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If and Then: A Critique of Speculative NanoEthics

Alfred Nordmann

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Abstract Most known technology serves to ingeniously adapt the world to the physical and mental limitations of human beings. Humankind has acquired awesome power with its rather limited means. Nanotechnological capabilities further this power. On some accounts, however, nanotechnological research will contribute to a rather different kind of technological development, namely one that changes human beings so as to remove or reduce their physical and mental limitations. The prospect of this technological development has inspired a fair amount of ethical debate. Here, proponents and opponents of such visions of human enhancement are criticized alike for engaging in speculative ethics. This critique exposes a general pattern that extends to other nano-, bio-, or neuroethical debates. While it does not apply to all discussions of "enhancement technologies" it does apply to all ethical discourse that constructs and validates an incredible future which it only then proceeds to endorse or critique. This discourse violates conditions of intelligibility, squanders the scarce and valuable resource of ethical concern, and misleads by casting remote possibilities or philosophical thought-experiments as foresight about likely technical developments. In effect, it deflects consideration from the transformative technologies of the present.

Keywords Responsible ethics · Imagined futures overwhelm the actual present · Technology that adapts the world to limited humans *vs.* technology as a means to transcend human limits · Enhancement effects *vs.* the enhancement of human capabilities · Critiques of the human enhancement discourse · Scenario methods · Presuppositions vs. long-term consequences of research · Identifying potentially transformative research · Moving beyond consequentalism and deontology

The following critique of much nanoethical discourse is offered by a philosopher and historian of science, that is, by a reluctant ethicist who is operating under "conditions of incredibility" [29]. Insufficiently informed by ethical theory (or meta-ethical reflection) it testifies to the conviction that a socio-historical and philosophical understanding of the phenomenon "nanotechnology" is a precondition for a responsible discourse on societal and ethical aspects. As it draws on two sketches of related arguments [29, 30], this paper aims to suggest a more systematic critique. The origin of all three papers was a contribution to the James Martin Institute's World Forum on Science and Civilization on the topic of "Tomorrow's People: The Challenges of Technologies for Life Extension and Enhancement" (Oxford, March 2006). It has since benefited from comments by Christopher Coenen, Reinhard Heil, Ineke Malsch, John Weckert, and others.

A. Nordmann (✉)
Institut für Philosophie, Technische Universität Darmstadt, Schloss, 64283 Darmstadt, Germany
e-mail: nordmann@phil.tu-darmstadt.de

> The contemporary fascination with space travel, artificial intelligence, and genetic engineering has led to the resurrection of the age-old visions of the transcendent power of artifacts and techniques to transform the human condition. We are constantly being presented with retellings of the classic tales of conquest and ingenuity that can be subsumed under the "myth of progress." It is the "if only" syndrome, the eternal technical fixation that is deeply embedded in our underlying conceptions of reality. If only we could develop an even better instrument of production or destruction, if only we could tame another force of nature to provide us with unlimited energy, then our wealth and our capacities – the values by which we measure progress – would be so much greater. More than two millennia after the sun melted the wings of Icarus for coming too close, we are still under the spell of hubris, trying to fly higher and higher. [16, p. 5]

Mikael Hård and Andrew Jamison's cultural history of technology and science identifies a conditional that extends beyond genetic engineering also to nanotechnology [21]. To be sure, technological dreams and the conditional "if only we could do this..." are by no means ethically neutral. But whatever the ethical concerns with technological hubris may be, they are becoming exacerbated by a radical foreshortening of the conditional, that is, by what one might call the "if and then" syndrome. An if-and-then statement opens by suggesting a possible technological development and continues with a consequence that demands immediate attention. What looks like an improbable, merely possible future in the first half of the sentence, appears in the second half as something inevitable. And as the hypothetical gets displaced by a supposed actual, an imagined future overwhelms the present.[1]

The following reflections engage the if-and-then that underwrites some current discussions of human enhancement technologies, specifically those that concern the supposed transcendence of human limitations or the achievement of expanded physical and mental capabilities, even of immortality. They do not concern the discussion of enhancement effects on otherwise unaltered, still limited human bodies. Typically, such effects are not permanent. When we take off our glasses, we cease to have enhanced vision. A few months or years after cosmetic surgery, the scars are still there but the enhancement effect of feeling like a more beautiful person has withered away. Viagra temporally produces a desired effect of more sustained sexual performance on a body with limited stamina. Clearly, the technical production of such enhancement effects warrant ethical and political consideration. And clearly, this does not rely on an if-and-then – these enhancements effects can be attained today. In contrast, notions of (unlimited) life-extension, of mind–machine and mind–mind interfaces, expanded cognitive power or new sensory modalities presuppose profound scientific and technical breakthroughs that currently appear theoretically possible at best. Also, these visions do not concern enhancement effects on humans with their physical and mental limitations but they posit the removal or reduction of physical and cognitive limits and the appearance beyond these limits of a new human being.[2] The following reflections on the if-and-then address all those who venture beyond the "if" to ethically engage the technological shaping of such a new human being.

Several decades ago, claims regarding the achievement of immortality were framed in terms of the fringe-science of "cryonics": if it were possible to temporarily freeze the entire human body some might then awaken to a future with new technical and medical capabilities. To the extent that there was any public "ethical" debate of this, it consisted in wishing the wayfarers well who would invest in such a questionable or outright ludicrous scheme. The seemingly unbounded promise of "nanotechnology" has now taken the place of "cryonics" – making it quite respectable to invoke even the most extravagant

[1] Grunwald [13] pays close attention to the linguistic difference between a "constative" and a "conditional" nanotechnological future. Nordmann [28] offers a general critique of nanotechnology as a technology-of-the-future but emphasizes instead that nanotechnologies claim a new territory for technical agency, that they unfold in space rather than (historical) time, and that therefore they should be viewed in the context of globalization rather than progress or transcendence.

[2] It should be clear from this that – contrary to some participants in these debates – I dispute that the creation of enhanced human beings is simply the next continuous step beyond the familiar practice of producing enhancement effects on non-enhanced human beings. For further arguments see the critique of the claims by Arthur Caplan and John Harris below.

deliverances of this vaguely all-powerful technology. The appeal to "nano" lends an air of real authority to claims regarding the achievement of immortality and establishes the if-and-then: If the requisite human enhancement technologies become reality, we are now to know, for example, whether people have a right of access to them – and failure to address this issue might leave us unprepared for the time when these technologies arrive (note the displacement of the "if").[3]

Human enhancement, to be sure, is just one example of many: If it should be possible to create a direct interface between brains and machines, this research threatens an invasion of privacy when machines are used to read human minds.[4] If molecular manufacturing were to be achievable within the next 20–50 years, we need to prepare for an age of global abundance and thus a new organization of our economies.[5] If the development of machine intelligence leads to ever greater machine agency, we need to adjust our criminal codes to hold machines responsible.[6] Also, if nanomedical lab-on-a-chip diagnostics and genetic screening technology become standard practice, there arises in many more cases the predicament of knowing a condition or disease where there is no treatment or cure.[7] And if, finally, it is scientifically possible to extend human life-expectancy indefinitely, any objections to this research agenda are tantamount to murder or at least to the failure of coming to the aid of a dying person who can be saved.[8]

The last of these examples illustrates with particular clarity how speculative ethics is used to invent a mandate for action. The true and perfectly legitimate conditional "if we ever were in the position to conquer the natural ageing process and become immortal, then we would face the question whether withholding immortality is tantamount to murder" becomes foreshortened to "if you call into question that biomedical research can bring about immortality within some relevant period of time, you are complicit with murder" – no matter how remote the possibility that such research might succeed, we are morally obliged to support it.[9] The following study takes a closer look at arguments like these – aiming not only to debunk them one at a time but to make a general

[3]This if-and-then is at work in the following passage. "Like any extremely powerful new technology, nanotechnology will bring with it social and ethical issues. [...] consider the claim that nanobiology will enable people to live longer, healthier lives. Longer average lifetimes will mean more people on Earth. But how many more people can the Earth sustain?" [1, p. 8] Note the "reification of a possible future" (Arie Rip, in conversation), the transition from a merely claimed possible future to the issues that undoubtedly *will* arise.

[4]This possibility was raised in a highly qualified hypothetical manner by Moor and Weckert [26, 306]: "... theoretically with nanotechnology and wireless transmission a person's brain functioning could be unknowingly tapped and information about it transmitted. Reading someone else's thoughts might be difficult, but capturing information that would be indicative of a particular mental state, such as anger or sexual arousal, might be rather easy." In a far less qualified manner, a November 10, 2006 conference of legal and data protection experts discussed this foreshortened conditional: If the most extravagant neuroscientific claims were proven true and thoughts were materialized in the brain, images of the brain call for privacy protection since they capture an individual's state of mind ("Die Gedanken sind frei ... – Hirnforschung und Persönlichkeitsrechte," organized by the *Landesbeauftragte für Datenschutz und Informationsfreiheit Nordrhein-Westfalen* and the *Institut für Informations-, Telekommunikations-, und Medienrecht*). At that conference, the contribution by Petra Gehring effectively undermined this if-and-then.

[5]This is one of the main tenets of the so-called *Center for Responsible Nanotechnology*, http://www.crnano.org/.

[6]Futurologist Ian Pearson and many others have advanced this proposal.

[7]This if-and-then is currently popular in discussions of nanomedicine. Aside from stating a discrepancy that arises for the diagnosis of any incurable illness, its popularity owes to the fact that it flatters nanomedical research: We are to take for granted that, in fact, nanomedicine will vastly increase diagnostic power.

[8]Aubrey deGrey, for example, asserts: "I just want to save lives. I see no difference between preventing someone's death through medicine and preventing death through defeating ageing. It's just not a distinction" (quoted in [25], p. 54).

[9]Compare this to "If current global warming trends continue, The Netherlands will be submerged within a few decades." This conditional differs from the if-and-then in that it has not served to motivate ethical debate or public preparedness (let alone to construct a new ethics for these changed conditions). Instead, it served only as a backdrop to the salient questions whether we have reason to believe that current trends will continue and, if yes, whether or not we can do something to prevent them from continuing. These salient questions do not pertain to an imminent future but concern the present and past. "Foreshortening the conditional" consists also in skipping this focus on present conditions that alone decide whether the antecedent is or can be satisfied.

case against foreshortening: If supposedly tough-minded foresight is premised upon credulity and intellectual sleight of hand, we ought not to take it seriously.[10] Secondly, ethical concern is a scarce resource and must not be squandered on incredible futures, especially when they distract from on-going developments that demand our attention. A third line of reasoning seeks to show that the questions prompted by the if-and-then are unintelligible for systematic reasons.

After a sampling and critique of discursive strategies that establish the if-and-then, a second main section discusses appropriate and inappropriate ways of historically framing the discourse on current technoscientific developments. The paper concludes with a brief survey of ethical concerns that come to light once one refuses to become distracted by the if-and-then.

Sleights of Hand

Ethical reflection of science and technology typically reacts to issues that *present* themselves in the form of classical dilemmas, actual and current predicaments, or hypothetical cases. In the case of reproductive technologies, for example, ethical discussion has proven its relevance by being very close on the heels always of novel techniques. In contrast, nanotechnologies develop a tool-box for technological development. As such they prepare the ground for a technical convergence at the nanoscale. By enabling such a convergence, nanotechnologies create a methodological challenge in that ethical engagement with *presenting* issues becomes displaced by a perceived need to proactively engage *emerging* issues. Lay and professional ethicists are only beginning to meet this challenge.

One strategy is to confine oneself to just those ethical issues that are present already in the process of emergence and thus prior to the appearance of any technical novelty. Its adherents will focus on questions of intellectual honesty and funding choices, including the making and accepting of promises, including the problem of hype and the need to recognize limits of technical possibility or societal desirability, including the question of distributive justice in the allocation of research funds, and including an assessment of the visions that are promoted by funding calls and applications. A second strategy exercises the virtue of patience and enters into debate only as particular issues present themselves. After some time of waiting for a genuine nanotechnological problem, the scientific and technical questions surrounding nanoparticle toxicity have finally given rise to a new discussion of risk governance, of epistemic and objective uncertainty. The if-and-then syndrome characterizes the third strategy which construes possibly emerging issues as if they were presenting themselves already. "Foreshortening the conditional" exemplifies this. With a view towards human enhancement technologies, a cursory review exhibits various attempts to present these possibly emerging technologies as presenting actual ethical issues. This prepares the ground for a more principled critique.

Foreshortening

The *Guardian* is not known to be an uncritical newspaper. Nevertheless, under the headline "There is no stop-button in the race of human re-engineering" it suggests until the very last lines that future technology comes upon us like an irresistible force of nature rather than as the result of societal investment, diffusion dynamics, and cultural appropriation. The article also provides an assessment of

[10] Alasdair Urquhart advances an analogous argument to critique certain discussions in the philosophy of cognitive science: "Current work in the philosophy of mind manifests a fascination with far-fetched thought experiments, involving humanoid creatures magically created out of swamp matter, zombies, and similar imaginary entities. Philosophical discussion of the foundations of cognitive science also frequently revolves around implausible thought experiments like Searle's 'Chinese Room' argument. [...] unless computational complexity is considered, arguments based on such imaginary experiments may appear quite powerful. On the other hand, by taking such resources into account, we can distinguish between objects that exist in the purely mathematical sense (such as the Turing machine that succeeds at the imitation game), and devices that are physically constructible" ([34], p. 27 – I would like to thank for Philip Brey for drawing my attention to this). Similarly, nanotechnological and other technoscientific prospects suffer from the failure to distinguish physical possibility (all that does not contradict outright the laws of nature) and technical possibility (all that humans can build).

the prediction that in 30 years and with a life expectancy of 110 years we will routinely use memory enhancements and brain implants. Curiously, however, this assessment is not based on consultations with cognitive scientists or medical researchers. The predictions are to be anything but far-fetched simply because they are being made:

> Sound far-fetched? It's anything but. This is the most conservative of a range of scenarios about the possibilities of 'human enhancement' that have prompted fierce debate in the US and are exercising many a scientist's mind around the world. [7]

Similarly, James Wilsdon of DEMOS can hardly be accused of being an uncritical technophile. But even as he champions the cause of a democratic and open debate of the subject, he traverses within the space of a half-sentence the huge distance from science fiction to commercial fact, from now to a remote, perhaps hypothetical future: "Yet as the technologies for human enhancement start moving from the pages of science fiction into the laboratory, and eventually into the marketplace..." [35]. On the one hand he designates his subject matter as something that belongs on the pages of science fiction, on the other hand he is already beholden to the moment when science fiction moves into the laboratory and just as surely into the marketplace.[11] Likewise he rejects on the one hand technological determinism and hopes to strengthen the social process of shaping technology, but on the other hand is propelled by a seemingly unstoppable, perhaps accelerating technology push.[12]

Indeed, the most suggestive "argument" for a hypothetical future that is upon us already comes from a large family of logarithmic plots that extrapolate an accelerating speed of technical development from the past via the present into the future. If past and present trends continue, so the argument goes, even seemingly remote technical capabilities will be upon us before we know it. These graphs not only extrapolate from the more or less recent past into the future but are themselves the result of an extrapolation from the computer industry's "Moore's Law" to all of technology. Though they have no standing among academic historians of technology, these graphs nevertheless enjoy credibility and considerable

[11]By introducing its readers to multiple standpoints, Miller and Wilsdon's [24, 25] anthology *Better Humans* appears to proceed more carefully than the brief contribution to a newspaper that demands strong claims to attract the interest of its readers. However, their book follows the pattern set by Madeleine Bunting in the *Guardian*. Its first part is entitled "The Case for Enhancement" and collects predominantly visionary voices that welcome the advent of enhancement technologies. The second part invites a critical engagement with these visions. In other words, the claim that the enhancement technologies are really coming is validated simply in virtue of the existence of those voices that make a case for it. This can be seen also in Miller and Wilsdon's introduction. After raising on pp. 21 to 23 the question of hype, they offer three practical suggestions that take the advent of ever more radical enhancement technologies for granted (they recommend upstream engagement, consideration of demographic effects, and attention to the use of performance enhancers in school). Instead, the first practical suggestion should have been to find out precisely what new capabilities and technological "effects" we might actually be confronted with.

[12]The nearly imperceptible slide by serious scholars from an improbable "if" to a looming "then" can also be found in the description of a research project at Arizona State University www.asu.edu/transhumanism/about.html, accessed February 13, 2007). Here, a critical attitude towards the mere claims advanced by transhumanists gives rise to a stark view of a societal predicament: "Transhumanism articulates a vision about the possibility of attaining happiness in this life. The very use of advanced technologies, according to transhumanists will liberate humanity (both collectively and individually) from many ills. [...] We hypothesize that the materialistic approach to human happiness, characteristic of transhumanism, should be understood in the proper historical and cultural perspectives. [...] As the scientific advances in the seventeenth and eighteenth centuries, with their social and political consequences, produced modern societies dominated by a secular vision of the utopian fulfillment of human history, how will contemporary scientific, social and cultural advancement transform our vision of end and fulfillment of human history? Will it be the Golden Age of historical fulfillment or an apocalypse of human destruction? Will transhumanism inaugurate a trans-ethical fulfillment of ethics or a decline into demonism?" (I would like to thank Christopher Coenen for pointing this out to me.)

popularity.[13] While Moore's Law has served as a roadmap for the computer industry and therefore turns out to be self-fulfillingly true (at least roughly true for some decades, with a brick-wall possibly ahead), it serves to establish the if-and-then when it is taken as a universal law of nature and history.

The suggestiveness of this logarithmic pattern is exemplified by the draft minutes of an exploratory workshop on potential benefits of brain–computer and brain–machine interfaces (BCI–BMI). Where ambitious programs have only scant evidence to show for so far, the scheme of exponential growth allows one to read this evidence as a sign for much greater things to come:

> Current BCI–BMI applications are one-way communication systems (e.g. spelling devices). Current state-of-the-art allows processing 40 bits/min. This is far too slow for effective communication, but a large improvement with respect to a couple of years ago (only 2 bits/min in 2002). Assuming a similar rate of progress, a *communication speed similar to natural speech* might be achieved *by 2020*. [36]

These few lines report on impressive therapeutic progress that has been achieved by way of implanted electrodes, patient training and software development to help totally immobilized persons spell out words on a computer screen through efforts of concentration.[14] In 2002, patients were able to transmit 2 bits/min, 4 years later this figure is up to 40 bits or five letters per minute. If this rate of progress were to continue indefinitely, one could calculate that by 2020 such patients will be able to communicate to the computer as fast as healthy people speak (and that by 2025 everyone can communicate faster than they have been able to so far[15]). The quoted draft minutes do not claim that this extrapolation will actually hold, nor do they call it into question. Instead, they implicitly invoke Moore's Law as a standard for envisioning the future potential of brain–machine interfaces. In light of Moore's Law, the conditional "if present trends continue" becomes a virtual assurance, allowing us once again to drop the "if" and move on to the "then."[16]

Conflation

The notion of exponential growth makes a grand and seductive claim about the history of technology. It is also a blunt tool in the effort to render an otherwise remote and speculative future as something that demands our immediate attention. But there are other, seemingly less spectacular ways to read small success stories regarding brain–machine interfaces as signs of a future that will see radically enhanced human beings. Indeed, John Harris [17] or Arthur Caplan [8] propose a more mundane kind of historical continuity. They extrapolate from the past to the

[13]The graph is credible and popular also because it comes recommended by Ray Kurzweil, a successful and ingenious wizard who invented the flatbed scanner. One would be less credulous, to be sure, if one knew about its author only that he seriously believes to have physically aged only 2 years over the course of 16 [22, 23]. – Academic historians of technology appear to simply ignore what they are considering a crudely inaccurate reduction of a rich and complicated history. A critical analysis and public rebuttal (along the lines of Bruland and Mowery [6]) would be helpful. Reinhard Heil points out to me that there are some discussions of the matter on the internet, for example a critical piece by Theodore Modis on "The Singularity Myth," http://ourworld.compuserve.com/homepages/tmodis/Kurzweil.htm (accessed February 15, 2007).

[14]Despite media reports to the contrary, these and similar advances are a far cry from "controlling a machine by thought alone."

[15]This prospect is included in the vision of the so-called NBIC-report on converging technologies: "Visual communication could complement verbal communication, sometimes replacing spoken language when speed is a priority or enhancing speech when needed to exploit maximum mental capabilities" [31, p. 16].

[16]Aside from the general difficulty of carrying Moore's Law from one domain to the next, there is here a special reason to doubt its applicability and especially its assumption that a continuous development is subject to exponential growth. In this case, there simply is no current trend that – if continued – leads from controlling a device by effort of concentration to a speech-like communication of thought. A thought, after all, is something that has content or meaning. For several hundred years, science has pursued the dream of localizing thoughts as physical objects in the brain [15]. It is not at all clear whether any progress has been made in this regard. Some of the more promising theories of language and thought suggest that there can only be shared meanings and that a thought is therefore a social thing that exists not in the brain of individuals but among the minds of many. As long as such debates are not settled (and there is no settlement in sight) one has not even entered a technological trajectory like Moore's Law.

future by making all technology look alike, maintaining that it has always served the creation of better people with enhanced capabilities.

> That's what agriculture is. That's what plumbing is. That's what clothes are. That's what transportation systems are. They are all attempts by us to transcend our nature. Do they make us less human? [8, p. 39]

According to these arguments, one either accepts the advent of technologically enhanced people of tomorrow or denies the obvious truth that humans have always used technology and thereby improved their condition. But Caplan's off-handed remark is plainly wrong on three counts and one is by no means forced into such a simple-minded dichotomy. First, agriculture, plumbing, and transportation systems did not seek to overcome or transcend human nature. Instead of expanding physical and cognitive limits, these technologies rendered the world more manageable for human beings and their limited physical and cognitive means. Secondly, to the extent that agriculture, plumbing and transportation systems shape the world we live in, human values and identities are changing alongside these technologies. But surely this is not change in the direction of transcendence. As they renders the world more habitable for themselves, human beings do not just liberate themselves and extend their powers but also create new dependencies, new kinds of ignorance, new problems even of human or ecological survival. Finally, Caplan's remark conflates a transhumanist interest in technology for individualized human enhancement with the tradition of "enhancing" oneself through education and ingenuity. He neglects to mention that currently popular visions of human enhancement, molecular manufacturing, and global abundance do not aim to continue the tradition of technologically cultivated life-forms or public infrastructures (agriculture, plumbing, transportation systems) but seek to liberate individual humans from the need to use their native intelligence and ingenuity in order to get the most out of limited resources.

Caplan's conflation calls for distinctions such as the one introduced above between familiar technological enhancement effects on limited humans and the technological dream to remove or reduce physical and cognitive limits so that beyond these limits a new human being might appear.[17] This is a distinction of attitudes towards technology and not of greater or smaller changes to human beings. Indeed, it acknowledges that human beings change over the course of history, as do conceptions of ourselves as species-beings.[18] The difference is that only in the case of adopting the humbler attitude human beings step to the plate with a sense of vulnerability, taking this vulnerability as the basic condition that calls for a use of tools – and looking in light of this awareness for social arrangements and technological empowerment [14, p. 62f.]. In the other case, humans wish to deny that their vulnerability is a basic unalterable condition but consider it an unfortunate accident. Their envisioned technology is to enforce this denial and transform them into what they really are or deserve to be, namely immortal, omniscient, omnipresent, all-powerful [2, 3]. For the time being, all known technology is of the former kind and only the strategies of foreshortening or of conflation can suggest a

[17] This distinction can also be found in Hutchins's famous reflection on the enhancement or amplification of cognitive abilities [20, pp. 153–155]. Many extant cognitive technologies (language, mathematics) are there said to "merely" change the tasks so as to make them more manageable. These technologies introduce changes to the world that include effects on those who act in the world – and they are said to be distinct from technologies that actually amplify cognitive ability. I endorse this distinction but don't believe that such actual amplifications are forthcoming.

[18] Jürgen Habermas also acknowledges this; indeed, it is the premise of his argument. Rather than assume an unchanging and unchangeable human nature he posits a specific self-understanding of the modern subject which includes a certain conception of the human as a species-being. This self-understanding is threatened by a self-contradiction (and not by a contradiction with an essential human nature) when certain technological visions are entertained, when the relation of human-technology-nature is conceptualized in a wholly different way ([14], p. 76). Habermas objects to this as a modern subject who finds himself in a specific legal, constitutional, moral framework. From the point of view of social science, he recognizes the contingency and changeability of this subject. As a moral agent he has no choice but to judge by the best of his knowledge and according to the moral principles and values that are available to him (indeed, that constitute his modern subjectivity).

transition from the familiar to the envisioned mode of technological development.[19]

Consider, in contrast to all of this, the case of global warming. Here, publics and politicians have been careful to convince themselves that the trend is real or at least highly plausible – there are no assumptions about entirely new capabilities emerging or about dramatic breakthroughs in basic scientific knowledge, there is no denial of technical or scientific limits, there is no blanket appeal to the deliverances of nano- and biotechnologies and their convergence. Also, after persuading themselves of the real danger of global warming, they have started looking for cultural and political interventions along with highly specific technical programs that might slow down or perhaps stop the trend. (It must be doubted, of course, that they are doing enough. At any rate, no one is calling for ethical consideration of life in a world-under-water.)

Straw Men

Caplan and Harris already constructed a straw man by painting the sceptic as a person who denies what is obvious, namely that human beings have always been changing along with their technologies. Inversely, mere acknowledgment of the fact that there is no immutable and eternally fixed human nature is to be tantamount to embracing a highly particular conception of technology in the service of human enhancement: After homo sapiens designed shields against the most elementary selection pressures, biological evolution was superseded by cultural evolution which now affords the capabilities to intentionally steer also the further physical and mental evolution of humankind. Similarly, after the achievement of political liberty, humanity is said to soon realize morphological freedom and multiply human natures.[20]

This line of reasoning would suggest that the speculative future of radically enhanced human bodies and minds appears so foreign or remote only because people are held back by the assumptions of human unchangeability. If this does not appear plausible, there are other, more sophisticated (and insidious) ways of erecting a straw man. It has been suggested, for instance, that there is a systematic "status-quo-bias" or an inappropriate preference for how things are. According to Nick Bostrom and Tony Ord, this bias "may be responsible for much of opposition to human enhancement." Tellingly, they assert that the removal of biases such as this one "will sometimes do more to improve our judgments than accumulating or analyzing a large body of particular facts" [4, pp. 657f.]. Since in the case at hand all the relevant facts are assumed to lie in an unknowable future and since there are apparently no good reasons to challenge cognitive enhancement technologies, the irrational attitudes of detractors are explained by Bostrom and Ord in terms of an "inappropriate favoring of the status quo."[21] After reviewing psychological evidence that such bias actually exists, the authors recommend a strategy for discovering whether it is operative in the particular assessment of cognitive enhancement: Status quo bias is tantamount to the belief that the continuous cognitive-ability-parameter is at its optimum; those who hold this belief will resist the reduction of intelligence just as much as its enhancement [4, p. 665]. It turns out, however, that this more sophisticated argument provides only a variant to Caplan's and Harris's false dichotomy: One either believes in optimal parameter values (that is, in

[19]The claim that "all known technology is of the former kind" is sure to provoke the production of counter-examples. Perhaps I should qualify and speak only of technology known to and understood by me. Eye-glasses, scientific instruments, pace-makers, Viagra, cosmetic surgery, sports- and memory-doping, vaccinations, deep-brain stimulation, brain–machine interfaces, Kevin Warwick's interface of nervous systems all produce enhancement effects. Human beings change through these effects – just as our live-expectancy has been extended through better public health, nutrition, wealth. But also just like the public health system, these technologies have afforded vulnerable human beings the ability to get further with their limited means; they have not changed life-span or aimed at the removal of those limits.

[20]To be sure, not only the promoters of enhancement technologies hold to this simplistically dichotomized view. Jürgen Habermas discusses and rejects the strategy of "moralizing (human) nature" and positing its immutable essence as a last defence of human dignity against its technical appropriation ([14], pp. 46–51). Francis Fukuyama and Leon Kass appear to pursue just this strategy.

[21]The authors discuss whether someone who refuses to lower as well as to enhance cognitive ability has recourse to other viable arguments. They purport to show that there are no such arguments. Therefore, any such refusal expresses merely an inappropriate favoring of the status quo, removal of that bias will then change the initial judgement and one will now seek to optimize non-optimal parameters ([4], pp. 671f.).

a non-improvable human nature) or one should endorse cognitive enhancement.[22]

Bostrom and Ord thus produce a curious reversal of the burden of proof to promote the displacement of the present by a hypothetical future. Living in the present and competing for public attention in a situation where everyone tries to discover how we might solve known problems with currently available means, one has to make one's case: If you believe that human societies are threatened by global warming and that something should be done about this, you better produce some evidence for the reality of this threat. Bostrom and Ord reverse this burden of proof. Those who refuse to prepare for an unknown and unknowable future of cognitive enhancement are required to justify their stance, if only by demonstrating that they do not suffer from status-quo-bias.[23]

Such reversals of the burden of proof are familiar from other contexts such as Creationism or Intelligent Design. Perhaps it is not necessary to adduce evidence for the claim that the doctrine of creationism is on a par with evolutionary theory. Instead, if evolutionary biologists cannot offer absolute proofs of their theories, they should accept creationist teaching as just another unproven theory. Indeed, Bostrom offers in another paper just such an inference from lack of certainty to equiprobability:

> [...] to assume that artificial intelligence is impossible or will take thousands of years to develop seems at least as unwarranted as to make the opposite assumption. At a minimum, we must acknowledge that any scenario about what the world will be like in 2050 that postulates the absence of human-level artificial intelligence is making a big assumption that could well turn out to be false. It is therefore important to consider the alternative possibility: that intelligent machines will be built within 50 years. [5, p. 41]

In other words: If we can't be sure that something is impossible, this is sufficient reason to take its possibility seriously.[24] Instead of seeking better information and instead of focusing on the programs and presuppositions of ongoing technical developments, we are asked to consider the ethical and societal consequences of something that remains incredible. Again and for the last time in this survey of examples, considerations of the present are overwhelmed by the supposed imminence of a highly speculative future.

Contingencies

The preceding survey of if-and-then strategies exposed the sleight of hand that is typically involved when an improbable future is presented under the guise of unflinching technology foresight. It has also touched in passing on possible elements of a more systematic analysis and rejoinder. While a comprehensive analysis cannot be developed here, it may be possible to show how ethical speculation about human enhancement technologies is framed. Indeed, such speculation gets traction from the way in which the questions about our technical future and about human change are posed. A quick analysis of these questions attempts to show that the if-and-then of the enhancement discourse presupposes a blindness to the historical contingency of the given situation in which human beings find themselves and from which alone they can embark on ethical discourse as well as on trajectories of technological development.

History and Technology

Günther Anders diagnosed in the 1960s a profound reversal in the relation of history and technology [3, p. 73]. The development of technology used to take place within history, namely, by advancing the open-ended designs and interests of human societies.

[22] In the second part of their paper Bostrom and Ord offer another test for status quo bias (the double reversal test). The present critique (that they are working with a false dichotomy) does not apply straightforwardly to this second test. However, the second test exposes even more clearly their utter incomprehension of approaches that are neither consequentialist nor deontological, that appreciate the historicity of the human condition and therefore cannot view the human being as a collection of parameters that either are or are not at an optimum and that can be optimized in isolation of each other.

[23] It should be apparent that this critique is not addressed to promoters of cognitive enhancement alone. It is directed with equal force at those who accept that burden of proof and produce lengthy arguments why we should reject such human enhancement technologies.

[24] This slippage is present also in an assumption that informs many nanotechnological promises, namely the unexamined notion that what is physically possible is also technically possible (that is, one can engineer anything that does not contradict outright the laws of nature), see note 10 above.

Atomic weapons and the threat of nuclear destruction introduced finitude with the prospect of a humanly induced extinction of the human species at any time. From now on, history was confined by this permanent threat and in this sense develops only within technology. Rather than fully appreciate and explore Anders's remark, it is enough to notice here that this reversal reappears in two entirely different ways of asking about "our nanotechnological future." According to a first and customary way of framing the question, history unfolds only within a given technological condition. It is not a single question, really, but a family of questions: What will the future of science and technology bring? What might become of us as nanotechnology progresses? What problems will our societies face, how might we avoid them, prepare for them etc.? Quite another way of framing the questions subordinates technology to historical contingencies: What can technological research contribute to the solution of current problems? How do technological programs and visions engage and challenge the world we live in? What are their claims on our bodies, our ways of living and interacting, the currently established relations of self, society, and nature? Why should the present be transformed in this way or that?

Claims about human enhancement (rather than mere enhancement effects) get traction and elicit debate only in the context of the first of these families of questioning. However, if one embraces the challenge to evaluate what the future will bring, the very possibility of an ethical perspective on emerging technologies is undermined as one is left with a series of equally untenable positions. The first of these posits an eternally fixed human nature against which future realities might be measured. The difficulties with this kind of position have been alluded to above. Aside from its historical implausibility it can always be accused of making an unwarranted metaphysical assumption. Secondly, one could take the status quo as an arbitrary basis of judgement – but the way in which the question is framed informs us that this basis holds no longer and that the status quo is quite irrelevant for the future that is to be evaluated. Another option would therefore be to adopt a blatantly paternalistic attitude: "we people of the present know what is good for you people in the future." If one wants to avoid such paternalism at all costs, one could finally adopt a laissez faire attitude and refrain from ethical judgement: Whatever the future holds, it is obviously a product of more or less well-reasoned actions and ethically considered desires, preferences, choices. Whether this is an exhaustive list of options or not, current debates on the enhancement technologies of the future take place within this discursive space. These debates have in common that they are premised on a believing attitude towards the future, indeed, that they lend credibility to it.[25] They are "future friendly" even where the participants in the debate reject with moral outrage what the future is to hold.[26]

The situation changes and looks more favourable for ethics when the question "what will the future bring?" is replaced by "why should we now accept this or that promise of a technological future?" In light of this second question, technological programs are seen for the way in which they make claims on the present. While ethical discourse is still difficult and contentious, it is not deprived of its standpoint. Here, the contingency of the current situation offers an ineluctable, necessary, actually available starting-point. This situation is not optimal but it is all that we have got. And in any situation in which we find ourselves we are obliged to act according to the best of our knowledge and ability. And thus, we may be challenged to evaluate other cultures, the reported past, and envisioned futures – knowing full well that

[25] In her critique of bioethics, Petra Gehring points out how it validates "a certain way for the future to have a claim on us and thus *produces* the future" [10, p. 120]: To the extent that the future is invested with the power to shape present conduct, planning, reflection, or preparation, it can indeed be produced by predictions, credulity, or the adoption of claims for ethical deliberation.

[26] For a more sustained critique of the future-orientation of nanodiscourse see Nordmann [28]. It argues that the globalization discourse provides a more appropriate and fruitful frame for ethical and societal questioning. This is supported by principled considerations but also from the point of view of Science Studies and an analysis of nanotechnology as a conquest of (inner) space. Since the current debate on human enhancement technologies stands under the spell of the if-and-then and is therefore inherently "future friendly," it is curious to note that the World Transhumanist Association has embarked on a "Campaign for a Future Friendly Culture," that is, "[a] campaign to encourage balanced and constructive portrayals of longevity, human enhancement and emerging technologies in popular culture." Its specific goals include efforts to "[i]ncrease the sensitivity of culture creators and consumers to the biopolitical messages and bioconservative tropes in popular culture" and the promotion of "transhumanist artists, authors, film-makers, game designers and culture creators" [19].

our values are not shared and need not be relevant to these other cultures, to the envisioned future or some remote past. This is at the same time our moral predicament and our most considered point of departure. Rather than adopt a believing attitude towards the future, an ethics beholden to present capabilities, needs, problems, and proposed solutions will begin with vision assessment [12]. Envisioned technologies are viewed as incursions on the present and will be judged as to their likelihood and merit: How credible are these claims, and do these technologies solve acknowledged problems? More generally: What do these visions tell us about the present, what is their implicit criticism of it, how and why do they require us to change?

To take as the starting point for ethical deliberation our historically contingent situation amounts to an acknowledgement of the ineluctable frailty of such situations and of the subjects who seek orientation in them. Accordingly, ethics, art, and technology are all viewed as that which helps a frail and changeable being come to terms with the world.[27] It is not addressed to an entirely fictitious entity, a god, future existence, or to a body-part that demands better treatment:

> It is a loathsome and cruel trick that nature takes such an exquisitely wondrous creation as the human brain and imprisons it inside the weak, inefficient, fragile, and short-lived structure that is the human body. Our bodies may be beautiful, but they are unacceptably ephemeral. [33, p. 191]

In contrast, ethics, art, technology have to accept and understand our ephemeral existence in order to design prostheses, conceptual schemes, social arrangements in which our traditions, inventions, thoughts can survive and do some work even beyond the physical existence of any individual person.

Imagining Humanity

There is another reason for taking human frailty and contingency as a limited and limiting starting point. It is strictly speaking impossible to imagine ourselves as something other than we are. Accordingly, we cannot conceive even our admittedly transitory natures or changing selves as currently deficient and at another time fully realized. All we can do is to first project our selves as technical systems outside and independent of ourselves and then to imagine human perfectibility as the improvement on given parameters in that technical system. As before, the discourse on human enhancement technologies gains traction once we take that leap and dissociate the human being qua technical system from the place where our wants and desires have been shaped and seek expression.[28] Only once this leap is taken, does the contest between consequentialist and deontological positions begin: who is to say that improvements to human performance parameters will be bad on balance, and can we really claim an unalienable integrity for the human being as a technical system?

This is not the place to fully develop this point which is most forcefully made by Jean-Pierre Dupuy in his critique of such a dissociated, "algorithmic" conception of nature and self [9]. Such a development would have to begin with arguments for the claim that it is impossible to imagine ourselves as something other than we are.[29] One such argument would refer to the ways in which we are always implicated in the perspective on ourselves. Even "lost souls" who wish they didn't have their bodies or their lives want something better for *themselves*. There is a less esoteric way of making this argument, however. It follows roughly along these lines: If we conceive of

[27] Thus, technology is brought back into the realm of history rather than merely of temporality. As opposed to a temporal process in physics, a historical process is characterized by the fact that historical agents change and do not continue unaltered on some linear or exponential trajectories of realization, intention, technological progress.

[28] Why should anyone take this leap? The if-and-then strategies suggest that this is not for us to decide since this way of conceiving the body is upon us already along with the requisite enhancement technologies. But it is far from clear that even someone who takes Viagra or undergoes cosmetic surgery (and who is thus acutely aware of the frailty of his or her body) is therefore committed to a notion of technological transcendence of human limitations (see the discussions above).

[29] Transhumanists need not maintain, of course, that they can intelligibly imagine themselves to be other than they are. Indeed, the "singularity" may be welcome precisely because it involves an utterly surprising transformation – like falling in love, going to the theatre, undergoing therapy, or any other profoundly "life-altering" experience (which can be had, of course, without pursuing the dream of transhumanism). However, it requires some such imagination of an enhanced self to expect from technology that it will produce a new, expanded, or in some respect less limited (trans-) human being.

human beings as more or less integrated bundles of bodies, minds, histories, purposes etc., that is, in a vaguely holistic manner – what might we mean by human enhancement? Here one could be referring to an improved human species since humanity can do better than produce an occasional Galileo, Shakespeare, or Einstein.[30] This suggestion is unintelligible, however, since there is no vantage point from which to assess, for example, whether humanity would be better off if more people were like Mahatma Gandhi or Martin Luther King (- would a crowd of Gandhis and Kings start beating up on one another?).

While it is hard to envision a human species that is intellectually and morally better than itself, it appears much easier, of course, to think of one's personal mediocre self in need of improvement: if only I could compose like Beethoven, play the piano like Glenn Gould! It is easy to envision such intellectual, artistic, and moral improvements since for them there are the familiar enhancement strategies of education, of interest and immersion, of ambition and appropriation. If the point is to seek a technical alternative to those old-fashioned strategies, this amounts to the adoption of a dissociated engineer's perspective on human minds and bodies as more or less well-designed technical products. Looking for the optimization of extant functionalities one tends to fall into the same pattern that dominates most commercial product development. Instead of envisioning a change of human nature, one asks merely whether some natural features can be optimized without destabilizing the whole system: Could this human body be more durable, stronger, lighter, faster, and of course smaller, cheaper to make, expensive to sell, and ever so easy to replace? And thus the predominantly white male community of human engineers or transhumanists has focused primarily on features of physical and mental prowess: live longer, jump further, see more, process extra information extra quickly, sleep less, extend your reach. One then goes on to discuss these stereotypical upgrades in the equally stereotypical terms of individual consumer rights: If this becomes available in the marketplace, who could prevent me from owning it?

Since one cannot intelligibly express what it might mean to enhance human beings as more or less integrated wholes in their social settings, one thinks of them instead as a sum of functions, as technical systems with particular traits.[31] About the human being so conceived one can ask whether it performs sub-optimally, or rather, whether some or all of its traits can be optimized. One does this simply by describing a function and creating a comparative: happy becomes happier, strong becomes stronger, smart becomes smarter, hard becomes harder, long becomes longer. Therefore, in the debates on enhancement technologies, the difference between the proponents and detractors is not necessarily that some demand morphological freedom (there should be many human natures instead of one) while others insist on a single fixed human nature. Instead, those who formulate the demand consider the human being as a technical system capable of enhancement one trait at a time, while their detractors view human perfectibility as conditioned upon flourishing, that is, upon a world in which specific capabilities and talents can become effective. The focus of the detractors is not on a fictitious design-target in the future but on the present world that fosters or inhibits the achievement of human capacities and goals.

Room for Debate

This critique of speculative ethics and its reliance on the if-and-then has been directed at those who discuss the pros and cons of human enhancement technologies *as if such technologies were upon us already.* There is quite another and far more illuminating way to draw upon the idea of human enhancement technologies for purposes of reflection on technology and self, society, nature. Philosophers are notorious for using improbable scenarios in order to press an issue. Think of Descartes conjuring an evil demon who deceives us about our sense perceptions, think more recently of Thomas Nagel's infamous brain in a vat. Philosophers take such scenarios seriously enough to generate insights from them and to

[30]To be sure, these three individuals are examples of human flourishing and not of technical enhancement. The flowery metaphor suggests that they were well-rooted in a social environment that allowed them to flourish and develop their specific capabilities.

[31]This is a form of technological hubris, to be sure (compare the opening paragraph of this paper). For Jean-Pierre Dupuy, it constitutes a catastrophe that is already happening and requires no future physical disaster to make it more serious (Dupuy [9], see also Sandel [32]).

discover values that might guide decisions regarding the future. But they do not take them seriously enough to believe them.

Likewise, philosophical interest in the question of human nature provides a splendid context for a hypothetical consideration of enhanced individuals. Indeed, if we seek to understand ourselves, there is hardly a more telling question to ask than: "Suppose you were free to choose your body and mind, would you choose yourself more or less as you are?" To dramatize this question we might suggest certain specific means of remaking ourselves – ways to surgically beautify, chemically dope ourselves, schemes of becoming immortal, controlling machinery by thought alone, or enhancing our abilities to acquire and process information. Such prospects thus make for fascinating, indeed, endless discussions. Some of these could lead to empirical questions, for example, long-term psychological studies of the presumed enhancement-effects of cosmetic surgery (how profound are they and how long do they last). Others might take us to the policy arena and ways of formulating just what we want from technology. The visions of immortality and thought-controlled machinery can thus serve their purpose quite irrespective of any particular beliefs or commitments about the future. Indeed, if science fiction scenarios lead to interesting philosophical questions, it is precisely because one suspends disbelief in the presence of fiction. Relieved of the pressure to determine what is true or false, what is likely to happen and what not, we can forge ahead and explore who we are, who we might wish to be, and how these wishes reflect on ourselves or our views of human nature.

In other words, there is nothing wrong with public debate of human enhancement technologies or molecular manufacturing where such visions provide a backdrop for society to reflect upon itself. However, if the point is to demonstrate foresight or to debate the ethics of technologies that converge at the nanoscale, claims about human enhancement are misleading and serve only to distract us from comparatively mundane, yet no less important and far more pressing issues.

Reclaiming the Present

Once one breaks the spell of the if-and-then, a lot of work needs to be done. As we have seen, distinctions need to be made and maintained. In order to resist foreshortening, considerable work is required to hold the scientific community to its own standards of honesty and clarity. Whose responsibility is it, for example, to remind scientists, the media, and the public of the categorical difference between a therapeutic brain–machine interface and the vision of a thought-controlled mind–machine interface? A distinction of similar importance is that between physical and technical possibility. A third distinction has been urged repeatedly throughout this paper, but its articulation requires more work. On the one hand, there is technology that adapts the world to the requirements and needs of frail and limited human bodies (engineering *for* body and *for* the mind). The lever permits a weak person to move heavy objects, eyeglasses exploit a law of optics to let one see better with bad eyes, a pacemakers keeps a feeble heart going, and a railway system quickly transport sluggish bodies. This is the technology that we know and it employs human ingenuity to devise tricks by which we can achieve more with what little we continue to have. There is an extension of reach, a greater effectiveness in the world, even a public health infrastructure for greater life expectancy, but no "human enhancement." Arguably, the oft-cited man who takes Viagra is also not enhanced but merely experiences a desired effect on his still-feeble body. While this effect may enhance sexual performance, this is indeed no different than the lever enhancing the performance of a builder. On the other hand there are the envisioned human enhancement technologies that are subject of much current debate, that are claimed to expand human lifespan, engineer new senses, construct faster information processing and reaction times, introduce new physical and perceptual skills, and finally render us entirely independent of our physical bodies (engineering *of* the body and *of* the mind).[32]

To elaborate and maintain such distinctions is conceptual as well as political work. Similarly, the discovery of ethical issues that might have been overshadowed by the if-and-then of enhancement technologies requires such conceptual and political work. One example must suffice. Once we take our eyes from the supposedly thought-controlled mind–machine interfaces of an indefinitely remote future,

[32]For the distinction between engineering *for* and engineering *of* body and mind, see the so-called C*TEKS*-report [18].

we come upon very powerful machine–brain-interfaces. Rather than try to get signal and perhaps thoughts out of the brain, deep-brain-stimulation produces effects in the brain and already exerts amazing and disturbing influence on human motor control but also on mood. It helps patients with tremors or debilitating depressions to resume on the flick of a switch a nearly normal life. It does so by performing very small lobotomies. There is nothing particularly sublime or marvelous about this. Instead of liberation and transcendence it invokes the idea of technical dependency and even the scenario of remote-controlled humans – of whom we would hardly say that they are enhanced or that they possess extended powers of self-determination, even if we placed the remote-control in their own hands. Here, the emerging attention of ethicists is clearly called for (for example, [27]).

Finally, by reclaiming the present one rejects at the same time a teleological notion according to which we need technology to fully realize human potential [31]. Instead, one might claim that we need social innovation and a process of public agenda-setting to bring out the potential of technology [11, 18]. This echoes the substitution of engineering *of* body and mind by engineering *for* body and mind. It should be apparent by now that this substitution owes not just to considerations of technical feasibility or to an imputed ethical conservatism. It reflects that engineering *of* body and mind aims for an inefficient and unoriginal use of technology. Such an approach would be limited to one individual, one customer, patient, or consumer at a time. This individualism detracts from what is already being achieved through changes to the infrastructure or the creation of smart environments that might enhance and constrain human decision making and interaction on a societal level.[33] As opposed to human enhancement technologies, this also happens to be quite within near- and medium-term technical reach and thus has a legitimate, even urgent claim upon our attention.

Refusing the if-and-then brings to light how less spectacular, more familiar technologies shape and reshape, perhaps transform social interactions, individual agency, and a sense of subjectivity or self. The intriguing prospect of an improbable mind–machine interface overshadows the very real and ongoing development of distributed contributed computing systems that use RFID and related technologies to create smart environments. Molecular manufacturing and the so-called "GMO-analogy" overshadow the nanotechnological development of new materials – and surely, there was hardly a more consequential technical development in the twentieth century than the introduction of new materials like plastics.

Even if all this serves to justify a decisive stance against speculative ethics, one might finally worry whether the wholesale rejection of the if-and-then throws the baby out with the bathwater. After all, there are also reasonable extrapolations of current developments and some slippery slope is perhaps more real than another. With its consistent orientation to past and present, to programs, presuppositions, and implications rather than envisioned consequences and future deliverances, this paper has tried to show that it is not important whether one can distinguish better and worse modes of scenario-construction: The "reasonable extrapolations" can be identified without looking at the extrapolated scenarios. One can recognize them by seeing, for example, that the scenarios underwrite currently funded research.[34] In order to assess and critique programs of life-extension, one need not decide whether some trajectory (say, nanotobots repairing human cells) is more plausible than another (improvements of public health, reduced incidence of obesity). Instead, all one needs to do is question the visions that explicitly underwrite ongoing research. If some biomedical research considers human cells as factories with machinery that breaks but that could be repaired, this research is already challenging a certain self-conception

[33] In light of recent advances in robotics, in the development of data gloves and smart environments, and in light of surgeries that can be performed already at an arbitrary physical distance between patient and surgeon, why should anyone be impressed that Miguel Nicolelis and Kevin Warwick can electronically transmit invasively obtained data of correlations between brain or nerve signals and muscular action? In light of the fact that data glove technologies will be further improved, refined, adapted to commercial applications long before anyone could even contemplate the acquisition of a somehow useful brain implant, not only the technical but also the economic feasibility of invasive enhancements technologies appears doomed from the start.

[34] Alternatively, as in the case of global warming, the reasonable rather than speculative (if-and-then) extrapolation appears in a physical model merely as a natural consequence of humanly created initial conditions.

of humanity and perhaps just the one that has given rise to Enlightenment notions of autonomy and consumer choice in the first place. For public debate and philosophical critique of this research program from within our contingently given, changeable yet ineluctable historical condition, there is no need to misleadingly validate a hypothetical future, to be "future-friendly," credulous, visionary. Luckily, we do not even need to be particularly imaginative.[35]

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[35]It is therefore that Jean-Pierre Dupuy and Jürgen Habermas do not care whether certain events happen or do not happen in a remote future – as far as they are concerned, they are happening already in that our conceptions of the self are changing [9, 14]. As in Heidegger, so with Dupuy, the "catastrophe" is metaphysical, whether or not our changed conceptions yield any technological innovation whatsoever. (This might afford a more charitable reading also of the research program at Arizona State University, quoted in note 12 above.) As argued in Nordmann [28], I fully agree with this manner of avoiding the if-and-then. Indeed, it informs the present analysis: While I would not dare formulate moral maxims for future human, non-human, post-human beings, I can see that the enhancement discourse makes claims first upon my present attention, and second on my more or less deficient body – claims that I can and must refuse, if only to resist an unwarranted attribution of defectiveness.

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