

Plenty of gloom and doom at the bottom?

The relationship between humans and technology is often viewed as a debate between technophobes who oppose technology, irrespective of its benefits, and technophiles who think that all technology is good. **Chris Toumey** prefers the cyborg point of view.

Some of my friends in the humanities tell me that they became interested in nanotechnology after reading an article called 'Why the Future Doesn't Need Us' by Bill Joy in *Wired* magazine¹. They were familiar with certain implications of genetic engineering and robotics that might threaten what it means to be human, but nanotechnology was unknown to them. How, then, does nanotechnology fit into Joy's ideas about new technologies that can cause the end of humanity?

Joy's argument began with his credentials: he was a brilliant computer scientist in graduate school and later co-founded Sun Microsystems. He believed in "the value of the scientific search for truth and in the ability of great engineering to bring material progress", but he also insisted that science needed ethical direction. At first Joy was confident that moral dilemmas would not complicate his work on information technology, but then he learnt that Ray Kurzweil — the inventor and futurist — welcomed the fusing of humans with robots. This disturbed Joy, not just because it was wrong in principle, but also because robots with full human sentience were on the verge of crossing the divide from fantasy to reality, in his opinion.

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In response, Joy gave the reader a catalogue of advice and causes for alarm: new technologies have unintended consequences; unanticipated effects can cascade out of control; sexy new technologies acquire an amoral momentum to develop and deploy them; and so on. His main concern was that developments in genetic engineering, robotics and nanotechnology would lead to new devices that could self-replicate and then evolve into a species of their own that might lead to humans becoming extinct, possibly by as soon as 2030.



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The interactions between humans and technology are more subtle than they appear at first sight.

Joy's argument included a pair of classic themes from the long tradition of wariness about technology. First, we should contrast the existential richness of human values with the moral aridity of our technology: we cherish equality, for example, but technology does not care about such matters. Second, Joy said that we should "limit development of the technologies that are too dangerous, by limiting our pursuit of knowledge."

The relationship between humans and technology has been a topic of debate since the Industrial Revolution, a debate that has often taken the form of a shouting match between technophobic humanists on one side and technophilic scientists and engineers on the other. But both viewpoints can be problematic: technophiles are sometimes naive about the human implications of their projects,

and technophobes can be unrealistic about resisting new technologies. There is, however, another viewpoint that expands and enriches that debate — cyborg theory.

In her *Cyborg Manifesto*^{2,3}, the author and academic Donna Haraway argues that the relationship between humans and technology is well beyond the control of either technophobes or technophiles. For example, if technological change has an autonomous inevitability, what is left for us to decide for ourselves? Do we have any prerogatives? To answer these questions, Haraway invokes a set of insights concerning our social identities — that is, our sense of who we are in relation to other people. It is known that one way for people to create a sense of themselves is to create boundaries: black versus white, liberals versus conservatives and so on. Anthropologists diagnose these boundaries

as cultural constructions, meaning that they are artificial and arbitrary. And yet those who form their own identities this way typically believe that these boundaries are entirely natural and essential.

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Sometimes these boundaries have a scientific dimension (for example human versus non-human, or organic versus inorganic): one way for us to construct our social identities is to invoke scientific or technological terms or concepts. You may be familiar with the way some people describe themselves as either Mac users or PC users, as if the two categories are totally alien to each other. At this point Haraway indicates that we ought to have the freedom to create new identities for ourselves, not by invoking even more boundaries, but by escaping or by-passing the categories that have been superimposed on us. This is where the cyborg comes in. As a being that straddles human and machine, organic and inorganic, the cyborg resists the boundaries that scientific terms have forced on us. For example, a person missing a limb could escape the category of disabled through the use of prostheses, or an individual might change from one gender to another with the help of surgery and hormones. By means of the internet, someone who is shy in face-to-face situations could be brash in electronic communications. The physicist Stephen Hawking resists the pigeonhole of 'ALS victim' and assumes the identity of notable physicist by using his high-tech wheelchair/keyboard. Thus people use science and technology not to superimpose more social categories on themselves or others, but to free themselves from those categories. Haraway's cyborg is not obligated to respect predetermined categories.

This approach does not argue that machines are cooler than humans, nor does it say that they are soul-stealing zombies. To some it may look like classic technophobia because it observes that we are becoming overly intimate with powerful technologies. When our computers go down or our mobile phones malfunction, we see clearly how much our work or our family life requires these information and communication technologies. And if our personalities depend so much on these machines, then they — or we — have diminished our existential worth. But Haraway's analysis goes on to show that we can also use technology to escape

from artificially inscribed boundaries and identities. This looks like classic technophilia: see how technology gives us new choices for how we create ourselves. Moreover, a cyborg does not require a physical interface between a human and a machine; it is an existential relation to technology that affects one's sense of self.

Now let us bring nanotechnology into this story. Bill Joy worried that self-replicating nanobots would evolve into a species of their own that would displace humans. Can cyborg theory tell us something different? Let us take the case of information and privacy. Genomics and nanomedicine will generate enormous amounts of data, and will require extremely powerful information systems to manage and integrate DNA sequencing data, imaging systems, healthcare informatics and so on⁴. Therefore, if you are concerned about the exquisite detail in which your insurance company, credit card company or government can see your private life, then nanotechnology will multiply your unhappiness as data about your genes, your blood and your organs are integrated into large databases that can be accessed by a variety of powerful organizations.

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That's the downside, but there is also an upside. As diagnostic tools become smaller and more accurate courtesy of nanotechnology, they will probably move towards over-the-counter devices for use at home. In the past a woman might have hesitated to visit a clinic to find out whether she was pregnant if she did not trust clinic staff to keep the results confidential. Now she can diagnose herself in complete privacy by purchasing a pregnancy-testing kit. This same kind of diagnostic privacy is likely to increase with nano-enabled diagnostic devices. People will screen themselves for various conditions, and will subsequently decide for themselves whether to seek a therapeutic treatment that would compromise their privacy. In short, the same technology that threatens our privacy in some ways could increase it in other ways. And anyone who makes use of this technology on his or her own terms will be a satisfied nano-cyborg.

Another area is individualized treatment. Most pharmaceutical therapy is a matter of matching individual patients to standard drugs or combinations of

standard drugs (because it is economically impractical to create different drugs for different patients). One of the agonies of drug therapy is the process of adjusting doses as the physician tries to get a unique individual to respond to standardized products.

There is reason to believe that nanotechnology might change that by providing extraordinarily precise information about a patient's molecular composition, thereby making personalized drug therapies possible⁵. If we stop at that statement, we have a classic sense of technophilia. But as well as the obvious clinical benefits, there is an existential aspect. At a time when many feel that our healthcare systems are cruelly impersonal, a personalized drug therapy will be especially attractive. The customization of drug therapy — if it really happens — will resonate with a strong sense of individualism, of the unique worth of each person. This too is a cyborg relationship.

Neither privacy nor personalized medicine, as assisted by nanotechnology, fits neatly into the end-of-humanity fears of Bill Joy. Each is a mixture of good science, exciting medicine and serious consequences for our sense of ourselves. Will we have the freedom to accept or reject the applications of nanotechnology? How will these applications affect our sense of who we are in relation to our technologies? Should we be prepared to be empowered, or to be demeaned?

Perhaps some applications of nanotechnology will reinforce the fears of technophobes, and others will confirm the hopes of technophiles. But when we ask how nanotechnology will affect us, we need to look beyond molecules and see how it has the potential to influence our existential lives. For complicated questions of self, identity and technology, cyborg theory offers more nuance than the classical parameters of technophobia versus technophilia. □

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