

Christopher Coenen

**Utopian Aspects of the Debate on Converging
Technologies**

Pre-Print: 13.11.2007

Erschienen in: Banse, G.; Grunwald, A.; Hronszky, I.;
Nelson, G. (Hrsg.): Assessing societal implications of
converging technological development. Berlin: edition sigma
2007, S. 141-172
(Gesellschaft - Technik - Umwelt, Neue Folge 11)

ITAS - Elektronische Pre-Prints

Allgemeine Hinweise

Wie mittlerweile viele wissenschaftliche Einrichtungen, bietet auch ITAS elektronische Pre-Prints an, die bereits zur Publikation akzeptierte wissenschaftliche Arbeiten von Mitarbeiterinnen und Mitarbeitern – in der Regel Buchbeiträge – darstellen.

Für die Autoren bietet dies den Vorteil einer früheren und besseren Sichtbarkeit ihrer Arbeiten; für die Herausgeber und Verlage die Möglichkeit einer zusätzlichen, werbewirksamen Bekanntmachung des jeweiligen Buchprojekts. Auf die in Aussicht stehende Veröffentlichung wird hingewiesen. Nach Erscheinen der Publikation werden der geänderte Status vermerkt und die bibliographischen Angaben vervollständigt.

Allgemeine Anregungen und Kommentare zu den ITAS Pre-Prints richten Sie bitte an Fritz Gloede (gloede@itas.fzk.de).

Empfohlene Zitierweise des vorliegenden Pre-Prints:

Coenen, Chr.: Utopian Aspects of the Debate on Converging Technologies.
Karlsruhe: ITAS Pre-Print: 13.11.2007;
<http://www.itas.fzk.de/deu/lit/epp/2007/coen07-pre01.pdf>

Utopian Aspects of the Debate on Converging Technologies

Abstract

The upcoming concept of converging technologies accentuates the coalescence of originally separated branches of science and technology. Tendencies of real technological convergence go along with a convergence of futuristic visions. Several of these visions have been deemed utopian or dystopian. Given this, and the historical importance of utopian thought, the article discusses utopian aspects of posthumanist technofuturism and the use of utopian and anti-utopian references in the ongoing debate on technological convergence. It will be argued that posthumanist visions function as common reference points in this debate and together form an intellectual repository for polemical and other purposes. Moreover, some possible consequences for the assessment of the ethical and societal implications of technological convergence will be addressed.

1 Posthumanism and the Convergence of Technofuturist Visions

The emerging concept of converging technologies (CT) evolved mainly out of activities within the US National Nanotechnology Initiative. While the rise of nanotechnology was already marked by an increased awareness of the opportunities and challenges arising from new technoscientific synergies, the CT concept further accentuated the coalescence of originally distinct branches of science and technology (S&T). It became more widely known after the publication of a workshop report entitled “Converging Technologies for Improving Human Performance: Nanotechnology, Biotechnology, Information Technology and Cognitive Science” (Roco/Bainbridge 2002), the fields abbreviated as “NBIC”. The workshop, held in December 2001, was sponsored by the National Science Foundation and the Department of Commerce. This constellation and the participation of high-level politicians, scientists, and representatives of government institutions and private corporations created the impression that the “NBIC initiative” is an official US activity, which is, however, not the case. Nevertheless, CT initiatives subsequently started in Europe (HLEG 2004; cf. Coenen et al. 2004) and elsewhere.

The debate is still mainly restricted to experts concerned with research and technology development (RTD) policy, to a few nongovernmental organisations (NGOs) and to some active journalists. Two issues of discussion are (a) the prospects of enhancing or augmenting human cognitive and physical capabilities (“human enhancement”) and (b) the significance of the “technoimaginary” (including futurism and science fiction). These issues are prominent topics of the debate mainly because of the US NBIC initiative. Its program and cultural context reflect processes which can be deemed a convergence of visions from popular culture and various fields of S&T, above all the NBIC fields, including artificial intelligence (AI), robotics and brain science. Many of these visions are “technofuturistic” in the sense that they portray a future in which the human condition (and, in particular, human corporeality) and some features of societies are fundamentally transformed by technology. While technofuturism is certainly not a new phenomenon, it has apparently been experiencing a kind of revival since the 1980s; this is mainly true in the US, but also, if to a lesser degree, in Europe. Moreover, it exhibits rather unusual political characteristics, some of which will be analysed in this article.

In recent years, futuristic visions have attracted growing attention in various fields of research, including that of interdisciplinary technology assessment in which the concept of “vision assessment” was developed (Grin, Grunwald 2000; Grunwald 2004). One element of this is the analysis of normative aspects of “visionary communication”, another, the study of the strategic use of visions by the actors involved in such communication (Grunwald 2006). It aims to help overcome the confrontation between doomsayers and enthusiasts, a problem that is often deemed a crucial challenge (e.g. Nowotny 2005; STOA 2006), by fostering ethically and historically informed discussions about the issues at stake. In the following, we summarise the findings of an ongoing assessment of futuristic visions in the debate on CT, with the focus on normative and strategic aspects. The findings primarily relate to the actor level and historical aspects, in particular to the way in which various actors relate “posthumanist” visions to the tradition of utopian thought. The reasons for selecting this subject for study are that (a) posthumanist technofuturism plays a crucial role in the visionary discourse on CT (and, in the view of some scholars, even contributes to a new model of

technology application; cf. e.g. Wolbring 2005), (b) references to the “utopian” are an important element of the debate, shedding light on the political profiles of the groups involved, and (c) the interrelations of posthumanism and utopianism generally deserve further clarification because they appear to be highly relevant to the normative and imaginary aspects of S&T.

Posthumanist technofuturism can be regarded both as a particular set of ideas regarding the technological transformation of mankind, and as an emerging sociocultural movement that champions posthumanist goals. In contrast to the branch of postmodernist philosophy and media theory that is also sometimes called “posthumanism”, the posthumanism discussed in this article lays claim to practicality. Its goal is the creation of radically transformed human beings or artificial beings by means of engineering. Its mentors include Marvin Minsky, an AI research pioneer, Hans Moravec, an expert in robotics, Ray Kurzweil, an IT expert, inventor and futurologist, and Eric Drexler, the famous nanofuturist. However, the leading figures in public discourse are philosophers and social scientists (whose position should not be confused with the above-mentioned philosophical “posthumanism”). One of the main goals of “practical” posthumanism is the “enhancement” or augmentation of human capacities and abilities, primarily by creating new man-machine interfaces, but also by using drugs and other means. The prospects of genetic engineering are also an important aspect, but do not lie at the core of contemporary posthumanism, presumably because of related dystopian visions and the history of “eugenics”. Many posthumanists also believe in the feasibility of a very “strong AI”, the creation of human-like, superhuman computer intelligence. One of their favourite visions is that one day in the not too distant future, it will be possible to digitally “scan” human minds (“uploading”) and transfer human consciousness to computers and new robotic devices or other artificial bodies. As a consequence, a kind of personal immortality will be achieved, and individual egos (or at least a copy of them) will exist forever. Such quasi-immortal “cyberminds” may reach out into outer space (Bainbridge 2004b; Moravec 1992), creating an intergalactic civilisation, often imagined as a collective superintelligence. Some posthumanists envision a future universe whose matter and energy is saturated with intelligence, and even consider how such an intergalactic civilisation could “(spread) our intelligence beyond this universe” (Kurzweil 2005, p. 366). The further development of CT is deemed the necessary prerequisite for all these developments, and science fiction plays a crucial role, both as a source of inspiration and a transmitter for posthumanist visions. Most of posthumanism’s younger roots lie within technophilic “fringe” groups such as “cryonicists” and other offshoots of the anti-ageing movement, enthusiasts of space colonisation, certain cybercultures, and Drexlerian nanofuturism. Earlier in this decade, posthumanist visions were discussed in the huge public debate that followed publication of Bill Joy’s pessimist-futurist essay “Why the future doesn’t need us” (April 2000; cf. Schirrmacher 2001), which draws heavily on the ideas of Moravec, Kurzweil, Drexler and other futurists.¹

Posthumanism has organised itself politically in the “transhumanist” movement, whose organisations are relatively small, but which attract media attention, taking up older traditions of futurist thinking and feeding them into political, academic, and public spheres. The movement is often perceived as being pro free market, anti-government, and decidedly individualistic. This is largely due to the pioneering role of the “extropians”, a transhumanist group that started its activities in California in the 1980s, picking up on libertarian futurist traditions of the preceding decades (cf. Hughes 2004; Klerkx 2006; Krüger 2004). However, as the organisation of the libertarian “extropians” has been defunct since 2006, the World Transhumanist Association (WTA) is now the organisational centre of transhumanism, and here, left-leaning transhumanists are apparently strong (WTA 2005). Article 1 of its “Transhumanist Declaration” (WTA 2002) states what can be seen as the common basis for most transhumanists: “Humanity will be radically changed by technology in the future. We foresee the feasibility of redesigning the human condition, including such parameters as the inevitability of aging, limitations on human and artificial intellects, unchosen psychology, suffering, and our confinement to the planet earth.” A number of influential individuals in industry, academia and, to a certain extent, the political sphere seriously consider or advocate posthumanist visions (or even support transhumanist organisations). Organised transhumanists have managed to gain a foothold in the academic world, being particularly successful in the UK and the US. Moreover, non-university institutes that are run by transhumanists play a significant role in the debates on the ethical, legal, and societal implications of nanotechnology and other fields of RTD. While it can be argued that posthumanism is quasi-religious, it is also very scientific. Therefore, it comes as no surprise that its adherents try to establish

¹ His references to nanofuturism and warnings of terrorist abuses of the CT attracted most attention. Posthumanism in a narrow sense is now discussed more widely, often under the label of “human enhancement”. Debates on genetic engineering (such as the “Sloterdijk debate”) and brain research have also included futurist perspectives, including the prospects of a hardening or even “naturalisation” of social hierarchies.

themselves firmly in the academic world, offering a kind of complementary posthumanist system in this sphere, including expertise in ethics and foresight. Quite often scientists and politicians appear irritated by posthumanism, derisively characterising it as science fiction or pseudoscience. But the goals of “practical” posthumanism not only resonate within the above-mentioned subcultures and postmodern academic and artistic circles, but also pertain to some fields of RTD.²

The NBIC initiative in the US is an important point of reference for transhumanists for two reasons: on the one hand, the prominence of “human enhancement” and the consideration of far-reaching posthumanist visions in its visionary program, and, on the other hand, the propinquity of some of its members to organised transhumanism. The overall technofuturistic character of the initiative’s visionary program has been the subject of analysis for some time now (Paschen 2004) and, therefore, need not be discussed in detail here.³ Among the strategic aspects, “visionary communication” (Grunwald 2004) is relevant in many recent transformations of the relationships between S&T, business, governmental and civil society; for instance, conjuring up far-reaching visions in discussions of biotechnology (cf. Euchner 2001) and nanotechnology (cf. Nordmann 2005) which have radical implications, e.g. with regard to the self-understanding of Western societies and S&T. In the visionary discourse on nanotechnology and its convergence with other fields, a peculiar platform for debate has been created, in terms of a “forum for exploring the future impact of all science and engineering” (Khushf 2004). This suggests a need to redefine some fundamental questions on the relationship between innovations in S&T and the human condition (Dupuy 2005; Grunwald 2006; Knorr Cetina 2004; Wolbring 2005). A wide range of futuristic visions are relevant to this debate, which is not restricted to “fringe” groups, but involves key policy actors (cf. HLEG 2004; Nordmann 2003; Paschen et al. 2004; Schummer 2004a). Vision assessment (e.g. Lösch 2006; STOA 2006) contributes to a fast-growing corpus of literature (cf. Baird et al. 2004; Nordmann et al. 2006; Schummer 2004b) in which the discourse on CT is analysed. The NBIC initiative’s visionary program includes (Roco/Bainbridge 2002; pp. 1, 5f. and 18-20):

- Two core visions to be realised within the next two decades, namely (a) that “the human body will be more durable, healthy, energetic, easier to repair, and resistant to many kinds of stress, biological threats, and aging processes” and (b) that “a combination of technologies and treatments will compensate for many physical and mental disabilities and will eradicate altogether some handicaps”.
- A view of a transformed civilisation looming on the horizon in which advances in CT will enhance sensory and cognitive capabilities (also “for defense purposes”), make “brain to brain interaction” available, perfect “human-machine interfaces including neuromorphic engineering for industrial and personal use”, and ameliorate “the physical and cognitive decline that is common to the aging mind”. This might then lead to “wholly new ethical principles” that will govern “areas of radical technological advance, such as the acceptance of brain implants, the role of robots in human society, and the ambiguity of death in an era of increasing experimentation with cloning”.
- The hope for a “golden age” to be realised by technological convergence going hand in hand with “human convergence”, leading to “world peace, universal prosperity, and evolution to a higher level of compassion and accomplishment”. With this, humanity might become something “like a single, distributed and interconnected ‘brain’” or a “networked society of billions of human beings” that could be “as complex compared to an individual human being as a human being is to a single nerve cell” and comparable to “a larger form of a biological organism”, possibly regulated with the help of “a predictive science of society”, by applying “advanced corrective actions, based on the convergence ideas of NBIC” and an “engineering” (Bainbridge 2004a) of culture;

² To give a few examples: The Foresight Institute (founded by Drexler) and the transhumanist Center for Responsible Nanotechnology influence the discourse on nanotechnology. James Martin, a futurist writer himself, sponsors transhumanists such as Eric Bostrom (with his Future of Humanity Institute at Oxford University). Moreover, and mainly in the US, there is a mainstream technofuturism, created, among others, by philosophising and politicising IT experts, visionary businessmen, militantly atheistic biologists, and liberal bioethicists. Transhumanism can be seen as an extreme edge of this milieu. Posthumanism is also promoted by IT industrialists such as Bill Gates (cf. Kurzweil 2005) and discussed seriously by renowned scientists (such as Michio Kaku).

³ The initiative is not only characterized by technofuturist overtones. Several scholars bring in mainstream societal and ethical aspects as well as innovative ideas concerning the role of social sciences with regard to CT (e.g. Khushf 2004). Academic and public attention was, however, mainly aroused by the fact that a seemingly official initiative not only took contentious visions seriously, but enthusiastically promoted some of them.

Even more far-ranging posthumanist visions (e.g. Robinett 2001; Spohrer 2001) have been seriously discussed. Some participants of the initiative were “impressed by the long-term potential for uploading aspects of individual personality to computers and robots, thereby expanding the scope of human experience, action, and longevity” (Roco/Bainbridge 2002, p. 86). Both, the similarities between posthumanism and the initiative’s visionary program as well as the contacts between participants of the initiative and transhumanist organisations have aroused suspicions of a hidden transhumanist agenda within the initiative and even of infiltration of US institutions by these organisations. The fact that Mihail Roco - senior NSF officer, main architect of the official US National Nanotechnology Initiative, and key figure of the NBIC initiative - counterfactually denied any affinities or connections with transhumanism furthered these suspicions, particularly in Europe. In the mean time, the direct connections have become very obvious. One recent manifestation was the latest publication by the initiative, which included a longer article by James Hughes (2006) without making any reference to his position as executive director of the WTA.⁴ In this article, Hughes analyses the debates between his movement and its critics, outlining a kind of transhumanist “policy of alliances”. Moreover, NSF’s William S. Bainbridge, sociologist of religion and co-editor of most of the initiative’s publications, has demonstrated his sympathies for organised transhumanism on various occasions and published very visionary posthumanist and polemical articles, in which he, for example, strongly criticised Western religious traditions and organisations (Bainbridge 2004b; 2005). In 2006, he was a keynote speaker at the WTA’s annual conference in Helsinki (Bainbridge 2006), presenting his worldview⁵, renewing his offer of a strategic cooperation, and strongly criticising the US government, warning of the rise of clerical fascism in the US. Moreover, he addressed the audience as “the heroes of the future” and emphasised the need for a vital transhumanist movement.

2 The Utopian vs. the Posthumanist

The interrelations of technofuturism (including its posthumanist variant), utopianism and S&T are highly complex, contentious subjects of academic research and political debate. While they cannot be discussed in any detail here, the central concepts of this article⁶ need to be delineated, taking historical and systematic aspects into account. This is all the more important since one and the same author, text or tradition of thought is often characterised as “utopian”, “(techno)futurist” and “posthumanist”. In our understanding, “technofuturism” is a rather heterogeneous bundle of future visions relating to the fundamental transformation of the human condition and of at least some features of society. “Posthumanism” is seen as a variant of futurism, focusing on visions of human or human-like intelligence embodied in non-biological, superhuman biological or man-machine forms.

Neither technofuturism as a whole nor posthumanism in particular is characterised here as “utopian”. This may come as a surprise since there are obviously structural similarities between technofuturism and utopian ideas, and not only from a conservative standpoint that sees both human nature and traditions as givens to be accepted or even glorified. These similarities include the concepts of perfectibility and the “New Man”, the belief in progress, the high hopes for rational planning of the future that is often envisaged as being conducted by an enlightened avantgarde, and the spirit of engineering in the broadest sense. Moreover, both utopian and technofuturist visions are often interpreted as secularised forms of Christian traditions or as modern versions of ancient myths and pre-utopian visions of an ideal society.

What is meant here, then, by the “utopian aspects” of the debate? Although our analysis is restricted to explicit references to the “utopian”, it is not limited to references to the “*Stammhaus*” (Ernst Bloch), the ancestral home, of Utopia, i.e. the literary genre. It also includes all other references to “utopia” or “utopianism”, including colloquial use of “utopian” to mean something unrealistic, illusionary or purely fantastical. The study was based on the following understanding of the utopian tradition (Saage 2003,

⁴ In November 2006, Hughes offered the WTA board his resignation (WTA 2006). He wants to continue to be executive director of the transhumanist Institute for Ethics and Emerging Technologies (IEET).

⁵ His worldview is a mix of such elements as posthumanism, militant atheism, Nietzscheanism, visions of a “cultural engineering”, and, when it comes to leftist sociologists, anti-utopianism (Coenen et al. 2004; Coenen 2006).

⁶ Conceptualisations of the utopian and colloquial uses of the word and its related terms are numerous and views diverge widely on their meanings and on normative aspects. “Futurism” is apparently used frequently in connection with visions of S&T, but it remains a rather vague term. “Posthumanism” has been recently established as a concept in cultural studies and other fields of research, but still lacks the insignia of a mature scientific term.

2005; cf. Coenen 2006): Utopians construct visions of a new society and political order and implicitly or explicitly criticise existing societies. Retrograde visions of an archaic Golden Age or a re-establishment of pre-modern social systems are not deemed utopian here. (The notion of a “conservative utopia” is accordingly seen as a *contradictio in adiecto*.) Utopian goals have to be mundane, open to rational deliberation, and possible to achieve without the help of supernatural entities. One basic difference is that between “archist” and anarchist utopias. While social justice and equality are important goals of any utopia, there are significant differences with regard to the role of elites. Archist utopianism, which combines elitism with ideals of social welfare and elements of social equality (Saage 2005), forms the mainstream of classical utopian thought, of which literary dystopias are an important branch. Dystopias have strengthened the self-reflective elements of the utopian genre, in the 20th century in particular, by articulating the growing doubts regarding the beneficial effects of S&T (Saage 2003; Saage 2006b).

Although technofuturism contains some ideas from the technoutopian tradition and some of the traits of social utopianism, there are several reasons for distinguishing the two concepts: First, futurism focuses on “technological fixes” for all kinds of social and individual problems, whereas in the utopian tradition the emphasis is always on reforming educational and political systems and changing culture. Second, the utopian tradition derives from an old literary genre that even coined the term “utopian”. While some influential interpretations deem a wide range of texts and phenomena to be utopian, this genre is always a central point of reference. Futurism, however, lacks such a core corpus, although science fiction is often seen as its literary expression. Third, and related to the previous points, their political profiles are different: While both look for sustainable solutions to basic problems of society and the human condition, such as the age-old scourges war, poverty, and environmental degradation, the utopian imagination always includes an implicit or explicit critique of the economic and political structures of existing societies. Futurism, however, is often nothing more than an extrapolation of trends in S&T, a vision of a high-tech version of present society.

This understanding of the utopian also opens a different perspective on some historical and normative aspects of posthumanism and the ongoing debates on CT. Relevant in this context are two aspects of the “pre- and early history” of today’s posthumanism: its intellectual roots in the cybernetics movement of the 1940s and 1950s, and the fact that parts of the “biofuturism” or “bioutopianism” of the 1920s and 1930s were an early form of posthumanism. Early cybernetics put forward the vision of creating non-biological intelligence and, by privileging “informational pattern over material instantiation”, opened up the posthumanist perspective of the human “embodiment in a biological substrate” as an “accident of history” (Hayles 1999, p.2). The cybernetic naturalisation of the mind is also an element of the metaphysical underpinnings of both posthumanism and the US NBIC initiative. It tends or is even bound to end up paradoxically in a new ontological dualism, if not spiritualism (Coenen 2006; Dery 1996; Dupuy 2005; Euchner 2005). Moreover, the cybernetic movement apparently had an anti-utopian impetus (Pias 2003), developing a vision of a future-orientated society that is perpetually adjusting to changing conditions and harmonising individual goals with societal ones, in a sociotechnical order based on man-computer interactions. The mainly Anglo-American (and more Anglo than American) early biofuturism was shaped by a circle of eminent natural scientists and intellectuals, such as H.G. Wells, famous author of science fiction, literary utopias, futurist works and political non-fiction, the biologists J.B.S. Haldane and Julian Huxley, and the crystallographer John Desmond Bernal. They were politically and culturally “progressive” and open or adherent to socialist ideas. All of them are held in high esteem by the transhumanists who, for example, named awards after Wells and Haldane and often credit Huxley as the inventor of the term “transhumanism”. In their futurist texts, they envisioned civilisations that control evolution, create improved humans or new species, and colonise outer space. In Bernal’s essay “The World, the Flesh, and the Devil” (1929), we encounter the vision of an ever-progressing man-machine hybridisation which leads to the construction of a network of disembodied brains and egos in outer space that leaves behind and secretly controls unaltered humanity on earth. Since this network can create artificial life and bio-machine hybrids (“angels”), it possesses tremendous powers to explore, control and manipulate the observable universe up to the stars. Finally, consciousness itself may end or vanish in a humanity that has become completely “etherealized” and ultimately perhaps resolving itself entirely “into light” (cf. Marxists Internet Archive 2002; Schäfer 1993).⁷ From the early 1960s on, biofuturist and cybernetic visions converge and are influenced by a new wave of “eugenics” (Paul 2005). Much of this visionary discourse was inspired by real and interrelated progress in the life and information sciences, partly

⁷ However, most prominent in recent debates on S&T is Haldane’s early biofuturist essay “Daedalus, Or Science and the Future” (1923; reprinted in Dronamjuru 1995, pp. 23-50), partly because it was a source of inspiration for Aldous Huxley’s famous dystopian novel “Brave New World”.

accomplished by the visionaries themselves and fuelled by funding for space and military research (mainly in the US). Nobel Prize winners such as Joshua Lederberg and Francis Crick publicly mused about how to create a genetically optimised humanity or, reacting to a speech by Haldane (1963), discussed various future ways to modify human beings.⁸

This review demonstrates that the antecedents of contemporary posthumanism are not confined to either fiction or ancient myths. They are mainly of 20th century origin and promise that mankind's dreams of old for individual immortality and a humanly meaningful cosmos will come true by means of S&T and social engineering on a global scale. Some of their main proponents have characterised them as attempts to develop a worldview or even a religion more suited to mankind's role as the key agent of evolution on a cosmic scale than Christian and other traditional religions. Today's posthumanism can be seen as a "total synthesis" of many elements, primarily, biofuturist and cybernetic ones. In organised transhumanism, these elements now form part of a peculiar *Weltanschauung* that appears to be less a political ideology than a salvation religion, not to be equated with utopianism.⁹ While this worldview is not shared by all who continue the older futurist traditions, it is in some ways in line with mainstream tendencies of the current visionary discourse in and about S&T (cf. Mauron 2005; Wolbring 2005). However, sarcastic remarks made by mentors of posthumanism, in which they express their contempt for the human body, non-scientists or mankind at large, can create the impression that posthumanism tries to articulate supposed underlying assumptions in S&T and its history of ideas, whose existence a great majority of scientists would probably deny. Denoting the brain as a machine consisting of "meat" (cf. Weizenbaum 1995 about Minsky), calling a world inhabited by non-"enhanced" humans a "zoo" (Bernal), and comparing humans to pet animals or bacteria (Moravec 1992) might be seen by some as expressions of humour or a mild form of misanthropy. Considered in an ethical context, however, they are highly objectionable. It is also obvious that pro-capitalist posthumanists such as Moravec (with his bizarre social Darwinist vision of competing cyberminds in outer space; Moravec 1994) reproduce central features of the Marxist Bernal's vision (cf. Coenen 2006; Paul 2005).

Although posthumanism is often deemed utopian, it is predominantly seen as a reaction to the Darwinian humiliation of mankind (Manuel/Manuel 1980), intent on replacing "blind evolutionary chance by the self-directed re-engineering of human nature" (Mauron 2005). Some aspects of posthumanism and transhumanism also appear to justify their classification as quasi-religious systems of belief with eschatological and puritanical overtones, and even Gnostic ones in the sense of contempt for human corporeality and for earthly existence.¹⁰ Several scholars have stressed the differences between utopian thought and posthumanism, while at the same time acknowledging similarities such as the *faible* for engineering approaches to reality and the idea of an avantgarde that reshapes humanity and the world (e.g. Saage 2006a). Although there are indeed affinities, the fulfilment of utopian longings appears to be at most a side effect of really important developments, even in left-wing posthumanist visions. Particularly relevant here is the scenario that mankind will happily, but stupidly live in material plenty in a quasi-utopian world (Bernal's "human zoo") on earth, left behind or even secretly controlled by a posthuman technoscientific elite that conquers the universe. Bernal's above-mentioned essay is instructive in this context: He certainly did not live in an ivory tower, but was engaged in science policy, socialist politics and the British efforts in World War II. Nonetheless, his futurism appears to be orientated towards the otherworldly with a basis in scientific materialism. The depreciation of a quasi-utopian world on a future Earth in which the traditional utopian longings of humanity are fulfilled, betrays an impulse that could be characterised as anti-utopian. Moreover, his futurism can be deemed apolitical (as has been noted also with regard to the

⁸ For example "through physiological and embryological alterations, and by the substitution of machines for his parts. (...) If we want a man without legs, we don't have to breed him, we can chop them off; if we want a man with a tail, we will find a way of grafting it on to him" (Lederberg, cited in Wolstenholme 1963, p. 362).

⁹ At least the far-ranging cosmic visions of an intergalactic posthumankind, giving birth to a kind of supernatural entity which reorders and spiritualises the universe, are quasi-religious. The same can be said of the more "modest" vision of quasi-immortal cyberminds (e.g. Bainbridge 2004b). One can find in transhumanism, of course, also sectarians, diverse views on minor subjects, internal conflicts and even some sceptics.

¹⁰ For early posthumanism's relevance in the context of science fiction and utopianism cf. Parrinder 1995, for its characterisation as utopianism cf. Grabner/Reiter 1984 (with regard to the history of S&T and utopianism); Paul 2005 (with regard to the history of "eugenics") and Porter 2001 (with regard to anti-medical polemics and the Christian overtones in posthumanism's distaste of the flesh). For Haldane's legacy cf. Alexander 2003; Dronamraju 1995. In recent debates about S&T, early posthumanism is mainly referred to by transhumanists (e.g. Hughes 2004; WTA 2003) and by some of its conservative critics (e.g. in the journal "The New Atlantis"). For an analysis of transhumanism as a salvation religion cf. Schummer 2004a; for characterisations of posthumanism as neo-Gnostic cf. e.g. Beiting 2006; Brumlik 2001; Coenen 2006; Davis 2004; and (critically) Krueger 2005.

long-time Marxist Haldane; cf. Ezrahi 1995), because Bernal suggested, here in line with important parts of the utopian tradition, that science can be put in the service of humanity only by a society freed from social conflict and ruled by an enlightened elite. Bernal opined that, when thinking of the future, even the least religious of men all retain in their minds an idea of some transcendental, superhuman event which will bring the universe to perfection or destruction. He thought that all human beings want the future to be mysterious and full of supernatural power, and argued that these aspirations have built our material civilisation and will go on building it in the future. Such posthumanist visions (a) appear to be the result of a mystification in which mankind is at the same time subject and object of demiurgic interventions, (b) camouflage or glorify the role of technoscientific elites and (c) display features that do not conform to the focus on the mundane that is characteristic for the mainstream of utopianism.

The following common characteristics of early and contemporary posthumanism can be emphasised: (a) the strong belief that the scientifically enlightened should be the avantgarde of humanity, pressing ahead with physical, cognitive and mental “betterment” or “enhancement” as well as with the transformation of human beings into man-machine hybrids (and perhaps, ultimately, into quasi-immortal egos gradually merging into a collective consciousness), (b) the hope to thereby create a civilisation that is able to control evolution (which represents an existential make-or-break goal for our species), (c) the predominantly anti-Christian character (while not necessarily anti-religious or totally lacking in Christian variants), and (d) a high degree of arbitrariness when it comes to political concepts and societal visions, and the tendency to simply opt for the ideology that appears to be most decidedly pro-S&T (be it Marxism, economic liberalism or any other kind of non-conservative system of ideas). Transhumanism also ties in with the self-stylisation of early biofuturism as the legitimate heir and logical continuation of humanism, the Enlightenment, and modern confidence in technoscientific and societal progress.¹¹

3 Utopian Aspects of the Debate on Converging Technologies and Post humanism

Against this background of some of the debate’s historical elements, we will now discuss findings from our own vision analysis. The primary actor groups considered here are the posthumanists themselves and their political opponents.¹² Posthumanists defend themselves against being characterised as “utopians” (also in the sense of “fantasts”). They stress that (a) their visions are based on sound science and realistic extrapolations, (b) they are aware of the risks involved, and (c) they do not want to realise any authoritarian utopian scheme, favouring individual freedom and choice. But they also (a) display a strong interest in visions that to many appear to be purely fantastic, (b) tend to dodge the questions of near- and mid-term risks, in fact of any risks that are not relevant to the existence of the human species as a whole¹³, and (c) do not discuss in any depth the risk of a totalitarian abuse of NBIC technologies. In line with older futurists such as Drexler (1986) and Wells (cf. Saage 2003), they do, however, criticise “static” utopias. The libertarian “extropians” argued that “social engineering should be piecemeal as we enhance institutions one by one on a voluntary basis, not through a centrally planned coercive implementation of a single vision” and advocated cultural diversity and social dynamism: “In place of the static perfection of a utopia, we might imagine a dynamic ‘extropia’, an open, evolving framework allowing individuals and voluntary groupings to form the institutions and social forms they prefer” (Extropy Institute 2003).

¹¹ These claims are affirmed by many critics of posthumanism, ranging from antimodernist Christians via cultural conservatives and ecologists up to feminists who criticise traditions of technoscientific visions and practice that they see as misogynic, directed against the diversity of human corporeality and as expressions of a strong desire to dominate and control. While this is not the place to discuss the relationships of technofuturism with humanism, Enlightenment, and other “progressive” traditions (cf. with regard to early posthumanism: Ezrahi 1995; Grabner/Reiter 1984), it can be pointed out that some posthumanist visions appear to be incompatible with “progressive” ideas such as the perfectibility of society (instead of the perfectibility of life) and with modern scepticism (Kettner 2005; Knorr Cetina 2004; Saage 2006; Winner 2005; cf. Coenen 2006).

¹² For overviews and analyses of the discourse see, for example, Garreau 2005; Hughes 2004 and 2006; Mauro 2005; Schummer 2004a; STOA 2006. Cf. also Coenen 2006.

¹³ Several scholars and journalists have pointed out that the debate on CT, nanofuturism and posthumanism is characterised by a confrontation of “heaven” and “hell” scenarios (Garreau 2005) which, however, are often based on the same assumptions concerning the prospects of S&T (Paschen et al. 2004; STOA 2006). With regard to the ethics and social shaping of S&T, it is problematic (Schummer 2004a) that this confrontation leads to a fixation on what leading transhumanists discuss under the label of “existential risks”.

Transhumanism is more than libertarian technofuturism, however. There is obviously a constant tension between left-leaning activists and libertarians. In the last eruption of internal conflicts in transhumanism, which took place in early 2006, libertarians harshly criticised what they saw as a radical left-wing bias in some influential WTA leaders. At the centre of conflict was James Hughes, the WTA executive director. He has often argued for a revitalisation of the technoutopian tradition, but like many leftist posthumanists gives priority to rather remote posthumanist dreams and unusual ideas (such as the neuroenhancement of animals) over mainstream “progressive” goals.¹⁴ Hughes summarised his visions as follows: “To rekindle a progressive utopianism, the Next Left (...) needs visionary projects worthy of a united transhuman world, like guaranteeing health, intelligence and longevity for all, building world government, eliminating work, and colonizing the Solar system” (Hughes 2004, p. 194; cf. Coenen 2006). Although his ideas are often quite moderate and reminiscent of European social democracy, he also promotes ideas that in his critics conjure the spectre of totalitarianism. Besides his sympathies for a world government and a rehabilitation of “eugenics”, his most contentious ideas are visions of “virtue engineering”, which in his view could be realised, for example, by means of prenatal manipulations to make male human beings less aggressive. While he seldom forgets to distance himself from totalitarianism, his notion that the utopian “New Man” can be constructed using CT “to edit and augment our desires, to eliminate our vices and enhance our virtues” (Hughes 2003) open some dystopian prospects.¹⁵

What are the theoretical prospects of a left posthumanism? One can very roughly distinguish three main currents of leftist academic thinking: The “First Left” is very optimistic about technoscientific progress, displaying some technoutopian and futurist elements. The “Second Left”, whose influence peaked in the “New Left” of the 1960s and 1970s, challenges specific societal aspects of S&T, partly in the form of a fundamental critique. It was one of the inspirations of the ecologist and feminist movements, which also developed rather strong left wings. The “Third Left”, described as “postmodern”, “deconstructionist” or even “posthumanist”, focuses on cultural and societal aspects of S&T and what it sees as hidden assumptions and biases in the modern worldview, thereby partly radicalising ideas of the “Second Left” and partly integrating elements from other philosophical traditions. With regard to the “First Left”, early biofuturism made it obvious that visions of a massive modification of human beings can, at least superficially, be combined with socialist ideas. A possible merger of “Third Left” ideas with transhumanism, based on shared assumptions regarding man-artefact interrelations, appears to be less hampered by normative differences with regard to the posthuman, than by their respective assumptions concerning societal and cultural aspects of S&T. The transhumanists favour “traditionally modern” standpoints, while “Third Left” thinkers argue for a critical evaluation and deconstruction of modern traditions. Nevertheless, fashionable “Third Left” intellectuals (Hardt/Negri 2000) have embraced posthumanist visions, trying to synthesise theoretical and “practical” posthumanism. In terms of the “Second Left”, it has been noted that Ernst Bloch’s concept “*Allianztechnik*” and his utopian vision of new relationships between technology, nature and man appear to be compatible with specific visions of NBIC convergence (Nordmann 2006). This compatibility stems in part from “First Left” traditions, and similar points could be made with regard to other influential “Second Left” thinkers such as Herbert Marcuse. Nevertheless, of the three, the “Second Left” appears at first glance to be the most improbable candidate as an intellectual source of a left posthumanism, mainly due to the lasting influence on public discourse of two leading proponents of the Frankfurt School of Critical Theory, Theodor Adorno and Max Horkheimer. Many who refer to them stress the “dehumanising” tendencies of S&T, partly in line with the critique of posthumanism and genetic engineering that was brought forward by today’s most important proponent of the Frankfurt School, Jürgen Habermas (2001). He warned of a self-instrumentalisation of the species that could endanger individual self-determination, give rise to asymmetrical relations between human beings and prove to be disruptive for human corporeality. Moreover, Adorno and Horkheimer’s critical stance towards the social reality of human corporeality, which culminated in the characterisation of the human body as a trained corpse, as well as their argument against positively picturing utopia are

¹⁴ His offer to resign as WTA executive director was published (WTA 2006) together with WTA’s three new action programs, including the campaign for “the Rights of the Person” with the following goals: (a) universal access to health and enabling technologies, in particular, for disabled people, (b) “human-level” rights protections to great apes, (c) “cognitive liberty”, including the liberalisation of psychoactive drugs laws, and (d) support for research into cognitive enhancement technologies.

¹⁵ Such visions might not be representative of posthumanism, but the basic assumptions that individual mindsets and beliefs as well as cultural values can and should be artificially and systematically altered are at the core of posthumanism. However, many transhumanists distance themselves from leftist utopianism. Similarly, the few fascists who have tried to become part of the movement were rejected by libertarian and leftist transhumanist leaders alike.

referred to by several critics of posthumanism. There are, however, some hints that the apparent core vision of posthumanism, the overcoming of death in a literal sense, is not diametrically opposed to Adorno's ideas on human corporeality and utopianism. In Adorno's view (1975), Marxian materialism has secularised the theological *Bilderverbot* (ban on images) by not permitting utopia to be positively pictured.¹⁶ Moreover, he stated that materialism's great desire would be the resurrection of the flesh, a desire he characterised as utterly foreign to idealism, the realm of the absolute spirit, but as also characteristic of the Christian tradition. Adorno agreed with Bloch that the hope to overcome death, in a literal and materialist sense, is at the heart of utopia, its "neuralgic point" being the question of the abolition of death (Adorno/Bloch 1978; cf. Anderson 2004): While the immediate reaction of many to the notion that people might no longer die is that nothing could be worse or more horrifying, for the utopian consciousness the potentiality of an abolition of death is what one really wants. From this perspective, the identification with death appears to be an extension of the identification with the existing society. Adorno also points out that in philosophy (particularly in that of Martin Heidegger) even the potentiality of an abolition of death is often depreciated and death sanctified or made absolute.¹⁷

Many features of contemporary posthumanism appear to be problematic from leftist or "progressive" perspectives, for example, (a) the naïve political concepts or even ignorance towards political power on the part of left-wing transhumanists, (b) elitist patterns of thought in libertarian posthumanists' visions (cf. Hartmann 2000) and their tendency to adjust human "nature" to society instead of changing the latter (cf. Schaper-Rinkel 2003) or (c) the overall fetishisation of intellectual capabilities, culminating in the vision of immortal cyberminds, which apparently reflect fears of middle-class "symbolic workers" concerning their individual socioeconomic status. Nevertheless, some developments in the fields of CT raise questions that are highly relevant for newer leftist preoccupations such as questions of bodily aspects of identity or fears of a panoptic surveillance society. The same can be said with regard to the idea of societal and cultural progress: While claims for an "intelligence augmentation" on the basis of an advanced body-external communication infrastructure (Hartmann 2000) or for an "engineering for the mind and the body" instead of an "engineering of the mind and the body" (HLEG 2004) may also be attractive from more traditional leftist perspectives, posthumanist core visions obviously not only evoke old visions of human perfectibility, but also resonate in Third Left circles that propagate a "radical body politics" and criticise the dichotomisation of human beings and artefacts (cf. Winner 2005). The current relationships between posthumanists and leftist movements are, however, mainly antagonistic. There are several authors and organisations who criticise posthumanism for reasons of ecology, sustainability, growth critique (*Wachstumskritik*) or anti-technocracy, for example: (a) the anti-corporate NGO ETC Group that is highly influential in the international political debate on nanotechnology and CT and characterises the NBIC initiative derisively as a successor of the technoutopian tradition (ETC Group 2006), (b) several leftist ecologist thinkers who, with regard to posthumanism, stress the general need for limiting technology development and criticise what they see as old tendencies of modern S&T which are directed against human corporeality and nature (e.g. Gorz 2004), and (c) some anarchist groups who radicalise these critiques, denouncing CT as technologies developed for the subjugation and ultimately destruction of man and nature, and criticise transhumanists, the NBIC initiative and some of their intellectual forefathers.¹⁸

¹⁶ In this context, the concept of "singularity" (a kind of civilisational quantum leap caused by rapid advances of the CT) is noteworthy (Kurzweil 2005) which has given birth to a transhumanist substream, the "singularitarians", who stress the idea that contemporary humans cannot even imagine what the post-singularity future will look like. A similar idea is developed with regard to utopianism in Bostrom 2005c. The singularity is sometimes, and most often derisively, compared to eschatological concepts of fundamentalist Christians (e.g. "rapture").

¹⁷ In Adorno's view, an abolition of death by technoscientific means would in itself be no more significant from a truly utopian perspective than the invention of television, but utopian thinking would be impossible without the idea of life liberated from death (Adorno/Bloch 1978, p. 360; cf. Anderson 2004). If the fear of death, as Bloch added, really is the main driver of utopianism, and the same applies to posthumanism, there may be a basis for a posthumanist "Second Left" utopianism. However, the transhumanist goals to overcome "unchosen psychology" and mortality by technological fix, the quasi-spiritualism of the cybermind visions, and the posthumanist disregard for the sociohistorically formed human body in which traces of historical suffering and utopian longings coexist (cf. Pritchard 2002), would still make it a kind of *mésalliance*.

¹⁸ One of the latter groups has gained some public attention in France, by launching a campaign against R&D centres in the Grenoble area and criticising the NBIC technologies as "nécrotechnologies". To a certain degree, Bill Joy can also be counted among the left-leaning critics of posthumanism as he challenged the fixation on immortality and pleaded instead for a revitalisation of utopian traditions which are not restricted to individual perfectibility (cf. Coenen 2006; Garreau 2005).

The view of posthumanism as being very individualistic and “anarcho-capitalist”, which is also supported by the social Darwinist ideas of Moravec and some extropians (cf. Coenen 2006; Giesen 2004; Hughes 2004), is shared by many of its critics. Nevertheless, their positions differ: While many European intellectuals criticise the lack of societal visions and even appear to miss a hint of social utopianism in what they perceive as an hyperindividualistic worldview typical of US culture, others are more concerned with the dangers of individualistic utopianism which, in their view, is as deliberately neglectful or naïve with regard to human nature as are other forms of utopianism. In any case, some of the most important elements of the debate on CT and posthumanism crystallise within a discursive space that is shaped by references to the tradition of literary dystopias and, in particular, to Aldous Huxley’s novel “Brave New World” (1932). In this crystallisation a diversity of intellectual traditions and lines of argument is ordered in a seemingly dichotomous way: on the one hand, a view of dehumanisation as being an objectionable core feature of technoscientific modernity, on the other, the posthumanist vision of deliberate dehumanisation (Schäfer 1993).¹⁹

Huxley’s dystopian visions are evoked numerously by representatives of all relevant actor groups in the debate on CT and posthumanism, but the most important role is played here by the US President’s Council on Bioethics (PCBE) and its circle, which are widely perceived as a core element of the US cultural conservative “camp”. The centrality of “Brave New World” as a point of references for many US conservatives can be exemplified by the fact that George W. Bush evoked its horror visions in his first prime-time TV address as US president in August 2001 when he publicly delivered his position regarding stem cell research and also announced the establishment of the PCBE. While his predecessor, Bill Clinton, had embraced very optimistic visions of converging informatics and biotechnologies and, in the strange atmosphere of the millennium year 2000, even publicly toyed with the posthumanist dream of immortality (cf. NHGRI 2006; final statement by the President), Bush stated in his TV address: “We have arrived at that brave new world that seemed so distant in 1932, when Aldous Huxley wrote about human beings created in test tubes in what he called a ‘hatchery’.” (White House 2001). The PCBE has officially cited the first report of the US NBIC initiative as one example of an influential posthumanist current in S&T and emphasised that the posthumanist and other, more moderate biofuturist visions could resemble “the humanly diminished world” portrayed by Huxley, “whose technologically enhanced inhabitants live cheerfully, without disappointment or regret, ‘enjoying’ flat, empty lives devoid of love and longing, filled with only trivial pursuits and shallow attachments” (PCBE 2003, p. 7). The PCBE and its circle admittedly and systematically uses references to “Brave New World” as a polemical instrument, recommending it together with the works of Hans Jonas and C.S. Lewis²⁰ as one of the most valuable historical resources for moral reorientation in light of recent technological innovations in biotechnology. Their core argument is that tendencies of our assumedly hedonistic, permissive and culturally self-forgetful society (such as “liberal eugenics” and the widespread use of psychoactive substances) lead us down a slippery slope to a dehumanised world which, at least in the West, will most probably not be ruled by totalitarian regimes, but will nevertheless be fundamentally flawed in a cultural and moral sense. They tend to leave out military interests in “human enhancement” technologies, and, while they concede that Huxley himself stressed the danger of a totalitarian world-state, they belittle the possible role of states. In their view, old-fashioned “eugenics” only remains a problem in countries like China. With regard to genetic engineering and to the use of mind-altering drugs, PCBE member Francis Fukuyama for example advised that critics should not “get hung up on the red herring of state sponsorship or the prospect of government coercion” (Fukuyama 2003, p. 88). The primary targets of the conservatives’ criticism are irresponsible parents, politically correct teachers, technophilic libertarians, cultural “progressives” and some segments of industry. When asked what he deemed the World’s most dangerous idea, Fukuyama chose transhumanism, stressing that many of its core ideas are implicit in much of the research agenda of temporary biomedicine. He warns, in a similar vein to Jürgen Habermas (2001) but with a decidedly conservative notion of “human nature” and less convincingly, that the modification of what he vaguely calls the “human essence” or “Factor X” might destroy the

¹⁹ Tendencies of S&T that are often labelled as “dehumanising”, could instead be called “humanising” with regard to the hitherto “naturally grown”. A society shaped by these tendencies could be morally unbearable exactly because humans (instead of “God” or “Nature”) manipulate the bodily foundations of the human condition (cf. Habermas 2001). Such ambiguities are obviously caused by conflictive normative aspects of the “human”. While the characterisation as a dichotomy is problematic, these conflicting views of dehumanisation are indeed shaping the current debates.

²⁰ C.S. Lewis is of central importance for many Christian critics of posthumanism (e.g. Beiting 2006), and ideas and works of Hans Jonas are highly relevant in the debate on CT, with the conservatives placing special emphasis on his critique of utopianism (cf. Coenen 2006). Conservative critiques of neo-Gnostic traits of posthumanism refer, rather surprisingly, only seldom to the relevant works by Jonas.

equality of rights and thereby the basis of Western democracy. Leon Kass, first chairman of the PCBE, also sees our societies on a slippery slope to a Brave New World. He writes: "Just give us the technological imperative, liberal democratic society, compassionate humanitarianism, moral pluralism, and free markets, and we can take ourselves to Brave New World all by ourselves" (Kass 2002, p. 52). In his view, only a moral and religious awakening may save us. The ambivalence of Huxley's works towards "eugenics", utopianism, psychoactive drugs and traditional sexual mores is ignored by the PCBE and its circle (but not by some Christian conservatives), and they often try to subsume him to the Christian anti-biofuturist literary tradition, in which visions of an "abolition of man" (C.S. Lewis) are decried. Fukuyama even implies that Huxley was a Christian writer. And while US conservatives critically discuss the early biofuturism of Haldane and others as a technoutopianism, they do not view it as a historical and biographical context of "Brave New World".²¹ To summarise, the PCBE and its circle exploit Huxley's dystopia for their own culturally and politically conservative agenda, overemphasising some points, ignoring or belittling others, and even misrepresenting facts.

Even where they admit that libertarian technofuturism is not to be equated with Stalinism and other totalitarianisms, the PCBE and its sympathisers display particular concern about the US NBIC initiative: "Today, in some limited but prominent libertarian circles, utopianism is back. (...) Like Descartes and Voltaire, and other early enthusiasts, the more extreme adherents of the new utopian scientism have high hopes indeed for the project. 'Converging Technologies for Improving Human Performance', a report released this year by the National Science Foundation, offers a glimpse of this worldview. (...) In the familiar parlance of modern utopians, the report promises more than technology: '(...) the twenty-first century could end in world peace, universal prosperity, and evolution to a higher level of compassion and accomplishment.' This is madness, of course, and this sort of talk certainly marks the extreme edge of the new utopianism. Not many libertarians think this way. (...) They (or, to be precise, a subset among them) are the new utopians: strident, rationalist, atheist, materialist proponents of a technical substitute for political authority. But they are also deeply committed to liberty, and this makes them different and better than most of the cold-blooded dreamers of old. We could certainly do worse" (Levin 2003). While giving such a final all-clear with regard to the libertarians is not typical for the PCBE and its circle or other US conservatives, the irritation with the NBIC initiative's ideas and activities as well as the assumed technofuturist radicalisation of older traditions of Western thought is shared by many US conservatives. This also applies to Christian theologians and lay activists who, as individuals or representatives of their organisations, have tackled the issues of posthumanism and "human enhancement". They see utopianism (and posthumanism as one of its variants) as an important manifestation of modern hubris, an attempt to play God by violating laws of a given natural order of society and human existence. Besides anti-Darwinist polemics, they often offer a tapered version of a thesis that is also, at least implicitly, to be found in the texts of the PCBE and its circle, namely: that secular modernity is a morally disastrous aberration from the natural order, being dangerous, above all, because of its utopian elements and the consequences of technoscientific progress (which is, however, generally held in high esteem in US culture). They often interpret this aberration as a kind of heresy, having its roots in a magical or Gnostic, but in any case decidedly anti-Christian revival in the times of the Renaissance. Moreover, they argue that transhumanists as the "new utopians" intend to use S&T for realising "the perfect society of perfect people on a perfect earth" with "eternal life and freedom from pain, suffering, and the burden of a frail body" (Mitchell/Kilner 2003), and they often characterise transhumanism as a rival to Christianity, promising what is, in their view, already available to Christians (such as eternal life). Their rather numerous reactions to posthumanism range from calls for dialogue via well-informed and erudite critiques (e.g. Beiting 2006) down to polemics of varying quality, including some bizarre anti-Gnostic and anti-Satanist tracts.

The assumption of a religious confrontation between posthumanists and traditional religions is affirmed by transhumanists: The key figure of the US NBIC initiative and sociologist of religion William Bainbridge not only dreams of a renaissance of the Renaissance, a vision which is an integral element of the initiative's programme. He also sees the NBIC "convergenists" (his term) and the transhumanists as allied movements which challenge traditional Western religions and churches and thus at risk of similar persecution by traditional powers as heretical or magical movements of the past (Bainbridge 2005). Several leading figures of transhumanism concede or even emphasise similarities between their visions and religious ideas, and some ponder how to strengthen existing syntheses of posthumanism and religious thought or develop new ones. Nevertheless, the majority of transhumanists distance themselves from traditional religion or sympathise with decidedly atheist and

²¹ Huxley, grandson of the biologist Thomas Henry Huxley ("Darwin's bulldog") and brother of Julian Huxley, designed his dystopia in a critical reaction to futurist visions of Wells, integrating some of Haldane's visions (the latter two men being members of his social circle).

anti-clerical positions.²² The position of the WTA is that, while “not a religion, transhumanism might serve a few of the same functions that people have traditionally sought in religion”, but “(u)nlike most religious believers, transhumanists seek to make their dreams come true in this world, by relying not on supernatural powers or divine intervention but on rational thinking and empiricism, through continued scientific, technological, economic, and human development” (WTA 2003, p. 46).

While influential conservatives explicitly instrumentalise “Brave New World” and interpret elements of the utopian tradition in a one-sided and sometimes flawed way, transhumanists do the same but often without admitting their biases. They have started to discuss the utopian tradition, mainly to defend their ideas against accusations of being utopian, but so far with rather meagre results (cf. Coenen 2006).²³ The way they tackle the issue is, however, typical of some of their overall discursive strategies. Without mistaking political debates for exercises in literature study, we should, therefore, take a look at how they interpret literary works that they count among the dystopian tradition. Nick Bostrom, one of the two founders of the WTA and particularly influential in European transhumanism, often opines, for example, “that in neither 1984 nor Brave New World has technology been used to increase human capacities. Rather, society is set up to repress the full development of humanity” (Bostrom 2005a). In his view, “Brave New World” is “not a tale of human enhancement gone amok but a tragedy of technology and social engineering being used to deliberately cripple moral and intellectual capacities” and “the exact antithesis of the transhumanist proposal” (Bostrom 2005b). While it is, of course, true that in “Brave New World” the regime does not use “human enhancement” technologies to further the full development of humanity in a (trans)humanist sense, prenatal manipulations are, for example, used to equip specialist workers of the lower castes with certain enhanced capacities such as a better sense of balance. Here and elsewhere, Bostrom tends to evade the problem that future “human enhancement” technologies might be abused by repressive regimes, clinging to his normative concepts of transhumanism and the “posthuman”. While his critique of the conservative horror vision of “human enhancement” gone amok and leading to cultural decline has some validity, he often misses relevant points of critique by jumping to premature or one-sided conclusions. He writes, for example, that Mary Shelley’s novel “Frankenstein, or the Modern Prometheus” (original version published in 1818) is, like stories of the Golem and the Sorcerer’s apprentice, “a story of technology out of control”, continuing that “(t)he word ‘robot’ was coined by the Pole [Czech] Karel Capek” in his “dark play R.U.R. (1921), in which a robot labor force destroys its human creators” and concluding: “With the invention of the electronic computer, the idea of human-like automata graduated from the kindergarten of mythology to the school of science fiction (...) and eventually to the college of technological prediction” (Bostrom 2005a). Similar to his notion that a future posthuman music will be “to Mozart what Mozart is to bad Muzak” (Bostrom 2006), classical literary works of philosophical relevance are here dismissed as examples of immature antecedents of transhumanist thought. While the works of Shelley and Capek are indeed about “technology out of control”, they are also about human moral deficiencies, particularly in relation to their creatures, which appear to symbolise innovations in S&T. These artificial beings are portrayed by the authors as originally good (Frankenstein’s creature) or as successors of a humanity that has morally failed. The third act of Capek’s play, in which two robots have developed emotions and are going to become the Adam and Eve of a posthuman species, is an evocation of the imperishableness of life (“life” to be taken here literally, because Capek’s robots are organic). “R.U.R.” is thus a dark play in terms of its critiques of society and of extreme materialism; but it also includes a kind of happy end in which Capek uses the characters of two posthumans and the last surviving man to express his beliefs. In a nutshell, one could say that the works of Capek and Shelley (like some of the philosophical works that are criticised by transhumanists in a similar vein) are not anti-technology *per se*, but focus the mindsets of the posthumanist engineers, objecting to them for ethical reasons. By pressing the history of ideas as well as current debates on S&T into a Procrustean bed (which is their dichotomous ideology of a conflict between “bioconservative luddites” and “technoproggressives”), transhumanists contribute to what can be deemed a historically uninformed debate on CT. And they tend to evade two central points made

²² With regard to the very far-ranging and detailed future visions of their mentors (and, particularly, the provocative remarks on human corporeality and mankind), some leading transhumanists apparently feel a kind of unease (Hughes 2004) or develop such visions in an extremely vague way, as an unimaginable future (Bostrom 2005c). And Bernal, although the “most transhumanist” of the prominent early biofuturists, is relatively seldom referred to (compared to Haldane, Wells und Julian Huxley). Nevertheless, the fascination by cosmic visions as well as the contempt for the human body is still often found among transhumanists.

²³ One exception, not only with regard to utopianism, is Hughes (2004), but he also tends to oversimplifications, at least when presenting his views of the history of ideas to transhumanist audiences. An interesting critique of “Brave New World” and defence of “paradise-engineering” was written by David Pearce, the other co-founder of the WTA (<http://www.hedweb.com/huxley/bnw.htm>). He characterises his brand of posthumanism as utopian.

by their critics, namely (a) the relevance of questions of power and (b) the doubt whether humanity is mature enough to deal with very fast technological progress, particularly if it radically alters the human condition.

4 Conclusions

The anti-posthumanist conservatives and the transhumanists have recently been characterised as two camps waging “symbolic crusades”, the former by trying to instigate “moral panic” without having cogent ethical arguments, the latter “selling morally uplifting beliefs” that neatly fit into the “current entrepreneurial culture” (Mauron 2005). While this critique is too harsh, analysis of the utopian aspects of the debate reveals that the strategic use of futurist visions is central to current CT and posthumanism conflicts. Both conservatives and transhumanists present master narratives of the Western history of ideas (including early posthumanism), but are not willing to recognise the complexity of this history, in particular, with regard to the utopian tradition. It might seem that they are driven by ideological zeal to find historical legitimisations for their political agendas, but in fact they are not really interested in history at all. It is important for academia and society at large to release the debate on the historical and ethical aspects of CT from the grip of these opponents. The preliminary results of our vision analysis can be summarised as follows:

1) References to utopianism and literary dystopias are important in the discourse on CT and posthumanism, mainly reinforcing the ideological skirmishes between the transhumanists and conservatives and their impacts on the debate. Academic and other works may help to clarify the interrelations of the utopian tradition, technofuturism and S&T, but such a clarification is hampered by one-sided and even flawed accounts of the utopian tradition on the part of both transhumanists and conservatives. In terms of political issues and basic assumptions of human corporeality, their conflict resembles a show fight between hostile brothers who are rivals, but work together to get as much public attention as possible.

2) Posthumanism should not be conceptualised as utopian, because it is neither totally illusionary nor a social utopianism. The literary utopian tradition and utopianism in a broader sense were always predominantly outflows of socio-political imagination. At their core are visionary but defined concepts of highly improved or even ideal societies. The utopian “New Man” is indeed a kind of enhanced version of the old Adam, but this is true first and foremost in a moral sense. Posthumanism, on the other hand, is mainly concerned with technological construction of new beings to complement or replace humanity. It tends strongly towards quasi-religious visions of the abolition of temporal limits on individual consciousness, in which the ego is preserved and death outwitted by various technological means.

3) Seen as a political movement, posthumanism displays great ideological diversity, but excludes cultural-conservative standpoints. However, even self-declared progressives and leftists, including those who actually most strongly shape the transhumanist movement and take part in the US NBIC initiative, are apparently not very interested in improving the lot of existing mankind. Open questions are whether the tendency of some posthumanist thinkers to express contempt for mankind and human corporeality is characteristic of the movement as a whole and whether these ideas betray a worldview that is as equally dangerous as racism and anti-Semitism, as the AI pioneer Joseph Weizenbaum (1995) warned. Fascists trying to join the transhumanist movement have been repeatedly rejected by libertarian and left-leaning transhumanists alike. It is, in any case, obvious that some posthumanist visions are not in line with the mainstream tradition of humanist thought (Kettner 2005).

4) Interrelations of the US NBIC initiative and transhumanism in some ways boost tendencies present in both of them which favour social engineering approaches with a distinctively dystopian flavour. The stability and future relevance of this alliance should not be overrated, if only because of its rather narrow personal basis and the existence of critics inside and out. Nevertheless, the early history of posthumanist futurism demonstrates that visions of technological progress can bring together left-wing radicals and members of Western political elites. Moreover, one should keep in mind that some historical futurists, for example proponents of the Italian *futurismo*, started their careers as “ultraindividualists” and finished up as supporters of totalitarian regimes, the tie often being social Darwinism.

5) When it comes to recent or emerging developments in the NBIC fields that may lead to new “human enhancement” technologies, one should be aware of the fact that these technologies might be seen not only by “fringe” groups as a means of social engineering and an enforced moral betterment of mankind. In recent debates on bio- and neuroethics such prospects are already being discussed. And even the far-out cosmic dreams of the posthumanists that appear to be the (only partly hidden) core of their belief system are relevant to RTD policy today and the social shaping of S&T. They suggest an urgency to promote certain developments, while neglecting mundane societal and individual needs, and they change, becoming more and more accepted as parts of a legitimate worldview, societal concepts of humanity. With “technodreams and technocritiques of dehumanization” often still as unrelated as they were in the 20th century (Schäfer 1993), there is a need for more fora for interdisciplinary and societal discourse to enrich and inform the public debate on CT.

Postscript

When James Hughes announced his plan to resign from his position as the WTA’s executive director (WTA 2006), he emphasised that all transhumanists intend to “ensure a bright future for intelligent life until, or beyond, the heat death of the universe”, and expressed his expectation that any progress they make towards “that ambitious goal will be appreciated by future generations”. Given statements like this, one might ask whether choosing posthumanism as subject for study is an act of rational curiosity, or motivated by mere curiosity and love of the remote. One of the main reasons for analysing them and even the rather bizarre conflicts among and about the transhumanists was felicitously phrased by Mary Midgley (1992). She asked, with regard to Bernal and his successors, what ideal these visionaries are really pursuing, beyond the crude motives of desire for power and fear of death. Against the background of a comparison with several religious traditions, she points out a central feature of posthumanism: the hope for salvation by means of a technical fix in the very remote future. It does not, she continues, involve any present conversion, any immediate change in moral attitude, as utopias usually do. Why, then, take the trouble of examining these dreams? Because, Midgley concludes, posthumanist visions are not just a scheme for what might some time be done in outer space, but take part, here and now, in the shaping of our view of human beings and the world we live in. And they narrow this view in a way that though different in some aspects to archist utopianism and totalitarianism is still dangerous: Any risk that falls short of the extinction of the human species appears minor to many posthumanists, anyone opposing the allocation of resources for the realisation of their dreams is an enemy of mankind (which is for them, above all, the predecessor of a future “posthumankind”), intellectual efficiency is the only measure for man, and history is (largely) “bunk”. Transhumanists are addicted to the future, as Minsky once chose to praise them, and they celebrate a man (Bainbridge 2006) who coaxingly addresses them as the heroes of the future and demagogically warns of their persecution. There is something strangely fanatic about posthumanism, and we should, while taking into account the zealotry of some of its opponents, be aware of it. The last thing humanity needs is another form of fanaticism, be it political, religious or both.

Literature

[URLs last checked 2006 November 12]

- Adorno, T. (1975): *Negative Dialektik*. Frankfurt am Main: Suhrkamp
- Adorno, T., Bloch, E. (1978): *Etwas fehlt... Über die Widersprüche der utopischen Sehnsucht* (Radiogespräch; Leitung: Horst Krüger). In: Bloch, E.: *Tendenz-Latenz-Utopie*. Frankfurt am Main: Suhrkamp, pp. 350-368
- Alexander, B. (2003): *Rapture. How Biotech Became the New Religion*. New York: Basic Books
- Anderson, P. (2004): *The River of Time*. In: *New Left Review* 26 (March/April), pp. 67-77
- Baillie, H., Casey, T. (eds.) (2005): *Is Human Nature Obsolete?* Cambridge/MA: The MIT Press
- Bainbridge, W. (2004a): *The Evolution of Semantic Systems*. In: M. Roco, C. Montemagno (eds.), pp. 150-177
- Bainbridge, W. (2004b): *Progress toward Cyberimmortality*. In: *Immortality Institute* (ed.): *The Scientific Conquest of Death*. Buenos Aires: Libros en Red., pp. 107-122; <http://www.imminst.org/book1/>

- Bainbridge, W. (2005): The Coming Conflict between Religion and Cognitive Science. In: Wagner, C. (ed): Foresight, Innovation, and Strategy: Toward a Wiser Future. Bethesda/MD: World Future Society, pp. 75-87
- Bainbridge, W. (2006): Across the Abyss (Presentation, Transvision 2006; Helsinki, 18.08.2006); <http://www.transhumanismi.org/tv06/presentations/William%20Sims%20Bainbridge%20-%20Across%20the%20Abyss.pdf>
- Baird, D., Nordmann, A., Schummer, J. (eds.) (2004): Discovering the Nanoscale, Amsterdam: IOS Press
- Beiting, C. (2006): C.S. Lewis's Answer to 21st Century Transhumanism. In: Saint Austin Review (January/February), pp.10-15; http://www.staustinreview.com/jan06/beiting_article.pdf
- Bostrom, N. (2005a): „A History of Transhumanist Thought”, <http://www.nickbostrom.com/papers/history.pdf>
- Bostrom, N. (2005b): In Defense of Posthuman Dignity; www.nickbostrom.com/ethics/dignity.html
- Bostrom, N. (2005c): Letter from Utopia; <http://www.nickbostrom.com/utopia.html>
- Bostrom, N. (2006): Why I Want to be a Posthuman When I Grow Up (Draft). Forthcoming in: Gordijn, B., Chadwick, R. (eds.): Medical Enhancement and Posthumanity; <http://www.nickbostrom.com/posthuman.pdf>
- Brumlik, M. (2001): Aufbruch ins Haus der Hörigkeit. In: Die Gazette 12/0, <http://www.gazette.de/Archiv/Gazette-Dezember2001/Brumlik.html>
- Coenen, C., Fleischer, T., Rader, M. (2004): Of Visions, Dreams, and Nightmares: The Debate on Converging Technologies. In: Technikfolgenabschätzung - Theorie und Praxis, 13/3, pp. 118-125; <http://www.itas.fzk.de/tatup/043/coua04a.htm>
- Coenen, C. (2006): Der posthumanistische Technofuturismus in den Debatten über Nanotechnologie und Converging Technologies. In: Nordmann, A., Schummer, J., Schwarz, A. (eds.), pp. 195-222
- Davis, E. (2004): TechGnosis. London: Serpents Tail
- Dery, M. (1996): Escape Velocity. London: Grove Press
- Drexler, K.E. (1986): Engines of Creation – The Coming Era of Nanotechnology. New York: Anchor Books
- Dronamraju, K. (ed.) (1995): Haldane's Daedalus Revisited. Oxford: Oxford University Press
- Dupuy, J.-P. (2000): The Mechanization of Mind. Princeton/NJ, Oxford: Princeton University Press
- Dupuy, J.-P. (2005): The philosophical foundations of Nanoethics; <http://portal.unesco.org/ci/en/files/20001/11272942921Dupuy1.pdf/Dupuy1.pdf>
- ETC Group (ed.) (2006): Nanotech Rx; <http://www.etcgroup.org/en/materials/publications.html?id=593>
- Euchner, W. (2001): Neue Pfade zur Brave New World. In: Kühnel, M., Reese-Schäfer, W., Rüdiger, A. (eds.): Modell und Wirklichkeit (Festschrift für Richard Saage zum 60. Geburtstag). Halle (Saale): Mitteldeutscher Verlag, pp. 157-169
- Euchner, W. (2005): Der künstlich verbesserte Mensch und die 'künstliche Intelligenz' - Vorgeschichte und aktuelle Dimension. In: Leviathan 33/1, pp. 40-68
- Ezrahi, Y. (1995): Haldane Between Daedalus And Icarus. In: Dronamraju, K. (ed.), pp.64-77
- Fukuyama, F. (2003): Our Posthuman Future, London: Profile Books
- Garreau, J. (2005): Radical Evolution, New York et al.: Doubleday
- Giesen, K.-G. (2004): Transhumanisme et génétique humaine. In: L'observatoire de la génétique 16 (April/May 2004); <http://www.ircm.qc.ca/bioethique/obsngenetique/archives/archives.html>
- Gorz, A. (2004): Wissen, Wert und Kapital. Zürich: Rotpunktverlag
- Grabner, I., Reiter, W. (1984): Meddling with 'Politicks'. In: Mendelsohn, E. Nowotny, H. (eds.): Nineteen eighty-four: science between utopia and dystopia. Dordrecht: D. Reidel Publishing Company, pp. 235-259
- Grin, J., Grunwald, A. (eds.) (2000): Vision Assessment: Shaping Technology in 21st Century Society. Berlin et al.: Springer
- Grunwald, A. (2004): Vision Assessment as a new element of the Technology Futures Analysis Toolbox. In: Proceedings of the EU-US Scientific Seminar: New Technology Foresight, Forecasting & Assessment Methods, Seville, May 13-14 2004'; <http://www.jrc.es/projects/fta/index.htm>

- Grunwald, A. (2006): Converging Technologies for human enhancement: a new wave increasing the contingency of the *conditio humana* (in this book)
- Habermas, J. (2001): *The Future of Human Nature*. Cambridge: Polity Press
- Haldane, J. (1963): *Biological Possibilities for the Human Species in the Next Ten Thousand Years*. In: Wolstenholme, G. (ed.), pp. 337-361.
- Hardt, M., Negri, A. (2000): *Empire*. Cambridge/MA, London: Harvard University Press
- Hartmann, F. (2000): *Medienphilosophie*. Wien: WUV-Universitätsverlag
- Hayles, K. (1999): *How We Became Posthuman*. Chicago, London: The University of Chicago Press
- HLEG (High Level Expert Group 'Foresighting the New Technology Wave') (2004): *Converging Technologies - Shaping the Future of European Societies* (Rapporteur: Nordmann, A.). Brussels: European Commission
- Hughes, J. (2003): *Rediscovering Utopia*; <http://www.betterhumans.com> [not in archive, 2006 November 12]
- Hughes, J. (2004): *Citizen Cyborg*. Cambridge/MA: Westview Press
- Hughes, J. (2006): *Human Enhancement and the Emergent Technopolitics of the 21st Century*. In: Bainbridge, W., Roco, M. (eds.): *Managing Nano-Bio-Info-Cogno Innovations*. Dordrecht: Springer, pp. 285-307
- Huxley, J. (1963): *The future of man - evolutionary aspects*: In: Wolstenholme, G. (ed.), pp. 1-22
- Kass, L. (2002): *Life, Liberty and the Defense of Dignity*. San Francisco: Encounter Books
- Kettner, M. (2005): *Humanismus, Transhumanismus und die Wertschätzung der Gattungsnatur*. In: Bayertz, K. (ed.): *Die menschliche Natur*. Paderborn: Mentis, pp. 73-96
- Khushf, G. (2004): *Systems Theory and the Ethics of Human Enhancement: A Framework for NBIC Convergence*. In: Roco, M; Montemagno, C. (eds.), pp. 124-149 f
- Klerkx, G. (2006): *The transhumanists as tribe*. In: P. Miller, J. Wilsdon (eds.): *Better Humans?*, pp. 59-66; <http://www.demos.co.uk/files/File/BH-5.pdf>
- Knorr Cetina, K. (2004): *Beyond Enlightenment: The Rise of the Culture of Life*. In: *European Communities* (ed.): *Modern Biology & Visions of Humanity*. Brussels: European Communities, pp. 29-41
- Krüger, O. (2004): *Virtualität und Unsterblichkeit*. Freiburg im Breisgau: Rombach Litterae
- Krueger (Krüger), O. (2005): *Gnosis in Cyberspace*. In: *Journal of Evolution and Technology* 14/2; <http://jetpress.org/volume14/krueger.html>
- Levin, Y. (2003): *Science, Politics, and the New Utopians*; <http://www.techcentralstation.com/091803A.html>
- Lösch, A. (2006): *Anticipating the futures of nanotechnology: Visionary images as means of communication*. In: *Technology Analysis and Strategic Management*, Vol. 18, 3-4 (September 2006), pp. 393-409
- Manuel, F.E., Manuel F.P. (1980): *Utopian Thought in the Western World*. Cambridge/MA: Belknap Press
- Marxists Internet Archive (2002): *Transcript of Bernal. J. (1929): The World, the Flesh & the Devil* (Ch. 3, "The Flesh"); <http://www.marxists.org/archive/bernal/works/1920s/soul/ch03.htm>
- Mauron, A. (2005): *The Choosy Reaper*. In: *EMBO reports*, Vol. 6 (Special issue), pp. 67-71
- Midgley, M. (1992): *Science as Salvation: A Modern Myth and Its Meaning*. London: Routledge (ebook)
- Mitchell, C.B., Kilner, J. (2003): *Remaking Humans: The New Utopians Versus a Truly Human Future*; http://www.cbhd.org/resources/biotech/mitchell_kilner_2003-08-29.htm
- Moravec, H. (1992): *Pigs in Cyberspace*; <http://www.frc.ri.cmu.edu/~hpm/>
- Moravec, H. (1994): *Robots Inherit Human Minds*; <http://www.frc.ri.cmu.edu/~hpm/>
- NHGRI (National Human Genome Research Institute) (2006): *Transcript of the 8th Millennium Evening at the White House: Informatics Meets Genomics* (October 12, 1999); <http://www.genome.gov/10001397>
- Nordmann, A. (2003): *Shaping the World Atom by Atom: Eine nanowissenschaftliche WeltBildanalyse*. In: A. Grunwald (ed.): *Technikgestaltung zwischen Wunsch und Wirklichkeit*. Berlin et al.: Springer, pp. 192-203.

- Nordmann, A. (2005): Wohin die Reise geht: Zeit und Raum der Nanotechnologien. In: Gamm, G., Hetzel, A. (eds.): Unbestimmtheitssignaturen der Technik. Bielefeld: Transcript; pp. 103-123
- Nordmann, A. (2006): Renaissance der Allianztechnik? Neue Technologien für alte Utopien. Ms. (Workshop Utopie heute, Schweizerische Akademie der Geistes- und Sozialwissenschaften, Grenzensee, September 2005)
- Nordmann, A., Schummer, J., Schwarz, A. (eds.) (2006): Nanotechnologien im Kontext. Berlin: Akademische Verlagsgesellschaft AKA
- Nowotny, H. (2005): Unersättliche Neugier. Innovationen in einer fragilen Zukunft. Berlin: Kulturverlag Kadmos
- Parrinder, P. (1995): Shadows of the Future. Liverpool: Liverpool University Press
- Paschen, H., Coenen, C., Fleischer, T., Grünwald, R., Oertel, D. und Revermann, C. (2004): Nanotechnologie. Forschung und Anwendungen. Berlin et al.: Springer
- Paul, D. (2005): Genetic Engineering and Eugenics: The Uses of History. In: Baillie, H., Casey, T. (eds.), pp. 123-151
- PCBE (US President's Council on Bioethics) (2003) (ed.): Beyond Therapy. Washington, DC; <http://www.bioethics.gov/reports/beyondtherapy/>
- Pias, C. (ed.): Cybernetics/Kybernetik. The Macy Conferences 1946-1953 (Vol. 2). Zürich, Berlin: Diaphanes
- Porter, R. (2001): Medical Futures (The Wilkins Lecture 2000). In: Notes and Records of the Royal Society of London 55 (2), pp. 309-323
- Extropy Institute (2003): Principles of Extropy 3.11; <http://www.extropy.org/principles.htm>
- Pritchard, E. (2002): Bilderverbot Meets Body in Theodor W. Adorno's Inverse Theology. In: Harvard Theological Review 95:3, pp.291-318
- Robinett, W. (2002):The Consequences of Fully Understanding the Brain: In: Roco, M., Bainbridge, W. (eds.), pp.148-151
- Roco, M.C., Bainbridge, W.S. (eds.) (2002): Converging Technologies for Improving Human Performance. Arlington/VA: National Science Foundation
- Roco, M., Montemagno, C. (eds.) (2004): The Coevolution of Human Potential and Converging Technologies (Annals of New York Academy of Sciences 1013). New York: New York Academy of Sciences
- Saage, R. (2003): Utopische Profile: Widersprüche und Synthesen des 20. Jahrhunderts. Münster: LIT
- Saage, R. (2005): Plädoyer für den klassischen Utopiebegriff. In: Erwägen Wissen Ethik 16/3, pp. 291-298.
- Saage, R. (2006a): Konvergenztechnologischer Zukunftsvisionen und der klassische Utopiediskurs. In: Nordmann, A. et al. (eds.), pp. 179-194
- Saage, R. (2006b): Socio-political Utopianism and the Demands of the 21st Century. In: Spaces of Utopia: An Electronic Journal, 2 (Summer 2006); <http://ler.letras.up.pt/uploads/ficheiros/1640.pdf>
- Schäfer, W. (1993): Stranded at the Crossroads of Dehumanization: John Desmond Bernal and Max Horkheimer. In: Benhabib, S., Bonss, W., McCole, J. (eds.): On Max Horkheimer. Cambridge/MA, London: The MIT Press, pp. 153-183
- Schaper-Rinkel, P. (2003): Die europäische Informationsgesellschaft. Münster: Westfälisches Dampfboot
- Schirmacher, F. (ed.) (2001): Die Darwin AG. Köln: Kiepenheuer & Witsch
- Schummer, J. (2004a): 'Societal and Ethical Implications of Nanotechnology: Meanings, Interest Groups, and Social Dynamics'. In: Techne 8/2, pp. 56-87; <http://scholar.lib.vt.edu/ejournals/SPT/v8n2/pdf/schummer.pdf>
- Schummer, J. (2004b): „Bibliography of Studies on Nanoscience and Nanotechnology“: In: Hyle 10/2; <http://www.hyle.org/journal/issues/10-2/index.html>
- Spohrer, J. (2002): NBICS (Nano-Bio-Info-Cogno-Socio) convergence to improve human performance: Opportunities and challenges. In: Roco, M., Bainbridge, W. (eds.), pp. 89-102
- STOA (European Parliament Scientific and Technological Options Assessment) (2006): Converging Technologies (prepared by the Flemish Institute for Science and Technology Assessment, viWTA, and the Rathenau Institute; project leaders: Deboelpaep, R., Van Est, R.). Brussels: European Parliament

- Weizenbaum, J. (1995): The Myth of the Last Metaphor. In: Baumgartner, P., Payr, S. (eds.): Speaking Minds. Interviews with Twenty Eminent Cognitive Scientists. Princeton/NJ: Princeton University Press, pp. 249-263
- White House (Office of the Press Secretary) (2001): President Discusses Stem Cell Research (August 9, 2001); <http://www.whitehouse.gov/news/releases/2001/08/20010809-2.html>
- Winner, L. (2005): Resistance Is Futile: The Posthuman Condition and Its Advocates. In: Baillie, H., Casey, T. (eds.), pp. 385-411
- Wolbring, G. (2006): The Triangle of Enhancement Medicine, Disabled People, and the Concept of Health: A New Challenge for HTA, Health Research, and Health Policy. Edmonton/Alberta (Canada): Alberta Heritage Foundation for Medical Research
- Wolstenholme, G. (ed.) (1963): Man and His Future. Boston, Toronto: Little, Brown & Company
- WTA (World Transhumanist Association) (2002): The Transhumanist Declaration; <http://www.transhumanism.org/index.php/WTA/declaration/>
- WTA (2003): The Transhumanist FAQ (Version 2.1; main author Bostrom, N.); <http://transhumanism.org/resources/FAQv21.pdf>
- WTA (2005): Report on the 2005 Interests and Beliefs Survey of the Members of the World Transhumanist Association; <http://transhumanism.org/resources/survey2005.pdf>
- WTA (2006): WTA News 3 November 2006 (ed. by LaTorra, M.); <http://www.transhumanism.org/index.php/WTA/more/1222/>