Transhumanism

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Transhumanism is an international intellectual and cultural movement supporting the use of science and technology to improve human mental and physical characteristics and capacities. The movement regards aspects of the human condition, such as disability, suffering, disease, aging, and involuntary death as unnecessary and undesirable. Transhumanists look to biotechnologies and other emerging technologies for these purposes. Dangers, as well as benefits, are also of concern to the transhumanist movement.[1]

The term "transhumanism" is symbolized by **H+** or **h+** and is often used as a synonym for "human enhancement".[2] Although the first known use of the term dates from 1957, the contemporary meaning is a product of the 1980s when futurists in the United States began to organize what has since grown into the transhumanist movement. Transhumanist thinkers predict that human beings may eventually be able to transform themselves into beings with such greatly expanded abilities as to merit the label "posthuman".[1] Transhumanism is therefore sometimes referred to as "posthumanism" or a form of transformational activism influenced by posthumanist ideals.[3]

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Transhumanism

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The transhumanist vision of a transformed future humanity has attracted many supporters and detractors from a wide range of perspectives. Transhumanism has been described by one critic, Francis Fukuyama, as the world's most dangerous idea,[4] while one proponent, Ronald Bailey, counters that it is the "movement that epitomizes the most daring, courageous, imaginative, and idealistic aspirations of humanity".[5]

Contents

History

According to philosophers who have studied and written about the history of transhumanist thought,[1] transcendentalist impulses have been expressed at least as far back as in the quest for immortality in the Epic of Gilgamesh, as well as historical quests for the Fountain of Youth, Elixir of Life, and other efforts to stave off aging and death. Transhumanist philosophy, however, is rooted in Renaissance humanism and the Enlightenment. For example, Giovanni Pico della Mirandola called on people to "sculpt their own statue", and the Marquis de Condorcet speculated about the use of medical science to indefinitely extend the human life span, while Benjamin Franklin dreamed of suspended animation, and after Charles Darwin "it became increasingly plausible to view the current version of humanity not as the endpoint of evolution but rather as a possibly quite early phase."[1] However, Friedrich Nietzsche is considered by some to be less of an influence, despite his exaltation of the "overman", due to his emphasis on self-actualization rather than technological transformation.[1]

Cover of the first issue of H+ *Magazine* (http://www.hplusmagaz , a web-based quarterly publication that focuses on transhumanism, covering the scientific, technological, and cultural developments that are challenging and overcoming human limitations.

Nikolai Fyodorov, a 19th-century Russian philosopher, advocated radical life extension, physical immortality and even resurrection of the dead using scientific methods.[6] In the 20th century, a direct and influential precursor to transhumanist concepts was geneticist J.B.S. Haldane's 1923 essay *Daedalus: Science and the Future*, which predicted that great benefits would come from applications of advanced sciences to human biology—and that every such advance would first appear to someone as blasphemy or perversion, "indecent and unnatural". J. D. Bernal speculated about space colonization, bionic implants, and cognitive enhancement, which have been common transhumanist themes since then.[1] Biologist Julian Huxley, brother of author Aldous Huxley (a childhood friend of Haldane's), appears to have been the first to use the actual word "transhumanism". Writing in 1957, he defined transhumanism as "man remaining man, but transcending himself, by realizing new possibilities of and for his human nature".[7] This definition differs, albeit not substantially, from the one commonly in use since the 1980s.

Computer scientist Marvin Minsky wrote on relationships between human and artificial intelligence beginning in the 1960s.[8] Over the succeeding decades, this field continued to generate influential thinkers, such as Hans Moravec and Raymond Kurzweil, who oscillated between the technical arena and futuristic speculations in the transhumanist vein.[9][10] The coalescence of an identifiable transhumanist movement began in the last decades of the 20th century. In 1966, FM-2030 (formerly F.M. Esfandiary), a futurist who taught "new concepts of the Human" at the The New School in New York City, began to identify people who adopt technologies, lifestyles and world views transitional to "posthumanity" as "transhuman" (short for "transitory human").[11] In 1972, Robert Ettinger contributed to the conceptualization of "transhumanity" in his book *Man into Superman*.[12][13] FM-2030 published the *Upwingers Manifesto* in 1973 to stimulate transhumanly conscious activism.[14]

The first self-described transhumanists met formally in the early 1980s at the University of

California, Los Angeles, which became the main center of transhumanist thought. Here, FM-2030 lectured on his "Third Way" futurist ideology. At the EZTV Media venue frequented by transhumanists and other futurists, Natasha Vita-More presented *Breaking Away*, her 1980 experimental film with the theme of humans breaking away from their biological limitations and the Earth's gravity as they head into space.[15][16] FM-2030 and Vita-More soon began holding gatherings for transhumanists in Los Angeles, which included students from FM-2030's courses and audiences from Vita-More's artistic productions. In 1982, Vita-More authored the *Transhumanist Arts Statement*,[17] and, six years later, produced the cable TV show *TransCentury Update* on transhumanity, a program which reached over 100,000 viewers.

In 1986, Eric Drexler published *Engines of Creation: The Coming Era of Nanotechnology,*[18] which discussed the prospects for nanotechnology and molecular assemblers, and founded the Foresight Institute. As the first non-profit organization to research, advocate for, and perform cryonics, the Southern California offices of the Alcor Life Extension Foundation became a center for futurists. In 1988, the first issue of *Extropy Magazine* was published by Max More and Tom Morrow. In 1990, More, a strategic philosopher, created his own particular transhumanist doctrine, which took the form of the *Principles of Extropy*,[19] and laid the foundation of modern transhumanism by giving it a new definition:[20]

> Transhumanism is a class of philosophies that seek to guide us towards a posthuman condition. Transhumanism shares many elements of humanism, including a respect for reason and science, a commitment to progress, and a valuing of human (or transhuman) existence in this life. [...] Transhumanism differs from humanism in recognizing and anticipating the radical alterations in the nature and possibilities of our lives resulting from various sciences and technologies [...].

In 1992, More and Morrow founded the Extropy Institute, a catalyst for networking futurists and brainstorming new memeplexes by organizing a series of conferences and, more importantly, providing a mailing list, which exposed many to transhumanist views for the first time during the rise of cyberculture and the cyberdelic counterculture. In 1998, philosophers Nick Bostrom and David Pearce founded the World Transhumanist Association (WTA), an international non-governmental organization working toward the recognition of transhumanism as a legitimate subject of scientific inquiry and public policy.[21] In 1999, the WTA drafted and adopted *The Transhumanist Declaration*.[22] *The Transhumanist FAQ*, prepared by the WTA, gave two formal definitions for transhumanism:[23]

> 1. The intellectual and cultural movement that affirms the possibility and desirability of fundamentally improving the human condition through applied reason, especially by developing and making widely available technologies to eliminate aging and to greatly enhance human intellectual, physical, and psychological capacities.

2. The study of the ramifications, promises, and potential dangers of technologies that will enable us to overcome fundamental human limitations, and the related study of the ethical matters involved in developing and using such technologies.

A number of similar definitions have been collected by Anders Sandberg, an academic and prominent transhumanist.[24]

In possible contrast with other transhumanist organizations, WTA officials considered that social forces could undermine their futurist visions and needed to be addressed.[25] A particular concern is the equal access to human enhancement technologies across classes and borders.[26] In 2006, a political struggle within the transhumanist movement between the libertarian right and the liberal left resulted in a more centre-leftward positioning of the WTA under its former executive director James Hughes.[26][27] In 2006, the board of directors of the Extropy Institute ceased operations of the organization, stating that its mission was "essentially completed".[28] This left the World Transhumanist Association as the leading international transhumanist organization. In 2008, as part of a rebranding effort, the WTA changed its name to "Humanity+" in order to project a more humane image.[29] Humanity Plus and Betterhumans publish *h+ Magazine*, a periodical edited by R. U. Sirius which disseminates transhumanist news and ideas.[30][31]

Theory

For more details on this topic, see list of basic transhumanism topics.

It is a matter of debate whether transhumanism is a branch of "posthumanism" and how posthumanism should be conceptualised with regard to transhumanism. The latter is often referred to as a variant or activist form of posthumanism by its conservative,[4] Christian[32] and progressive[33][34] critics, but also by pro-transhumanist scholars who, for example, characterise it as a subset of "philosophical posthumanism".[3] A common feature of transhumanism and philosophical posthumanism is the future vision of a new intelligent species, into which humanity will evolve, which will supplement humanity or supersede it. Transhumanism stresses the evolutionary perspective, including sometimes the creation of a highly intelligent animal species by way of cognitive enhancement (i.e. biological uplift),[25] but clings to a "posthuman future" as the final goal of participant evolution.[35]

Nevertheless, the idea to create intelligent artificial beings, proposed, for example, by roboticist Hans Moravec, has influenced transhumanism.[9] Moravec's ideas and transhumanism have also been characterised as a "complacent" or "apocalyptic" variant of posthumanism and contrasted with "cultural posthumanism" in humanities and the arts.[36] While such a "cultural posthumanism" would offer resources for rethinking the relations of humans and increasingly sophisticated machines, transhumanism and similar posthumanisms are, in this view, not abandoning obsolete concepts of the "autonomous liberal subject" but are expanding its "prerogatives" into the realm of the posthuman.[37] Transhumanist self-characterisations as a continuation of humanism and Enlightenment thinking correspond with this view.

Some secular humanists conceive transhumanism as an offspring of the humanist freethought movement and argue that transhumanists differ from the humanist mainstream by having a specific focus on technological approaches to resolving human concerns and on the issue of mortality.[38] However, other progressives have argued that posthumanism, whether it be its philosophical or activist forms, amount to a shift away from concerns about social justice, from the reform of human institutions and from other Enlightenment preoccupations, toward narcissistic longings for a transcendence of the human body in quest of more exquisite ways of being.[39] In this view, transhumanism is abandoning the goals of humanism, the Enlightenment, and progressive politics.

Aims

While many transhumanist theorists and advocates seek to apply reason, science and technology for the purposes of reducing poverty, disease, disability, and malnutrition around the globe, transhumanism is distinctive in its particular focus on the applications of technologies to the improvement of human bodies at the individual level. Many transhumanists actively assess the potential for future technologies and innovative social systems to improve the quality of all life, while seeking to make the material reality of the human condition fulfill the promise of legal and political equality by eliminating congenital mental and physical barriers.

Transhumanist philosophers argue that there not only exists a perfectionist ethical imperative for humans to strive for progress and improvement of the human condition but that it is possible and desirable for humanity to enter a transhuman phase of existence, in which humans are in control of their own evolution. In such a phase, natural evolution would be replaced with deliberate change.

Some theorists, such as Raymond Kurzweil, think that the pace of technological innovation is accelerating and that the next 50 years may yield not only radical technological advances but possibly a technological singularity, which may fundamentally change the nature of human beings.[40] Transhumanists who foresee this massive technological change generally maintain that it is desirable. However, some are also concerned with the possible dangers of extremely rapid technological change and propose options for ensuring that advanced technology is used responsibly. For example, Bostrom has written extensively on existential risks to humanity's future welfare, including risks that could be created by emerging technologies.[41]

Ethics

Transhumanists engage in interdisciplinary approaches to understanding and evaluating possibilities for overcoming biological limitations. They draw on futurology and various fields of ethics such as bioethics, infoethics, nanoethics, neuroethics, roboethics, and technoethics mainly but not exclusively from a philosophically utilitarian, socially progressive, politically and economically liberal perspective. Unlike many philosophers, social critics, and activists who place a moral value on preservation of natural systems, transhumanists see the very concept of the specifically "natural" as problematically nebulous at best, and an obstacle to progress at worst.[42] In keeping with this, many prominent transhumanist advocates refer to transhumanism's critics on the political right and left jointly as "bioconservatives" or "bioluddites", the latter term alluding to the 19th century anti-industrialisation social movement that opposed the replacement of human manual labourers by machines.[43]

Currents

There is a variety of opinion within transhumanist thought. Many of the leading transhumanist thinkers hold views that are under constant revision and development.[44] Some distinctive currents of transhumanism are identified and listed here in alphabetical order:

- Abolitionism, an ethical ideology based upon a perceived obligation to use technology to eliminate involuntary suffering in all sentient life.[45]
- Democratic transhumanism, a political ideology synthesizing liberal democracy, social democracy, radical democracy and transhumanism.[46]
- Extropianism, an early school of transhumanist thought characterized by a set of principles advocating a proactive approach to human evolution.[19]
- Immortalism, a moral ideology based upon the belief that technological immortality is possible and desirable, and advocating research and development to ensure its realization.[47]
- Libertarian transhumanism, a political ideology synthesizing libertarianism and transhumanism.[43]
- Postgenderism, a social philosophy which seeks the voluntary elimination of gender in the human species through the application of advanced biotechnology and assisted reproductive technologies.[48]
- Singularitarianism, a moral ideology based upon the belief that a technological singularity is possible, and advocating deliberate action to effect it and ensure its safety.[40]
- Technogaianism, an ecological ideology based upon the belief that emerging technologies can help restore Earth's environment, and that developing safe, clean, alternative technology should therefore be an important goal of environmentalists.[46]

Spirituality

Although some transhumanists report a strong sense of secular spirituality, they are for the most part atheists.[21] A minority of transhumanists, however, follow liberal forms of Eastern philosophical traditions such as Buddhism and Yoga[49] or have merged their transhumanist ideas with established Western religions such as liberal Christianity[50] or Mormonism[51]. Despite the prevailing secular attitude, some transhumanists pursue hopes traditionally espoused by religions, such as "immortality",[47] while several controversial new religious movements, originating in the late 20th century, have explicitly embraced transhumanist goals of transforming the human condition by applying technology to the alteration of the mind and body, such as Raëlism.[52] However, most thinkers associated with the transhumanist movement focus on the practical goals of using technology to help achieve longer and healthier lives; while speculating that future understanding of neurotheology and the application of neurotechnology will enable humans to gain greater control of altered states of consciousness, which were commonly interpreted as "spiritual experiences", and thus achieve more profound self-knowledge.[49]

The majority of transhumanists are materialists who do not believe in a transcendent human soul. Transhumanist personhood theory also argues against the unique identification of moral actors and subjects with biological humans, judging as speciesist the

exclusion of non-human and part-human animals, and sophisticated machines, from ethical consideration.[53] Many believe in the compatibility of human minds with computer hardware, with the theoretical implication that human consciousness may someday be transferred to alternative media, a speculative technique commonly known as "mind uploading".[54] One extreme formulation of this idea may be found in Frank Tipler's proposal of the Omega point. Drawing upon ideas in digitalism, Tipler has advanced the notion that the collapse of the Universe billions of years hence could create the conditions for the perpetuation of humanity in a simulated reality within a megacomputer, and thus achieve a form of "posthuman godhood". Tipler's thought was inspired by the writings of Pierre Teilhard de Chardin, a paleontologist and Jesuit theologian who saw an evolutionary telos in the development of an encompassing noosphere, a global consciousness.[55]

The idea of uploading personality to a non-biological substrate and the underlying assumptions are criticised by a wide range of scholars, scientists and activists, sometimes with regard to transhumanism itself, sometimes with regard to thinkers such as Marvin Minsky or Hans Moravec, who are often seen as its originators. Relating the underlying assumptions, for example, to the legacy of cybernetics, some have argued that this materialist hope engenders a spiritual monism, a variant of philosophical idealism.[56] Viewed from a conservative Christian perspective, the idea of mind uploading is asserted to represent a denigration of the human body characteristic of gnostic belief.[57] Transhumanism and its presumed intellectual progenitors have also been described as neo-gnostic by non-Christian and secular commentators.[58][59]

The first dialogue between transhumanism and faith was the focus of an academic seminar held at the University of Toronto in 2004.[60] Because it might serve a few of the same functions that people have traditionally sought in religion, religious and secular critics maintained that transhumanism is itself a religion or, at the very least, a pseudoreligion. Religious critics alone faulted the philosophy of transhumanism as offering no eternal truths nor a relationship with the divine. They commented that a philosophy bereft of these beliefs leaves humanity adrift in a foggy sea of postmodern cynicism and anomie. Transhumanists responded that such criticisms reflect a failure to look at the actual content of the transhumanist philosophy, which far from being cynical, is rooted in optimistic, idealistic attitudes that trace back to the Enlightenment.[61] Following this dialogue, William Sims Bainbridge conducted a pilot study, published in the Journal of Evolution and Technology, suggesting that religious attitudes were negatively correlated with acceptance of transhumanist ideas, and indicating that individuals with highly religious worldviews tended to perceive transhumanism as being a direct, competitive (though ultimately futile) affront to their spiritual beliefs.[62]

Practice

While some transhumanists take an abstract and theoretical approach to the perceived benefits of emerging technologies, others have offered specific proposals for modifications to the human body, including heritable ones. Transhumanists are often concerned with methods of enhancing the human nervous system. Though some propose modification of the peripheral nervous system, the brain is considered the common denominator of personhood and is thus a primary focus of transhumanist ambitions.[63]

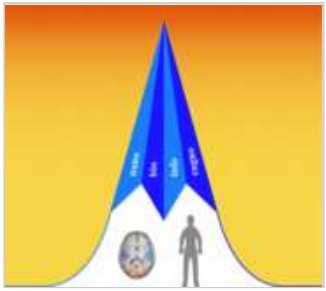
As proponents of self-improvement and body modification, transhumanists tend to use existing technologies and techniques that supposedly improve cognitive and physical

performance, while engaging in routines and lifestyles designed to improve health and longevity.[64] Depending on their age, some transhumanists express concern that they will not live to reap the benefits of future technologies. However, many have a great interest in life extension strategies, and in funding research in cryonics in order to make the latter a viable option of last resort rather than remaining an unproven method.[65] Regional and global transhumanist networks and communities with a range of objectives exist to provide support and forums for discussion and collaborative projects.

Technologies of interest

Main article: Human enhancement technologies

Transhumanists support the emergence and convergence of technologies such as nanotechnology, biotechnology, information technology and cognitive science (NBIC), and hypothetical future technologies such as simulated reality, artificial intelligence, superintelligence, mind uploading, and cryonics. They believe that humans can and should use these technologies to become more than human.[66] They therefore support the recognition and/or protection of cognitive liberty, morphological freedom, and procreative liberty as civil liberties, so as to guarantee individuals the choice of using human enhancement technologies on themselves and their children.[67] Some speculate that human enhancement techniques and other emerging technologies may facilitate more radical human enhancement by the midpoint of the 21st century.[40]



Converging Technologies (http://www.wtec.org/ConvergingTechnologie, a 2002 report exploring the potential for synergy among nano-, bio-, info- and cogno-technologies, has become a landmark in near-future technological speculation.

A 2002 report, *Converging Technologies for Improving Human Performance*, commissioned by the National Science Foundation and US Department of Commerce, contains descriptions and commentaries on the state of NBIC science and technology by major contributors to these fields. The report discusses potential uses of these technologies in implementing transhumanist goals of enhanced performance and health, and ongoing work on planned applications of human enhancement technologies in the military and in the rationalization of the human-machine interface in industry.[68]

While international discussion of the converging technologies and NBIC concepts includes strong criticism of their transhumanist orientation and alleged science fictional character,[69][70][71] research on brain and body alteration technologies has accelerated under the sponsorship of the US Department of Defense, which is interested in the battlefield advantages they would provide to the "supersoldiers" of the United States and its allies.[72] There has already been a brain research program to "extend the ability to manage information" while military scientists are now looking at stretching the human capacity for combat to a maximum 168 hours without sleep.[73]

Arts and culture

Main articles: Transhumanism in fiction and Transhumanist art

Transhumanist themes have become increasingly prominent in various literary forms during the period in which the movement itself has emerged. Contemporary science fiction often contains positive renditions of technologically enhanced human life, set in utopian (especially techno-utopian) societies. However, science fiction's depictions of enhanced humans or other posthuman beings frequently come with a cautionary twist. The more pessimistic scenarios include many horrific or dystopian tales of human bioengineering gone wrong. In the decades immediately before transhumanism emerged as an explicit movement, many transhumanist concepts and themes began appearing in the speculative fiction of authors such as Robert A. Heinlein (Lazarus Long series, 1941–87), A. E. van Vogt (*Slan*, 1946), Isaac Asimov (*I, Robot*, 1950), Arthur C. Clarke (*Childhood's End*, 1953) and Stanislaw Lem (*Cyberiad*, 1967).[25]

The cyberpunk genre, exemplified by William Gibson's *Neuromancer* (1984) and Bruce Sterling's *Schismatrix* (1985), has particularly been concerned with the modification of human bodies. Other novels dealing with transhumanist themes that have stimulated broad discussion of these issues include *Blood Music* (1985) by Greg Bear, *The Xenogenesis Trilogy* (1987–1989) by Octavia Butler; *The Beggar's Trilogy* (1990–94) by Nancy Kress; much of Greg Egan's work since the early 1990s, such as *Permutation City* (1994) and *Diaspora* (1997); The Culture novels of Iain M. Banks; *The Bohr Maker* (1995) by Linda Nagata; *Oryx and Crake* (2003) by Margaret Atwood; *The Elementary Particles* (Eng. trans. 2001) and *The Possibility of an Island* (Eng. trans. 2006) by Michel Houellebecq; *Mindscan* (2005) by Robert J. Sawyer; and *Glasshouse* (2005) by Charles Stross. Many of these works are considered part of the cyberpunk genre or its postcyberpunk offshoot.

Fictional transhumanist scenarios have also become popular in other media during the late twentieth and early twenty first centuries. Such treatments are found in comic books (*Captain America*, 1941; *Transmetropolitan*, 1997; *The Surrogates*, 2006), films (*2001: A Space Odyssey*, 1968; *Blade Runner*, 1982; *Gattaca*, 1997; *Repo! The Genetic Opera*, 2008), television series (the Cybermen of *Doctor Who*, 1966; *The Six Million Dollar Man*, 1973; the Borg of *Star Trek: The Next Generation*, 1989; manga and anime (*Galaxy Express 999*, 1978; *Appleseed*, 1985; *Ghost in the Shell*, 1989; *Neon Genesis Evangelion*, 1995; and *Gundam Seed*, 2002), computer games (*Metal Gear Solid*, 1998; *Deus Ex*, 2000; *Half-Life 2*, 2004; and *BioShock*, 2007), and role-playing games (*Shadowrun*, 1989, *Transhuman Space, 2002).*

In addition to the work of Natasha Vita-More, curator of the Transhumanist Arts & Culture center, transhumanist themes appear in the visual and performing arts.[74] Carnal Art, a form of sculpture originated by the French artist Orlan, uses the body as its medium and plastic surgery as its method.[75] Commentators have pointed to American performer Michael Jackson as having used technologies such as plastic surgery, skin-lightening drugs and hyperbaric oxygen therapy over the course of his career, with the effect of transforming his artistic persona so as to blur identifiers of gender, race and age.[76] The work of the Australian artist Stelarc centers on the alteration of his body by robotic prostheses and tissue engineering.[77] Other artists whose work coincided with the emergence and flourishing of transhumanism and who explored themes related to the transformation of the body are the Yugoslavian performance artist Marina Abramovic and the American media artist Matthew Barney. A 2005 show, *Becoming Animal*, at the Massachusetts Museum of Contemporary Art, presented exhibits by twelve artists whose work concerns the effects of technology in erasing boundaries between the human and non-human.

Controversy

Transhumanist thought and research depart significantly from the mainstream and often directly challenge orthodox theories. The very notion and prospect of human enhancement and related issues also arouse public controversy.[78][79] Criticisms of transhumanism and its proposals take two main forms: those objecting to the likelihood of transhumanist goals being achieved (practical criticisms); and those objecting to the moral principles or world view sustaining transhumanist proposals or underlying transhumanism itself (ethical criticisms). However, these two strains sometimes converge and overlap, particularly when considering the ethics of changing human biology in the face of incomplete knowledge.

Critics or opponents often see transhumanists' goals as posing threats to human values. Some also argue that strong advocacy of a transhumanist approach to improving the human condition might divert attention and resources from social solutions. As most transhumanists support non-technological changes to society, such as the spread of civil rights and civil liberties, and most critics of transhumanism support technological advances in areas such as communications and health care, the difference is often a matter of emphasis. Sometimes, however, there are strong disagreements about the very principles involved, with divergent views on humanity, human nature, and the morality of transhumanist aspirations. At least one public interest organization, the U.S.-based Center for Genetics and Society, was formed, in 2001, with the specific goal of opposing transhumanist agendas that involve transgenerational modification of human biology, such as full-term human cloning and germinal choice technology. The Institute on Biotechnology and the Human Future of the Chicago-Kent College of Law critically scrutinizes proposed applications of genetic and nanotechnologies to human biology in an academic setting.

Some of the most widely known critiques of the transhumanist program refer to novels and fictional films. These works of art, despite presenting imagined worlds rather than philosophical analyses, are used as touchstones for some of the more formal arguments.

Infeasibility (*Futurehype* argument)

In his 1992 book *Futurehype: The Tyranny of Prophecy*, sociologist Max Dublin points out many past failed predictions of technological progress and argues that modern futurist predictions will prove similarly inaccurate. He also objects to what he sees as scientism, fanaticism, and nihilism by a few in advancing transhumanist causes, and writes that historical parallels exist to millenarian religions and Communist doctrines.[80] Several notable transhumanists have predicted that death-defeating technologies will arrive (usually late) within their own conventionally-expected lifetimes. *Wired* magazine founding executive editor Kevin Kelly has argued these transhumanists have overly optimistic expectations of when dramatic technological breakthroughs will occur because they hope to be saved from their own deaths by those developments.[81] Despite his sympathies for transhumanism, in his 2002 book *Redesigning Humans: Our Inevitable Genetic Future*, public health professor Gregory Stock is skeptical of the technical feasibility and mass appeal of the cyborgization of humanity predicted by Raymond Kurzweil, Hans Moravec and Kevin Warwick. He believes that throughout the 21st century, many humans will find themselves deeply integrated into systems of machines, but will remain biological. Primary changes to their own form and character will arise not from cyberware but from the direct manipulation of their genetics, metabolism, and biochemistry.[82]

In his 2006 book *Future Hype: The Myths of Technology Change*, computer scientist and

engineer Bob Seidensticker argues that today's technological achievements are not unprecedented. Exposing major myths of technology and examining the history of high tech hype, he aims to uncover inaccuracies and misunderstandings that may characterise the popular and transhumanist views of technology, to explain how and why these views have been created, and to illustrate how technological change in fact proceeds.[83]

Those thinkers who defend the likelihood of massive technological change within a relatively short timeframe emphasize what they describe as a past pattern of exponential increases in humanity's technological capacities. This emphasis appears in the work of popular science writer Damien Broderick, notably his 1997 book, *The Spike*, which contains his speculations about a radically changed future. Kurzweil develops this position in much detail in his 2005 book, *The Singularity Is Near*. Broderick points out that many of the seemingly implausible predictions of early science fiction writers have, indeed, come to pass, among them nuclear power and space travel to the moon. He also claims that there is a core rationalism to current predictions of very rapid change, asserting that such observers as Kurzweil have a good track record in predicting the pace of innovation.[84]

Hubris (*Playing God* argument)

There are two distinct categories of criticism, theological and secular, that have been referred to as "playing god" arguments:

The first category is based on the alleged inappropriateness of humans substituting themselves for an actual god. This approach is exemplified by the 2002 Vatican statement *Communion and Stewardship: Human Persons Created in the Image of God,*[85] in which it is stated that, "Changing the genetic identity of man as a human person through the production of an infrahuman being is radically immoral", implying, as it would, that "man has full right of disposal over his own biological nature". At the same time, this statement argues that creation of a superhuman or spiritually superior being is "unthinkable", since true improvement can come only through religious experience and "realizing more fully the image of God". Christian theologians and lay activists of several churches and denominations have expressed similar objections to transhumanism and claimed that Christians already enjoy, however post mortem, what radical transhumanism promises such as indefinite life extension or the abolition of suffering. In this view, transhumanism is just another representative of the long line of utopian movements which seek to immanentize the eschaton i.e. try to create "heaven on earth".[86][87]

The biocomplexity spiral is a depiction of the multileveled complexity of organisms in their environments, which is seen by many critics as the ultimate obstacle to transhumanist ambition.

The second category is aimed mainly at "algeny", which Jeremy Rifkin defined as "the upgrading of existing organisms and the design of wholly new ones with the intent of 'perfecting' their performance",[88] and, more specifically, attempts to pursue transhumanist goals by way of genetically modifying human embryos in order to create "designer babies". It emphasizes the issue of biocomplexity and the unpredictability of attempts to guide the development of products of biological evolution. This argument, elaborated in particular by the biologist Stuart Newman, is based on the recognition that the cloning and germline genetic engineering of animals are error-prone and inherently disruptive of embryonic development. Accordingly, so it is argued, it would create unacceptable risks to use such methods on human embryos. Performing experiments, particularly ones with permanent biological consequences, on developing humans, would thus be in violation of accepted principles governing research on human subjects (see the 1964 Declaration of Helsinki). Moreover, because improvements in experimental outcomes in one species are not automatically transferable to a new species without further experimentation, there is claimed to be no ethical route to genetic manipulation of humans at early developmental stages.[89]

As a practical matter, however, international protocols on human subject research may not present a legal obstacle to attempts by transhumanists and others to improve their offspring by germinal choice technology. According to legal scholar Kirsten Rabe Smolensky, existing laws would protect parents who choose to enhance their child's genome from future liability arising from adverse outcomes of the procedure.[90]

Religious thinkers allied with transhumanist goals, such as the theologians Ronald Cole-Turner and Ted Peters, reject the first argument, holding that the doctrine of "co-creation" provides an obligation to use genetic engineering to improve human biology.[91][92]

Transhumanists and other supporters of human genetic engineering do not dismiss the second argument out of hand, insofar as there is a high degree of uncertainty about the likely outcomes of genetic modification experiments in humans. However, bioethicist James Hughes suggests that one possible ethical route to the genetic manipulation of humans at early developmental stages is the building of computer models of the human genome, the proteins it specifies, and the tissue engineering he argues that it also codes for. With the exponential progress in bioinformatics, Hughes believes that a virtual model of genetic expression in the human body will not be far behind and that it will soon be possible to accelerate approval of genetic modifications by simulating their effects on virtual humans.[25] Public health professor Gregory Stock points to artificial chromosomes as an alleged safer alternative to existing genetic engineering techniques.[82] Transhumanists therefore argue that parents have a moral responsibility called procreative beneficence to make use of these methods, if and when they are shown to be reasonably safe and effective, to have the healthiest children possible. They add that this responsibility is a moral judgment best left to individual conscience rather than imposed by law, in all but extreme cases. In this context, the emphasis on freedom of choice is called procreative liberty.[25]

Contempt for the flesh (*Fountain of Youth* argument)

Philosopher Mary Midgley, in her 1992 book *Science as Salvation*, traces the notion of achieving immortality by transcendence of the material human body (echoed in the transhumanist tenet of mind uploading) to a group of male scientific thinkers of the early 20th century, including J.B.S. Haldane and members of his circle. She characterizes these ideas as "quasi-scientific dreams and prophesies" involving visions of escape from the body coupled with "self-indulgent, uncontrolled power-fantasies". Her argument focuses on what she perceives as the pseudoscientific speculations and irrational, fear-of-death-driven fantasies of these thinkers, their disregard for laymen, and the remoteness of their eschatological visions.[93] Many transhumanists see the 2006 film *The Fountain*'s theme of necrophobia and critique of the quixotic quest for eternal youth as depicting some of these criticisms.[94]

What is perceived as contempt for the flesh in the writings of Marvin Minsky, Hans Moravec, and some transhumanists, has also been the target of other critics for what they claim to be an instrumental conception of the human body.[37] Reflecting a strain of feminist criticism of the transhumanist program, philosopher Susan Bordo points to "contemporary obsessions with slenderness, youth, and physical perfection", which she sees as affecting both men and women, but in distinct ways, as "the logical (if extreme) manifestations of anxieties and fantasies fostered by our culture."[95] Some critics question other social implications of the movement's focus on body modification. Political scientist Klaus-Gerd Giesen, in particular, has asserted that transhumanism's concentration on altering the human body represents the logical yet tragic consequence of atomized individualism and body commodification within a consumer culture.[58]

Nick Bostrom asserts that the desire to regain youth, specifically, and transcend the natural limitations of the human body, in general, is pan-cultural and pan-historical, and is therefore not uniquely tied to the culture of the 20th century. He argues that the transhumanist program is an attempt to channel that desire into a scientific project on par with the Human Genome Project and achieve humanity's oldest hope, rather than a puerile fantasy or social trend.[1]

Trivialization of human identity (*Enough* argument)

In his 2003 book *Enough: Staying Human in an Engineered Age*, environmental ethicist Bill McKibben argued at length against many of the technologies that are postulated or supported by transhumanists, including germinal choice technology, nanomedicine and life extension strategies. He claims that it would be morally wrong for humans to tamper with fundamental aspects of themselves (or their children) in an attempt to overcome universal human limitations, such as vulnerability to aging, maximum life span, and biological constraints on physical and cognitive ability. Attempts to "improve" themselves through such manipulation would remove limitations that provide a necessary context for the experience of meaningful human choice. He claims that human lives would no longer seem meaningful in a world where such limitations could be overcome technologically. Even the goal of using germinal choice technology for clearly *therapeutic* purposes should be relinquished, since it would inevitably produce temptations to tamper with such things as cognitive capacities. He argues that it is possible for societies to benefit from renouncing particular technologies, using as examples Ming China, Tokugawa Japan and the contemporary Amish.[97]

In the US, the Amish are a religious group probably most known for their avoidance of certain modern technologies. Transhumanists draw a parallel by arguing that in the near-future there will probably be "Humanish", people who choose to "stay human" by not adopting human enhancement technologies, whose choice they believe must be respected and protected.[96]

Transhumanists and other supporters of technological alteration of human biology, such as science journalist Ronald Bailey, reject as extremely subjective the claim that life would be experienced as meaningless if some human limitations are overcome with enhancement technologies. They argue that these technologies will not remove the bulk of the individual and social challenges humanity faces. They suggest that a person with greater abilities would tackle more advanced and difficult projects and continue to find meaning in the struggle to achieve excellence. Bailey also claims that McKibben's historical examples are flawed, and support different conclusions when studied more closely.[98] For example, few groups are more cautious than the Amish about embracing new technologies, but though they shun television and use horses and buggies, some are welcoming the possibilities of gene therapy since inbreeding has afflicted them with a number of rare genetic diseases.[82]

Genetic divide (*Gattaca* argument)

Some critics of libertarian transhumanism have focused on its likely socioeconomic consequences in societies in which divisions between rich and poor are on the rise[*citation needed*]. Bill McKibben, for example, suggests that emerging human enhancement technologies would be disproportionately available to those with greater financial resources, thereby exacerbating the gap between rich and poor and creating a "genetic divide".[97] Lee M. Silver, a biologist and science writer who coined the term "reprogenetics" and supports its applications, has nonetheless expressed concern that these methods could create a two-tiered society of genetically-engineered "haves" and "have nots" if social democratic reforms lag behind implementation of enhancement technologies.[99] Critics who make these arguments do not thereby necessarily accept the transhumanist assumption that human enhancement is a positive value; in their view, it should be discouraged, or even banned, because it could confer additional power upon the already powerful. The 1997 film *Gattaca*'s depiction of a dystopian society in which one's social

class depends entirely on genetic modifications is often cited by critics in support of these views.[25]

These criticisms are also voiced by non-libertarian transhumanist advocates, especially self-described democratic transhumanists, who believe that the majority of current or future social and environmental issues (such as unemployment and resource depletion) need to be addressed by a combination of political and technological solutions (such as a guaranteed minimum income and alternative technology). Therefore, on the specific issue of an emerging genetic divide due to unequal access to human enhancement technologies, bioethicist James Hughes, in his 2004 book *Citizen Cyborg: Why Democratic Societies Must Respond to the Redesigned Human of the Future*, argues that progressives or, more precisely, techno-progressives must articulate and implement public policies (such as a universal health care voucher system that covers human enhancement technologies) in order to attenuate this problem as much as possible, rather than trying to ban human enhancement technologies. The latter, he argues, might actually worsen the problem by making these technologies unsafe or available only to the wealthy on the local black market or in countries where such a ban is not enforced.[25]

Threats to morality and democracy (*Brave New World* argument)

Various arguments have been made to the effect that a society that adopts human enhancement technologies may come to resemble the dystopia depicted in the 1932 novel *Brave New World* by Aldous Huxley. Sometimes, as in the writings of Leon Kass, the fear is that various institutions and practices judged as fundamental to civilized society would be damaged or destroyed.[100] In his 2002 book *Our Posthuman Future* and in a 2004 *Foreign Policy* magazine article, political economist and philosopher Francis Fukuyama designates transhumanism the world's most dangerous idea because he believes that it may undermine the egalitarian ideals of democracy in general and liberal democracy in particular, through a fundamental alteration of "human nature".[4] Social philosopher Jürgen Habermas makes a similar argument in his 2003 book *The Future of Human Nature*, in which he asserts that moral autonomy depends on not being subject to another's unilaterally imposed specifications. Habermas thus suggests that the human "species ethic" would be undermined by embryo-stage genetic alteration.[101] Critics such as Kass, Fukuyama, and a variety of Christian authors hold that attempts to significantly alter human biology are not only inherently immoral but also threats to the social order. Alternatively, they argue that implementation of such technologies would likely lead to the "naturalizing" of social hierarchies or place new means of control in the hands of totalitarian regimes. The AI pioneer Joseph Weizenbaum criticizes what he sees as misanthropic tendencies in the language and ideas of some of his colleagues, in particular Marvin Minsky and Hans Moravec, which, by devaluing the human organism per se, promotes a discourse that enables divisive and undemocratic social policies.[102]

In a 2004 article in *Reason,* science journalist Ronald Bailey has contested the assertions of Fukuyama by arguing that political equality has never rested on the facts of human biology. He asserts that liberalism was founded not on the proposition of effective equality of human beings, or *de facto* equality, but on the assertion of an equality in political rights and before the law, or *de jure* equality. Bailey asserts that the products of genetic engineering may well ameliorate rather than exacerbate human inequality, giving to the many what were once the privileges of the few. Moreover, he argues, "the crowning achievement of the Enlightenment is the principle of tolerance". In fact, he argues, political liberalism is already the solution to the issue of human and posthuman rights since, in liberal societies,

the law is meant to apply equally to all, no matter how rich or poor, powerful or powerless, educated or ignorant, enhanced or unenhanced.[5] Other thinkers who are sympathetic to transhumanist ideas, such as philosopher Russell Blackford, have also objected to the appeal to tradition, and what they see as alarmism, involved in *Brave New World*-type arguments.[103]

Dehumanization (*Frankenstein* argument)

Australian artist Patricia Piccinini's concept of what human-animal hybrids might look like are provocative creatures which are part of a sculpture entitled *The Young Family*, produced to address the reality of such possible parahumans in a compassionate way. Transhumanists would call for the recognition of self-aware parahumans as persons.

Biopolitical activist Jeremy Rifkin and biologist Stuart Newman accept that biotechnology has the power to make profound changes in organismal identity. They argue against the genetic engineering of human beings, because they fear the blurring of the boundary between human and artifact.[89][104] Philosopher Keekok Lee sees such developments as part of an accelerating trend in modernization in which technology has been used to transform the "natural" into the "artifactual".[105] In the extreme, this could lead to the manufacturing and enslavement of "monsters" such as human clones, human-animal chimeras or bioroids, but even lesser dislocations of humans and non-humans from social and ecological systems are seen as problematic. The film *Blade Runner* (1982), the novels *The Boys From Brazil* (1978) and *The Island of Dr. Moreau* (1896) depict elements of such scenarios, but Mary Shelley's 1818 novel *Frankenstein* is most often alluded to by critics who suggest that biotechnologies could create objectified and socially-unmoored people and subhumans. Such critics propose that strict measures be implemented to prevent what they portray as dehumanizing possibilities from ever happening, usually in the form of an international ban on human genetic engineering.[106]

Writing in *Reason* magazine, Ronald Bailey has accused opponents of research involving the modification of animals as indulging in alarmism when they speculate about the creation of subhuman creatures with human-like intelligence and brains resembling those of Homo sapiens. Bailey insists that the aim of conducting research on animals is simply to produce human health care benefits.[107]

A different response comes from transhumanist personhood theorists who object to what they characterize as the anthropomorphobia fueling some criticisms of this research, which science writer Isaac Asimov termed the "Frankenstein complex". They argue that, provided they are self-aware, human clones, human-animal chimeras and uplifted animals would all be unique persons deserving of respect, dignity, rights and citizenship. They conclude that the coming ethical issue is not the creation of so-called monsters but what they characterize as the "yuck factor" and "human-racism" that would judge and treat these creations as monstrous.[21][53]

Specter of coercive eugenicism (*Eugenics Wars* argument)

Some critics of transhumanism allege an ableist bias in the use of such concepts as "limitations", "enhancement" and "improvement". Some even see the old eugenics, social Darwinist and master race ideologies and programs of the past as warnings of what the

promotion of eugenic enhancement technologies might unintentionally encourage. Some fear future "eugenics wars" as the worst-case scenario: the return of coercive state-sponsored genetic discrimination and human rights violations such as compulsory sterilization of persons with genetic defects, the killing of the institutionalized and, specifically, segregation from, and genocide of, "races" perceived as inferior.[108] Health law professor George Annas and technology law professor Lori Andrews are prominent advocates of the position that the use of these technologies could lead to such human-posthuman caste warfare.[106][109]

For most of its history, eugenics has manifested itself as a movement to sterilize against their will the "genetically unfit" and encourage the selective breeding of the genetically fit. The major transhumanist organizations strongly condemn the coercion involved in such policies and reject the racist and classist assumptions on which they were based, along with the pseudoscientific notions that eugenic improvements could be accomplished in a practically meaningful time frame through selective human breeding. Most transhumanist thinkers instead advocate a "new eugenics", a form of egalitarian liberal eugenics.[110] In their 2000 book *From Chance to Choice: Genetics and Justice*, (non-transhumanist) bioethicists Allen Buchanan, Dan Brock, Norman Daniels and Daniel Wikler have argued that liberal societies have an obligation to *encourage* as wide an adoption of eugenic enhancement technologies as possible (so long as such policies do not infringe on individuals' reproductive rights or exert undue pressures on prospective parents to use these technologies) in order to maximize public health and minimize the inequalities that may result from both natural genetic endowments and unequal access to genetic enhancements.[111] Most transhumanists holding similar views nonetheless distance themselves from the term "eugenics" (preferring "germinal choice" or "reprogenetics")[99] to avoid having their position confused with the discredited theories and practices of early-20th-century eugenic movements.[112]

Existential risks (*Terminator* argument)

Struck by a passage from Unabomber Theodore Kaczynski's anarcho-primitivist manifesto (quoted in Ray Kurzweil's 1999 book, *The Age of Spiritual Machines*[10]), computer scientist Bill Joy became a notable critic of emerging technologies.[113] Joy's 2000 essay "Why the future doesn't need us" argues that human beings would likely guarantee their own extinction by developing the technologies favored by transhumanists. It invokes, for example, the "grey goo scenario" where out-of-control self-replicating nanorobots could consume entire ecosystems, resulting in global ecophagy.[114] Joy's warning was seized upon by appropriate technology organizations such as the ETC Group. Related notions were also voiced by self-described neo-luddite Kalle Lasn, a culture jammer who co-authored a 2001 spoof of Donna Haraway's 1985 *Cyborg Manifesto* as a critique of the techno-utopianism he interpreted it as promoting.[115] Lasn argues that high technology development should be completely relinquished since it inevitably serves corporate interests with devastating consequences on society and the environment.[116]

In his 2003 book *Our Final Hour*, British Astronomer Royal Martin Rees argues that advanced science and technology bring as much risk of disaster as opportunity for progress. However, Rees does not advocate a halt to scientific activity; he calls for tighter security and perhaps an end to traditional scientific openness.[117] Advocates of the precautionary principle, such as the Green movement, also favor slow, careful progress or a halt in potentially dangerous areas. Some precautionists believe that artificial intelligence

and robotics present possibilities of alternative forms of cognition that may threaten human life.[118] The *Terminator* franchise's doomsday depiction of the emergence of an A.I. that becomes a superintelligence - Skynet, a malignant computer network which initiates a nuclear war in order to exterminate the human species, has been cited by some involved in this debate.[119]

Transhumanists do not necessarily rule out specific restrictions on emerging technologies so as to lessen the prospect of existential risk. Generally, however, they counter that proposals based on the precautionary principle are often unrealistic and sometimes even counter-productive, as opposed to the technogaian current of transhumanism which they claim is both realistic and productive. In his television series *Connections*, science historian James Burke dissects several views on technological change, including precautionism and the restriction of open inquiry. Burke questions the practicality of some of these views, but concludes that maintaining the *status quo* of inquiry and development poses hazards of its own, such as a disorienting rate of change and the depletion of our planet's resources. The common transhumanist position is a pragmatic one where society takes deliberate action to ensure the early arrival of the benefits of safe, clean, alternative technology rather than fostering what it considers to be anti-scientific views and technophobia.[120]

One transhumanist solution proposed by Nick Bostrom is differential technological development, in which attempts would be made to influence the sequence in which technologies developed. In this approach, planners would strive to retard the development of possibly harmful technologies and their applications, while accelerating the development of likely beneficial technologies, especially those that offer protection against the harmful effects of others.[41]

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