, it is well-known today that the technological minimalism of hunter-gatherer peoples was more than sufficient to secure a remarkably healthy and far more leisurely existence than most moderns live (Gowdy 1997; Cohen 1989). And, in addition, we know that the advanced artifacts of modernity are, outside the larger technological systems to which they belong, of virtually no practical value – this is arguably why the wheel was not employed for transportation in Mesoamerica until the Spanish imperialists arrived: the unmodified topography of the region was not conducive to wheeled transportation (Basalla 1988, 9-10). The point that I am driving at is this: what enables and sometimes absolutely necessitates the wheels of innovation to turn is the fact that technology is not only a magnificent *problem-solver* but also an extremely powerful *problem-generator*. It is *this* feature of technology that opens up vast new *spaces of innovation* for engineers – in search of unsolved but technologically solvable problems – to explore, thereby creating the (exaggerated) impression that progressive movement towards our valued goals has been made (more on this below). As for the *sources* of these problems, some derive from the dual use property of technical artifacts mentioned above; some from their "unintended consequences" (Merton 1936; Winner 1977, 88-100); some from (what might be called) the post-invention manufacture of previously non-existent problems; and finally, some problems derive from the necessary construction of increasingly complex "support systems" that enable the functionality of a target artifact. Melvin Kranzberg's "second law of technology" encapsulates this latter source in the inverted apothegm: "Invention is the mother of necessity" (Kranzberg 1986).

Thus, when one's historiographic approach focuses on, or at minimum includes, *this* aspect of history, the diachronic phenomenon of technological development appears quite different than it otherwise does on the progressionist reading. Rather than a triumphant series of *overcoming* the problems that impede human well-being, the history of technology presents itself as a protracted succession of problem-

generating episodes in which *previously non-existent or less serious problems* are either newly introduced or *re*introduced/exacerbated by technology (respectively). The first might be described as the creation of problems *ex nihilo* (completely novel problem creation) and the latter as the creation of problems *de novo* (a novel form of an old problem emerges).

Furthermore, the creation of such problems and their corresponding spaces of innovation is crucially important for the growth of technology, since *it makes possible the formulation of new technological solutions*.[18] Consider the existential risks mentioned above: virtually all of these are, as already noted, technogenic in nature. And as these risks are countered and neutralized with increasingly sophisticated "defensive" technologies, there is no doubt that the production of such risk-mitigating apparatuses will be hailed by progressionistic transhumanists as constituting significant strides forward in the inexorable "march of progress." Kurzweil, for example, discusses the possibility of creating an army of "blue-goo" police nanobots to obviate the eschatological scenario of "grey-goo" (Kurzweil 2005, 416; Drexler 1987). But what does this possibility really amount to? In the end, all we have achieved is *approximately the same level of security that we had prior to existence of this brand new nanotechnological risk*. The difference between now and then pertains only to *how* such security is achieved: today, of course, we don't need an expensive, complex, energy consuming, and so on, apparatus of highly sophisticated nanotechnology to protect us from ecophagy because *the grey-goo problem doesn't yet exist*. It is, therefore, only when one focuses exclusively on the *solution* to this problem that it can possibly appear to instantiate genuine progress. Indeed, neutralizing the grey-goo threat is rather like taking a giant leap forward *only after* taking a huge leap backwards. We come to occupy roughly the same position that we did before – except with more anxieties. This is a deceptively subtle point, I believe, and one that transhumanists often neglect in their writings on technology and progress.[19]

In addition to the dual usability of technical artifacts as an origin of new spaces of innovation, another important source of problems pertains to the *unintended consequences* of our increasingly powerful technological creations. The burning of fossil fuels and its many negative externalities is a good example: one of the initial arguments *for* the adoption of the gas-powered automobile rather than the electric or steam car was that the former would actually *reduce* pollution (e.g., by getting rid of horse manure in city streets). One is similarly reminded of the use of lead in gasoline as an anti-knock agent, or of DDT as a pesticide in the mid-twentieth century. Thus, if history is any indication, *the most worrisome of all the existential risk categories that Bostrom (2002) identifies is probably the non-specific class of "something unforeseen."* In this sense, while strategies like differential development might offer some protection against anticipatable risks like the grey-goo scenario, there will no doubt emerge a vast panoply of negative externalities that, as Winner puts it, will be "not *not* intended" – that is, risks that will have absolutely nothing "in the original plan that aimed at preventing them" (Winner 1977, 97). The paramount but unanswerable question thus becomes: What will be the "global warming" of nanotechnology? What will be the "eutrophication" of Strong AI? What possible thalidomide-like effects will "strategies for engineered negligible senescence" (SENS) (de Grey et al. 2002) inflict on human users? Such questions point not merely to "known unknowns" but "known unknowables," and with potentially eschatological consequences.

The third important problem source mentioned above is the post-invention manufacture of novel problems. This occurs when a technologist invents a device without any particular problem in mind.[20] Thus, to make the entity *marketable*, the technologist sets out to manufacture a "need" that did not previously exist or was not previously recognized as such. This is a case of, as the saying goes, "a solution looking for a problem," and it is commonplace in consumerist societies: companies sell products by persuading consumers that the item being sold is in some way necessary, when in fact it is entirely superfluous. Again, this may give the *impression* of progress, as more and more "problems" are given technological solutions, but in reality it amounts to nothing more than leaping back and forth, back and forth, creating and then solving. Finally, the fourth source considered here occurs when new technologies

"[require] further inventions to make them completely effective" (Kranzberg 1986, 548). As Winner notes, "one must provide not only the means but also *the entire set of means to the means*" (Winner 1977, 101). Thomas Edison's invention of the incandescent light bulb is exemplary, since it required the construction of an entirely new and highly elaborate electrical infrastructure to enable its functionality.

In these ways, then, technology not only magnificently *solves* but also powerfully *generates* problems, and by introducing new spaces of innovation for technologists to explore it creates the illusion that progress is being made. In fact, a significant proportion of all the technological solutions that *Homo faber* ("man the maker") has devised – clever and sophisticated as they may be – actually target problems that are in some nontrivial way technogenic.[21] Thus, in assessing whether or not history *is* a record of improvement, we must take care to consider not just the treatment of problems impeding the well-being of Earth-originating life but their etiology as well. This more symmetrical historiography yields a rather less optimistic and less progressive picture of history than that painted by many transhumanists. To be sure, then, *change* has occurred. But change is not sufficient for progress – there must also be *directional movement* towards a valued goal (Verdoux 2009a; Ruse 1996, 19-20).

Anthropological argument: The thesis of this subsection is that the anthropological data does not epistemically support the progressionist conception of history. I proceed with two arguments: first, that transhumanists often commit the fallacy of *hasty generalization* when arguing *for* the progressionist position; and second, that transhumanists often commit the *straw man* fallacy when arguing *against* alternative philosophies that advocate some form of relinquishment, such as neo-Luddism (broad relinquishment), the steady-as-she-goes option (which permits world-engineering but relinquishes person-engineering) and anarcho-primitivism (comprehensive relinquishment).[22] The first part of the thesis is general and applies to transhumanism insofar as is assumes a progressionist posture, while the second part specifically targets Kurzweil's arguments against neo-Luddism and anarcho-primitivism. I focus on Kurzweil because his objections seem to typify those of many other progressionistic transhumanists.

Now, to be sure that *I* am not knocking down a straw man, let us begin with a look at the following passages from Kurzweil's *The Singularity is Near* (2005), which evince both fallacies mentioned above:

> This romancing of software from years or decades ago is comparable to people's idyllic view of life hundreds of years ago, when people were "unencumbered" by the frustrations of working with machines. Life was unfettered, perhaps, but it was short, labor-intensive, poverty-filled, and disease and disaster prone. (Kurzweil 2005, 436.)
>
> Technology has [brought] benefits such as longer and healthier lifespans, freedom from physical and mental drudgery, and many novel creative possibilities […]. Substantial portions of our species have already experienced alleviation of the poverty, disease, hard labor, and misfortune that have characterized much of human history. Many of us now have the opportunity to gain satisfaction and meaning from our work, rather than merely toiling to survive. (Kurzweil 2005, 396.)
>
> Imagine describing the dangers (atomic and hydrogen bombs for one thing) that exist today to people who lived a couple of hundred years ago. They would think it mad to take such risks. But how many people in 2005 would really want to go back to the short, brutish, disease-filled, poverty-stricken, disaster-prone lives that 99 percent of the human race struggled through a couple of centuries ago? (Kurzweil 2005, 408.)
>
> Technological advances, such as antibiotics and improved sanitation, have freed us from the prevalence of […] plagues [etc.]. (Kurzweil 2005, 409.)

Let us begin with the second logical error mentioned above: the *straw man* fallacy. In such passages, many more of which could be adduced, Kurzweil decries the romanticization of life "a couple of centuries ago" or "hundreds of years ago" as idyllic and unencumbered. But who exactly romanticizes these periods? Who expresses nostalgia for the Late Middle Ages and Early Modern Period? The answer is, of course, that *no one does*!

On the one hand, the neo-Luddites champion a reform policy that entails dismantling or imposing moratoria on certain classes of technologies deemed too socially, psychologically, environmentally destructive or existentially risky. The psychologist Chellis Glendinning, for instance, argues that we ought to jettison television from the societal ship, since it "functions as a centralized mind-controlling force, disrupts community life, and poisons the environment" (Glendinning 1990). Similarly, Bill Joy advocates the imposition of moratoria on the development of nanotechnology, given the unprecedented risks it is expected to introduce (Joy 2000). However, no neo-Luddite advocates *returning* to an "idyllic" past lost by technology. Instead, exponents of this position are explicit in envisaging a thoroughly *technological* future, one in which humans have broadly relinquished the "bad" technologies (such as television and nanotechnology) while actively developing the "good" kinds of technology (one thinks of such entities as vertical farming, Lily pad Cities and the Fab Tree Hab – "an edible prefab home for humanity").[23] It is in fact a common misperception of neo-Luddism that it universally rejects technology. One needs to look no further than Joy's oft-cited article in *Wired* magazine[24] or Glendinning's 1990 manifesto, which postulates as the first principle of neo-Luddite philosophy that "*neo-Luddites are not anti-technology*" (emphasis in original).

Nor, for that matter, is the more ideologically radical philosophy of anarcho-primitivism strictly anti-technology. As Ted Kaczynski writes in his 1995 manifesto, the primitivist perspective only sees large-scale "organization-dependent" technologies as deleterious. "Small-scale" technologies, or those artifacts "[useable] by small-scale communities without outside assistance," are actually seen as beneficial and socially desirable (Kaczynski 1995, 208). Thus, it is only when technological systems transmogrify into the massive megatechnics of the industrialized West that they begin to truncate the freedom of human autonomy (or so Kaczynski claims). One finds important echoes of this idea in the theory of "normative determinism" (Bimber 1994; Ellul 1964) and Winner's notion of "reverse adaptation." According to these positions, the norms and standards of technology are, in advanced technological societies, problematically universalized in all or most other domains of human thought, experience and activity – domains in which the application of such standards would normally be seen as inappropriate (Winner 1977, 238-251).[25]

Even more important for the present paper is the futurological vision of anarcho-primitivism, which does *not* prescribe recreating the "short, labor-intensive, poverty-filled, and disease and disaster prone" (to quote Kurzweil) conditions of seventeenth century Europe – circa the time that Thomas Hobbes was writing. Instead, anarcho-primitivists advocate a revolutionary return to the *modus vivendi* of humans living prior to the Neolithic revolution – a watershed moment after which humans suffered an approximately 12,000 year decline in health and quality of life (Cohen 1989; Veenhoven 2005). Thus, while Kurzweil's claims may have a kind of rhetorical force, leading the naïve reader to wonder why anyone would pine for the past, Kurzweil is guilty of seriously mischaracterizing the opposing viewpoints: neo-Luddism advocates the preferential relinquishment of specific kinds of technologies, while anarcho-primitivists aim to restore the hunter-gatherer lifeways of pre-Neolithic peoples.[26] This is a simple point indeed, but one that I believe needs to be made given the current state of the transhumanist literature.

Even more striking is the consistent failure of transhumanists to accurately depict what life was like for our distant *Homo* ancestors. This leads to the first logical error mentioned above: the fallacy of a *hasty generalization*. To be sure, a full explication of this fallacy would require an encyclopedia-length paper reviewing an oceanic mass of anthropological data. My goal below is modest: to merely sketch out the

relevant paradigms currently established within contemporary anthropology (as enunciated in standard textbooks on the subject; see Ember et al. 2005). Thus, let us begin with the following statement from Mark Cohen's seminal *Health and the Rise of Civilization* (1989): "Some of our sense of progress comes from comparing ourselves not to primitives but to urban European populations of the fourteenth to eighteenth centuries. We measure the progress that has occurred since then and extrapolate the trend back into history" (Cohen 1989, 141). This is, of course, precisely what Kurzweil does in the above quoted passages – that is, he induces to a general proposition about human history based on a highly impoverished selection of data extracted from a single period of history.

Cohen continues: "A good case can be made that urban European populations of that period may have been among the nutritionally most impoverished, the most disease-ridden, and the shortest-lived populations in human history" (Cohen 1989, 141). Using (i) paleopathological studies, (ii) epidemiological extrapolations based on the same uniformitarian principles that underlie other scientific disciplines, and (iii) ethnographic studies of contemporary hunter-gatherer groups, Cohen argues that the Neolithic revolution, marked by the domestication of plants and animals and the adoption of sedentarism, was followed by an appreciable decline in human health and well-being. Quite incredibly, this decline persisted more-or-less until the mid-twentieth century, at which point human health finally improved. But Cohen is quick to note that the observed amelioration in health was largely limited to *the relatively affluent citizens of the industrialized West*.[27] Indeed, contrary to what most progressionists uncritically assume, "until the nineteenth or even twentieth centuries, the improvement in overall life expectancy appears to have been fairly small" (Cohen 1989, 140). Thus, *there exists no consistent correlation between the development of technology and the improvement of human well-being throughout history*.

The sociologist Ruut Veenhoven (2005) notes a similar decline in life-quality throughout most of human history, arguing that the start of "the agrarian phase marked a historic dip in human quality-of-life" (Veenhoven 2005).[28] Along these same lines, the Harvard psychologist Gregg Jacobs argues that modern society – with its phenomena of social atomism, consumerism and information overload – is largely responsible for the growing statistical prevalence of such psychopathologies as depression and anxiety. In Jacobs' words, "*The root cause of modern stress is the discrepancy between [the] modern world and ancestral world*" in which we evolved (Jacobs 2003, 60; emphasis in original). This observation – which one also finds explicitly discussed in Bostrom and Sandberg 2008 – leads Jacobs to declare "that progress has come at a great cost, for by creating maladaptive negative emotions and inhibiting positive ones, we have disrupted nature's balance" (Jacobs 2003, 60; Verdoux 2009b). (Note that Bostrom and Sandberg's paper discusses ways to fix this organism-environment mismatch using technological interventions.) Cohen similarly concludes with the assertion that:

> These data clearly imply that we need to rethink both scholarly and popular images of human progress and cultural evolution. We have built our images of human history too exclusively from the experiences of privileged classes and populations, and we have assumed too close a fit between technological advances and progress for individual lives. […] In popular terms, I think that we must substantially revise our traditional sense that civilization represents progress in human well-being – or at least that it did so for most people for most of history prior to the twentieth century. The comparative data simply do not support that image. (Cohen 1989, 140, 141.)

For these reasons, then, I argue that transhumanists ought to relax their progressionist posture. Based on the empirical data considered by the theorists above, it turns out that the most "solitary, poor, nasty, brutish, and short" periods of human existence have actually resulted from civilization itself, rather than from lack of technology. The anti-progressionist position here advocated thus concurs with the historian George Basalla in asserting that "a workable theory of technological evolution requires there be no technological progress in the traditional sense of the term but accepts the possibility of limited progress

toward a carefully selected goal within a restricted framework" (Basalla 1988, 218). Indeed, in order to bring about a posthuman state, transhumanism does require *comparative* progress, or progress towards a limited goal of value (e.g., the development of nootropic drugs to enhance human cognition, or the creation of superintelligent machines). But instances of comparative progress do not necessarily add or cumulate to create a transhistorical trend of *absolute* progress, and in fact the anthropological and futurological evidence strongly suggests that technology is a primary cause of human *non*-well-being. And, as I suggested above, the advanced technologies of the GNR revolution may very well precipitate an ERS (existential risk singularity), where such an event would virtually *guarantee* the self-immolation of our species or posthuman progeny through a technogenic catastrophe. Surely this is not progress!

But while technology has created a rather dismal future – one full of new and rapidly ramifying eschatological scenarios – does this mean we should abandon it? Should we restrict technological development according to *kind* or whether the artifacts produced target the human organism for modification? Or should we get rid of it in a comprehensive manner, as the primitivists contend?[29] In the final section below, I defend the transhumanist vision for the future by arguing that the alternatives provided are *comparatively more risky*. It follows from this that one can be an anti-progressionist, and one can hold a pessimistic view of humanity's future, while still advocating the futurological program of transhumanism (consisting of the descriptive and normative claims specified in Section 1). There is nothing logically inconsistent about this position, which I have termed *rational capitulationism*.

3. Rational capitulationism

An argument for the anti-progressionist version of transhumanism here advocated goes as follows:

> *Premise 1. The futurological program of transhumanism would by all accounts increase the likelihood of self-annihilation.*

By now, the truth of this proposition should be obvious: the philosophy of transhumanism asserts both that (i) the advanced technologies of the GNR revolution will enable us to world-engineer and person-engineer in radically new ways – possibly even enabling us to construct a novel species of technologized posthumans to take our place on the phylogenetic tree[30] – and (ii) the "enhancement" technologies that promise to make the creation of posthumans possible *ought to* be pursued, albeit in a circumspect if "proactionary" manner (More 2005). As expounded in the futurological argument of Section 2, of all the technology kinds that humans have devised since the Oldowan industry (circa 2.6 mya), those of the GNR revolution are *by far* the riskiest: not only has the number of existential risks and probability of their actualization increased significantly in the past 50 years, but this trend may actually be *exponential*. In the worst case scenario, this exponential growth of existential risks would persist into the next couple centuries, thus precipitating an ERS. It is therefore by virtue of transhumanism's imperative that we *should* foment and catalyze the further development of GNR technologies that its futurological program *will* increase the likelihood of self-annihilation. Nonetheless, it is crucial to note that…

> *Premise 2. The alternative futurological programs proposed would almost certainly increase the likelihood of self-annihilation more than transhumanism would.*

There are myriad reasons for accepting this claim. One line of argumentation suggests that humanity has (so to speak) crossed the Rubicon of technological development: there is no turning back now, at least not without further exacerbating our existential plight or significantly increasing human suffering.[31] Consider the option of broadly relinquishing (say) genetic engineering, due to the profound risks associated with its dual use properties. How might this be accomplished? As Walker writes in a 2009 article:

> Relinquishment requires us to not only stop future developments but also to turn back the hands of time, technologically speaking. If we want to keep ourselves completely immune from the potential negative effects of genetic engineering we would have to destroy all the tools and knowledge of genetic engineering. It is hard to imagine how this might be done. […] Think of the alcohol prohibition experiment in the early part of the century in the U.S. Part of the reason that prohibition was unsuccessful was because the knowledge and rudimentary equipment necessary for brewing was ubiquitous. It is these two features, availability of knowledge and equipment, that has made biohacking possible. And where would a relinquishment policy be implemented? If it is truly a viable and long-term strategy then relinquishment will have to be adopted globally. Naturally very few countries with advanced genetic technologies are going to be enthusiastic about genetically disarming unless they have some pretty good assurances that all other countries will also genetically disarm. This leads us to the usual disarmament impasse. (Walker 2009.)

Indeed, just as a community of *computer hackers* emerged in the second half of the twentieth century, so too has a group of *biohackers* – or "hobbyists who experiment with DNA and other aspects of genetics" – recently emerged (see Ayres 2008). Thus, a central concern with broad relinquishment is that imposing moratoria on an entire domain of emerging technology would only drive experimentation "underground," given that the two necessary conditions of knowledge and equipment are satisfied (which they are).[32] This goes not just for genetic engineering but nanotechnology as well: relinquishing *this* field of research would likely result in the creation of a community of *nanohackers* – or hobbyists who experiment with the technological manipulation of matter on the nano-scale. And who would argue that a biohacker, or nanohacker, or any other amateur tinkering with unprecedentedly powerful GNR technologies would pose *less* of a risk than professional scientists working in the controlled environment of the laboratory?

In contrast, the steady-as-she-goes option relinquishes not any particular field of technological research but rather the use of GNR technologies to modify the human organism. This position is exemplified by the bioconservative Francis Fukuyama (2002), who argues that political liberalism is predicated on the existence of a common metaphysical essence shared by all humans, since it is in virtue of this essence that we humans are moral beings with an "inherent value" (and therefore deserving of equal rights). Thus, by modifying this essence with person-engineering technologies, the transhumanist project would extract a necessary ingredient from political liberalism's moral recipe. It follows that *only* world-engineering technologies ought to be pursued. But again, we are left with the crucial question: How might one enforce such a restriction? Wouldn't any attempt to prevent person-engineering just drive experimentation underground? And might these underground person-engineers actually emerge as superior to us "normals" in some important respect? Kurzweil, in fact, gestures at the plausibility of the latter scenario in a mock dialogue with Ned Ludd, who expresses (like Fukuyama) a strong aversion to any technological modification of the human organism. Kurzweil rejoins to Ludd's anti-technology protestations: "*If you're speaking for yourself, that's fine with me. But if you stay biological and don't reprogram your genes, you won't be around for very long to influence the debate*" (Kurzweil 2005, 226; emphasis in original).

Furthermore, Walker points out that Fukuyama "says nothing about how we are to address the dual-use problem: the development of 21st century technologies for peaceful purposes necessarily bring with them the prospect that the same technology can be used for civilization ending purposes" (Walker 2009). It is indeed a nontrivial lacuna in Fukuyama's vision for the future that he fails to provide any implementable strategies for controlling and mitigating the existential risks associated with world-engineering technologies – the very same artifactual products of the GNR revolution that would be used for person-engineering purposes. In sum, then, the broad relinquishment and steady-as-she-goes options both pose serious logistical problems, the most worrisome of which (in my mind) pertains to the possibility of engendering a community of clandestine experimentalists driven "underground" as a result of moratoria imposed on one or more *kinds* of technological research.

Before concluding this subsection, though, it is worth taking a brief look at why the anarcho-primitivist option of comprehensive relinquishment also fails.[33] To begin, recall the problems with Kurzweil's arguments against primitivism: all those given involve fallacious mischaracterizations of the position or inaccurate portrayals of our "primitive" ancestors according the specious "Hobbesian ideology" (see Zerzan 1998, 258). Nonetheless, there *are* a number of cogent and compelling reasons for rejecting the proposition that an anarcho-primitivist revolution ought to be pursued: for one, recreating the mode of life had by our Pleistocene forebears would entail a massive, albeit transitory, increase in human suffering. As Ellul (a major intellectual source for Kaczynski) notes, "arrest and retreat only occur when an entire society collapses" (Ellul 1964, 89). Indeed, given the world population today, which far exceeds what could be supported by hunting, gathering, and fishing (especially after the many deleterious alterations of the environment brought about by human activity – see the "Holocene extinction event"), a primitivist revolution would entail realizing *at once* all the Malthusian catastrophes that technology has obviated over the centuries, such as that avoided by the Green Revolution (which of course introduced a myriad of new and more serious anthropogenic problems). While one could, and Kaczynski in fact does, argue along utilitarian lines that the suffering caused by transitioning to a long lost *modus vivendi* – the "primitivist singularity" – would ultimately be less than that resulting from the GNR revolution, the thought of effectuating such suffering via an overthrow of industrial capitalism and its heteronomous megatechnics is for most thinkers (present company included) too morally repugnant. We may thus eliminate the anarcho-primitivist position as a viable alternative plan for the future.

And with these negative appraisals we come to our…

> *Conclusion. The futurological program of transhumanism ought to be implemented rather than the alternative options available, that is, if one wishes to maximally minimize the inevitable increase in the probability of self-annihilation.*

There are, I have attempted to show, dire eschatological consequences to *all* the possible routes into the future thus far proposed: no matter which is ultimately implemented, our chances of survival have fallen nontrivially. And, as I have also attempted to establish, technology constitutes a crucial enabling factor in the network of causes responsible for our existential plight. But what are the practical implications of this thesis with respect to transhumanism? If absolute progress driven by technology is illusory and our future dismal, then why not jettison – so to speak – technology from the ship of humanity's future?

My line of reasoning to the conclusion above follows a simple process of elimination: transhumanism offers (what one might call) the *safest unsafe* passage into the future, that is, compared to the alternatives specified. But not only does the transhumanist program appear to constitute the best option for the future by avoiding the problems associated with certain forms of relinquishment, but it might actually contribute positively – in ways the alternatives could not – to the amelioration of our predicament. I refer here specifically to the creation and use of cognitive enhancement technologies, including neural implants, tissue grafts and nootropic drugs (Walker 2008b; Bostrom and Sandberg 2006; Bostrom and Sandberg 2009). After all, *who better to grasp, manipulate and control the problems unique to the GNR revolution than an advanced "species" of cognitively enhanced posthumans?*[34] Indeed, as many authors have noted, the rapid expansion of human knowledge in the past several centuries has entailed a corresponding increase in individual ignorance (Winner 1977, 283; see also Kelly 2008). No doubt, a major obstacle to effectively guarding against the worse possible scenarios considered by Bostrom (2002) is *epistemic* or *cognitive* in nature. It thus follows that enhancing our ability to think carefully, comprehensively and deeply about the (impending) problems confronting intelligent life on Earth will greatly augment our collective ability to survive. Person-engineering must not be wholly restricted.

The general view defended here is, I believe, already implicit in certain corners of the transhumanist literature: one finds in several authors a recognition of the technogenicity of our worsening situation *as well as* a sense that the best way to fix this situation – now that we have crossed the Rubicon of technology – is more technology, designed and implemented in a strategically prudent manner.[35] Walker, for example, argues that "even though creating posthumans may be a very dangerous social experiment, it is even more dangerous not to attempt it: technological advances mean that there is a high probability that a human-only future will end in extinction" (Walker 2009). And as I have already discussed, Bostrom has not only recently suggested that transhumanists eschew the term "progress", but he continues to be a major intellectual figure in the exploding field of techno-eschatology.

In closing, a primary impetus behind this paper was to make the position that I have termed *rational capitulationism* explicit. This involved refining and elaborating Walker's incipient arguments put forth in his 2009 article. In pursuing this end, I have attempted to emphasize that one can be a pessimist about the future, one can identify technology as the primary cause of our existential plight, and one can hold an anti-progressionist conception of history while at the same time advocating the descriptive and normative claims of transhumanism – in particular, the moral assertion that we *ought to* pursue both world-engineering and person-engineering technologies by fomenting the GNR revolution. This is, it appears, our best hope of surviving the future.

Notes

1. One might term these different strategies "world-engineering" or "niche construction" (following Odling-Smee et al. 2003) and "person-engineering" or "organism construction" (following Verdoux 2009b). The latter is accomplishable either by (a) enhancing a native capacity of the human organism, such as improving visual acuity or increasing the speed of cerebration using a "nootropic" drug, or (b) adding an entirely new capacity to the individual. There are, for example, vast universes of knowledge to which the mental apparatus of *Homo sapiens* has no epistemic access due to limitations inherent in our biological wet-ware and the "mind" program it runs. In other words, just as chimpanzees are *cognitively closed* to learning a human natural language (no matter how hard they might try), so too are we humans unable to entertain an infinite range of ideas that a cognitively enhanced posthuman might possibly come to understand. One way of putting this is that *future cognitive enhancement technologies will allow us to radically redefine the boundaries between what some philosophers have called "*mysteries*" (in principle insoluble for unenhanced humans) and "*problems*" (in principle soluble, even if presently unsolved)*. And similarly, the advanced person-engineering technologies favored by transhumanists will allow us to augment our sensorium to include entirely new modalities, such as echolocation and magnetoception.

2. Here there is an important ambiguity with respect to the term "progress" – an ambiguity that obfuscates talk about the reality of progress. On the one hand, progress can be understood in a local or comparative sense, while on the other hand the term can refer to a global or absolute phenomenon (see Ruse 1996, 20 for a full explication).

3. Note that Kurzweil resists the term "transhumanism." In fact, he doesn't mention it even *once* in his 2005 book on the Singularity. Nonetheless, he stands as a central intellectual figure in the transhumanist movement, and indeed Michael Anissimov (2006) lists singularitarianism as one of nine distinct but overlapping "sects" of the transhumanist movement.

4. It should be noted that transhumanism is an internally heterogeneous movement. As mentioned in note 3., Anissimov identifies a total of nine different variants of transhumanist philosophy. Most relevant to this paper is the fact that transhumanism contains both utopian *and* apocalyptic tendencies. The burgeoning literature on existential risks, in fact, is motivated primarily by the work of transhumanists.

Nonetheless, the utopian position – with its millenialist eschatology involving a future "techno-rapture" (the Singularity) – seems to predominate strongly within the tradition.

5. I should make explicit that I take "progressionism" and "progressivism" to be semantically equivalent terminological variants (at least for the present purposes). Both signify a worldview built around the idea that progress – in the absolute sense of Ruse 1996 – is an *historically real* phenomenon.

6. For example, consider the following passage from the Humanity+ website: "The history of economic and technological development, and the concomitant growth of civilization, is appropriately regarded with awe, as humanity's most glorious achievement. Thanks to the gradual accumulation of improvements over the past several thousand years, large portions of humanity have been freed from illiteracy, life-expectancies of twenty years, alarming infant-mortality rates, horrible diseases endured without palliatives, and periodic starvation and water shortages" (Bostrom 2005a). *It is precisely this view that I find extremely problematic and in need of serious revision*.

7. Unfortunately, Bostrom then proceeds to talk approvingly about technological progress in the very same paper! See also Niiniluoto 2007 for more on the use of "development" and "change" as neutral alternatives to "progress."

8. Simon Young argues that "A pessimistic Transhumanist is a contradiction in terms" (personal communication). In the present paper, I attempt to show this claim to be completely false.

9. Note that Bostrom's definition is highly theory-dependent, since it makes implicit reference to a future posthuman state assumed to be desirable.

10. Where the former term is superordinate of the latter: to say that something is technogenic is necessarily to say that it is anthropogenic, but the reverse is not necessarily true.

11. Note, however, that Bostrom does not accept all of Kurzweil's prognostications.

12. As Bostrom asseverates: "Considering that many of the existential risks that now seem to be among the most significant were conceptualized only in recent decades, it seems likely that further ones still remain to be discovered" (Bostrom 2009).

13. Not only are *types* of existential and sub-existential risks increasing in number, but the tokens of these types are increasing as well. Consider the following fact, articulated nicely by Joy in his 2000 manifesto: "The 21st-century technologies – genetics, nanotechnology, and robotics (GNR) – are so powerful that they can spawn whole new classes of accidents and abuses. Most dangerously, for the first time, these accidents and abuses are widely within the reach of individuals or small groups. They will not require large facilities or rare raw materials. Knowledge alone will enable the use of them." A prime example of this is the growing phenomenon of *biohacking*. No doubt there will also emerge *nanohackers*, as well as computer whizzes able to create new AI systems in the privacy of their own homes. See Section 3 for more.

14. It is worth pointing out the possibility of a publication bias here. As Bostrom writes: "It is possible that a publication bias is responsible for the alarming picture presented by these opinions. Scholars who believe that the threats to human survival are severe might be more likely to write books on the topic, making the threat of extinction seem greater than it really is. Nevertheless, it is noteworthy that there seems to be a consensus among those researchers who have seriously looked into the matter that there is a serious risk that humanity's journey will come to a premature end" (Bostrom 2009). Indeed, Russell and Einstein's statement (quoted in the body text) still appears to accurately describe the situation.

15. This will be the case even with "risk reduction" strategies such as differential development (e.g., nano-immune systems to guard against ecophagy) or the use of preemptive war to prevent rogue states from acquiring extremely dangerous weaponry, which both Bostrom (2002) and Kurzweil (2005) endorse.

16. In some cases, the exponent itself is exponentially growing, thus resulting in a stack of exponentials. See Kurzweil 2005, 41.

17. For example, Kurzweil writes that "degenerative (progressive) diseases – heart disease, stroke, cancer, type 2 diabetes, liver disease, and kidney disease – account for about 90 percent of the deaths in our society. Our understanding of the principal components of degenerative disease and human aging is growing rapidly, and strategies have been identified to halt and even reverse each of these processes" (Kurzweil 2005, 217). Surely, curing these conditions would create a robust impression of medical progress. But consider their cause: *it turns out that most of these are actually so-called "diseases of civilization."* Thus, such "progress" would actually involve solving a problem that civilization itself has created – merely returning us to a pre-technological state of good health.

18. Winner similarly writes that "technology is most productive when its ultimate range of results is neither foreseen nor controlled" (1977, 98).

19. Basalla (1998, 14) makes a similar claim in his argument that humans have "chosen an excessively complex, technological means of satisfying basic necessities." Indeed, this leads Basalla to endorse Jose Ortega y Gasset's characterization of technology as "the production of the superfluous," since "primitive" humans survived just as well – in some cases much better – than modern humans, despite our sophisticated megatechnics (Verdoux 2009b).

20. Note also that, as Basalla (1988) convincingly argues, a sizable portion of technology has resulted from "play." We may be *Homo faber*, but we are also *Homo ludens* ("man the player").

21. As Bostrom (2202) writes: "Without technology, our chances of avoiding existential risks would therefore be nil. With technology, we have some chance, although the greatest risks now turn out to be those generated by technology itself.".

22. Note that there is a continuum of relinquishment. In fact, Kurzweil himself advocates a limited kind of "fine-grained" relinquishment (2005, 411).

23. Most neo-Luddites reject the neutralist hypothesis that technologies are mere tools, neither "good" nor "bad" (e.g., "Guns don't kill people, people kill people"). Nonetheless, one need not believe that technologies have moral or political properties to worry about the GNR revolution and its eschatological ramifications.

24. In fact, while Joy is considered by many to be a neo-Luddite, he rejects the original eponym applied to the machinoclastic followers of Ned Ludd:

> From all this, I trust it is clear that I am not a Luddite. I have always, rather, had a strong belief in the value of the scientific search for truth and in the ability of great engineering to bring material progress. The Industrial Revolution has immeasurably improved everyone's life over the last couple hundred years, and I always expected my career to involve the building of worthwhile solutions to real problems, one problem at a time. (Joy 2000.)

25. For instance, reverse adaptation might lead one – in an insidious manner – to evaluate interpersonal relationships in terms of *technological* norms like reliability, efficiency, productivity, and so on. But this would normally be considered an inappropriate way of thinking about such relationships – or so the argument goes. Thus, in this way, human activity becomes "adapted" to technology, rather than technology to human activity. See Kurzweil 2005, 25-29 for some interesting examples of this putative phenomenon.

26. To put this in perspective, consider again Kurzweil's notion of the Singularity. One can, I believe, talk about the radical transition from the modern mode of life to a pre-Neolithic-like mode as involving a kind of "primitivist singularity." Consider the fact that, on Kurzweil's view, the Singularity will be catalyzed by the creation of superintelligence – "the last invention that humans will ever need to make, since superintelligences could themselves take care of further scientific and technological development" (WTA FAQ, 2.3). Note an important corollary of this view, namely that our epistemic access to what life will be like *after* the Singularity has occurred is completely restricted; one might say, employing a cosmological metaphor, that the Singularity constitutes a kind of "event horizon" that renders meaningless any prognostication of post-Singularity existence and what it might be like. This is in fact very similar to the primitivist's understanding of an anti-civilization revolution: leading exponents of primitivism to explicitly eschew speculating about what exactly life might be like post-civilization. All one can say is that *it will be novel*, unlike any state-of-being that has been. Thus, primitivism entails its own "Singularity" of sorts – that is, a *singular future event* in human history that would inaugurate an era about which humans cannot at present know.

27. Personal communication.

28. Veenhoven (2005) optimistically adds that "the transition to modern industrial society brought a change for the better."

29. As Bostrom (2002) argues, "We should not *blame* civilization or technology for imposing big existential risks."

30. Indeed, this will not only be a new token species, but a new *type* of species too: one that is biotechnological in constitution, or even entirely artificial (as in the case of mind-uploading or Strong AI systems).

31. The sentiment expressed here is not, of course, new. For example, "returning to a Mayan folk community he had studied in the early 1930s," the anthropologist Robert Redfield "wrote of the 'Village that Chose Progress' as having now 'no choice but to go forward with technology, with a declining religious faith and moral conviction, into a dangerous world'" (quoted in Stocking 1996).

32. Furthermore, Kurzweil worries that enforcing such moratoria would require a totalitarian state (2005, 406).

33. That is, comparatively speaking.

34. As Walker writes:

> The application to our problem is obvious: our fears about the misuse of 21st century technology reduce down to fears about stupidity or viciousness. [The] worry is that we may be the authors of an accident, but this time one of apocalyptic proportions: the end of civilization. Likewise, our moral natures may also cause our demise. Or, to put a more positive spin on it, the best candidates

> amongst us to lead civilization through such perilous times are the brightest and most virtuous: posthumans. (Walker 2009)

35. With respect to restoring the environment, this view finds expression in the bright green environmentalist movement called "Technogaianism" (see Hughes 2004, 212).

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