

God, persons and machines: theological reflections

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Abstract

The desire to transcend the limitations of human nature along with the development of new biological technologies, nanotechnology and an increasing understanding of genetics is transforming the human person and leading towards the development of cyborgs. The process of merging the mechanical with the biological has begun, the re-creation of the self is underway and the future holds even more changes in store. A symbiotic relationship between humanity and machinery already exists. There is now a debate between trans-humanists who are looking towards a shift in human nature, perhaps moving towards a post-human condition and bio-conservatives who see trans-human initiatives as nothing other than de-humanising.

In developing a theologically appropriate attitude towards these changes there are three important issues relating to the nature and action of God and the nature of humanity which have to be resolved. The first issue concerns the value of the various orders and structures of the natural world, the species and kingdoms and other previously impenetrable barriers which exist within in the natural world between various forms of life. To what extent are these appropriately blurred or overcome? The second concerns the nature of God's action in the world, the role that humanity plays in representing God and the appropriateness of understanding humanity as co-creators or, preferably, as pro-creators with God. The third concerns the meaning and status of human nature and the limits to our future human-controlled evolutionary development.

Key words

Future, technology, theology, cyborgs, genetics, DNA computing, nature, humanity, co-creators, pro-creators, transhumanism, divine action.

There is a cartoon that shows a salesperson pointing out the benefits of the latest personal computer to a potential buyer. She says, 'It's beginning to show some human characteristics — faulty reasoning, forgetfulness and repetition'.

If you find this even mildly amusing then, at the very least, it indicates that you are actually human and not just a machine! As it stands at the moment the ability to read the text, interpret the pictures, understand the literal meaning, comprehend the much more subtle point that is being made, and then feel even slightly amused and, finally, show that emotion in a manner appropriate for your setting, are all abilities and characteristics of humans. Even when doing something as simple as reading a cartoon it takes a lot to be a human being and yet we do so effortlessly!

The rich complexity of human life includes within it humour and imagination and the desire to continually want to go beyond our present state and position and press into new territory, to learn new things, to extend our abilities and even to transcend our very nature. Whether in cartooning or in science human imagination has always exceeded present reality, and thank goodness for that. Imagination is intelligence playing around and having fun. Thousands of years ago the Greeks imagined Icarus flying, and today we can (though a Boeing 747 is far less graceful and romantic a way to fly than on feathered wings!). The alchemists dreamt of transmuting lead into gold and although that is still beyond us we can turn sand into glass, iron ore into steel and petrochemicals into plastics. The ancient myth of the 'fountain of youth' – that there was a fountain from which one could drink in order to gain eternal life – is just that, a myth. And yet there are researchers who are not interested just in eliminating one disease here and another cause of death there, but who are investigating and manipulating the most fundamental aging mechanisms of the human body so that there can be an almost unlimited extension of human life. Telomere therapy may well be the means to allow people to live indefinitely. How would you feel about living to be, say, 400 years old? In 1818 Mary Shelley imagined the artificial creation of 'human' life in her story 'Frankenstein's Monster', an idea that was so thoroughly bizarre and terrifying that for almost 200 years it was the classic horror story. And, of course, the history of film from Hel (the very feminine robot of Fritz Lang's 1927 silent classic 'Metropolis') to Hal (the manipulative computer in '2001: a space odyssey') is replete with examples of robotic machines that are uncannily human. The relationship between the human and the non-human machine is one that has been the subject of much speculation.

Cyborgs

With test-tube babies, the re-programming of stem cells, gene manipulation and bio-printing (a process which utilises a modified ink-jet printer to spray out cells — instead of ink — onto successive layers of gell — instead of paper — in a computer generated pattern to build up a three dimensional replica of a bodily organ) the merging of the human and the mechanical no longer seems so unlikely — though for many it is still as horrific. The moral dimension is never far from the physical. In 1960, two writers, Manfred Clynes and Nathan Kline, wrote a speculative article about

the difficulty of space exploration and the incredibly large amounts of time it would take to get anywhere really interesting (Clines 1960).¹ They proposed that the rigors of extended space travel could be alleviated if it was possible to alter the form of the human person so that machines and electronic devices became a part of them. They called such people 'cybernetic organisms' or cyborgs for short. In an earlier era, where human relationships with animals were more significant than relationships with machines, people speculated about centaurs — half human and half horse, or the Sphinx — lion with a human face. It is just as natural in an age where machines are more important for people to speculate about the integration of human and machine. Donna Haraway defines cyborgs as 'creatures simultaneously animal and machine, who populate worlds ambiguously natural and crafted'. They have 'dangerous possibilities' (Haraway 1991 p.149).

The re-creation of the self has started: changing the form of our bodies through surgery, chemicals, hormone-producing implants, prosthetic limbs, organ transplants, xenotransplantation, artificial hearts, pacemakers, bionic ears, soon perhaps the replacement of damaged optic nerves in blind people with electronic technology to restore vision. These changes do not only affect the body but also character, through gene therapy and medication which treats mental disorders and alters sexual orientation. What changes will the control of neurochemistry bring about?

The process of merging the mechanical with the biological has begun.² Machines are now implanted into people and made acceptable to bodies through the use of various drugs which suppress the immune systems' rejection of them. We might not yet have all the technology of the six million dollar man but we are moving along quite nicely. Although I think that the vision of the television hero, 'the six million dollar man', is likely to remain unfulfilled in the form in which it was envisaged simply because the writers did not imagine that machines would actually start to change in their nature and become more biological.

The future holds even more changes in store. The genetic/biological revolution is merging with the science and technology of machines. Machines are changing. They are becoming more organic. The future of machines at the human machine interface lies with biotechnology. The unifying principle for life is DNA which links animal, vegetable and human life. The work that has been done in molecular biology and the creation of organic machines means that the possibility of creating cyborgs that are even more sophisticated and which involve a higher level of interaction of human and machine than previously imagined is very real. The merging of

¹ Their idea is the basis of the 1982 movie, "Blade Runner", in which the enhanced humans, the Cyborgs, are engaged in mining operations in the farther reaches of space.

² However viewing 'the body as a machine' is something of a philosophical return to Rene Descartes who argued that the human body was simply a machine made out of dead matter.

human and machine means a blurring of the boundaries of that which is human and that which is machine.

One great example of this convergence is the connection of James Watson with Leonard Adleman³. Watson is one of the discoverers of the structure of DNA and he wrote *Molecular biology of the Gene* which Adleman read. When doing so he realised that DNA could be used as a computer. Computers store data in strings made up of the numbers 0 and 1. Living things store information with molecules represented by the letters G, A, T and C. This was the beginning of DNA computing, and it was as recent as 1994. As long as computers are silicon based they are not 'us' but as they become DNA they can become part of us. The work has a long way to go, but it does go on because of the huge advantages with DNA computers⁴: there is a very cheap and unlimited source of supply, they are incredibly small but potentially hugely powerful because of ability to have parallel processing, and they can merge with people! Work in this area has continued as various people have developed logic gates and miniscule machines with self-sustaining power supplies and commercially viable projects using the power of parallel operation.

We are all cyborgs now

But if cyborg is a symbiotic relationship between human and machine the question has already been asked, most notably by Donna Haraway in her cyborg manifesto (1985), whether we are already cyborgs now. Haraway says, we are all cyborgs; our lives depend upon and are intimately connected with machines. The fact that we could live, and that some people do live, without machines is irrelevant for those of us that cannot imagine life without machines.

There is a tendency today to anthropomorphise machines (ascribing human characteristics to machines: 'my computer hates me'; 'ask Google';) and technomorphise people (viewing people as machines: 'the brain is a computer'; 'memory banks'). Whether willingly or unwillingly we are dependent on machines almost every moment of our lives. We are humans whose lives are integrated with machines that we have made. We are not physically cyborgs but culturally we are because of the impact of machines such as cars, computers and coffee machines. They have profound impact on every area of life, our comfort, recreation, knowledge and education.

³ The technology is still in development, and didn't even exist as a concept a decade ago. In 1994, Leonard Adleman introduced the idea of using DNA to solve complex mathematical problems. Adleman, a computer scientist at the University of Southern California, came to the conclusion that DNA had computational potential after reading the book *Molecular biology of the Gene*, written by James Watson (now in its fifth edition, published by Pearson/Benjamin Cummings, 2003), who co-discovered the structure of DNA in 1953.

⁴ There are several advantages to using DNA instead of silicon. As long as there are cellular organisms, there will always be a supply of DNA. The large supply of DNA makes it a cheap resource. Unlike the toxic materials used to make traditional microprocessors, DNA biochips can be made cleanly. DNA computers are many times smaller than today's computers. DNA's key advantage is that it will make computers smaller than any computer that has come before them, while at the same time holding more data. Unlike conventional computers, DNA computers perform calculations parallel to other calculations.

Our lives are controlled and formed by machines: where the car can go; what Google can tell us; what is shown on the TV; the way we work (for example, evidence to show that computer use in business can alter the decision making mode away from collaboration towards individual, sequential thinking). Our social relationships have not only been changed by machines but now extend to machines. As Ray Kurzweil has said, 'the only question is whether we become machines or machines become us'.

There are two aspects to this cyborg movement. There is the physical development and its implications for human morphology with the cyborg as a technological/biological issue in which machines become more organic, utilising molecular nanotechnology leading to ultimate control over human physiology and morphology, meaning it will be possible to build and re-build almost any part of our body atom by atom. Developments in artificial intelligence and DNA computing which can be seamlessly integrated into our brains will also be profound.

Then there is the cultural development related to being cyborg and the implications for human identity. This is cyborg as an idea or concept or perhaps a metaphor through which we determine ourselves through our interactions as part of a technoculture. In this sense cyborg is a term through which the nature of humanity is being explored.

How do we interpret this cyborg nature? There are positive interpretations of this movement. For some it is part of the modern thrust for exploration: In terms of a modern myth it means, in terms of Star Trek, 'to boldly go where no man has gone before'. For others it is a metaphor (signifier) of a move towards a positive technocratic society with a new form of transhumanism leading to posthuman society. Philosophical interpretations of this human search for self transcendence includes Friedrich Nietzsche's belief in Superman (literally 'overman') as humanity that has overcome the false values and flaws of humanity and has reached a state where humanity is no longer affected by pity, suffering, tolerance of the weak, the power of the soul over the body, the belief in an afterlife or the corruption of modern values. In *Thus spake Zarathustra*, Nietzsche, through Zarathustra, says

I teach you the overman. Man is something that shall be overcome [surpassed]. What have you done to overcome [surpass] him? All beings so far have created something beyond themselves; and do you want to be the ebb of this great flood and even go back to the beasts rather than overcome man? What is the ape to man? A laughingstock or a painful embarrassment. And man shall be just that for the overman: a laughingstock or a painful embarrassment.

At the same time there are negative interpretations. For some, rather than the idealism of Star Trek, there is the fear of the computer Hal in '2001: a space odyssey'. There has long been speculation that machines will one day take over, as anyone who has read Isaac Asimov's science fiction will know. His rules of robotics, well defined in many stories are designed to ensure that robots stay in their places and do not become humanity's master rather than its servant. But of course, there is another way of 'taking over'

by assimilation rather than by confrontation, an approach that is far more likely as machines change and as humans bring it about themselves. Is this another illustration of the story of the tower of Babel, which stands as a warning that it is possible for humanity to over-reach itself?

This (Tower) is only the beginning of what they will do; nothing will now be impossible for them; so the Lord scattered them abroad over the face of the earth.

Gen. 11:6-7

Are we building our own towers today? The industrial revolution of the eighteenth century and the information and computing revolution of the twentieth century will be technically and morally surpassed in significance by biotechnological revolution of the twenty-first century.

In all this there is now a debate between the transhumanists who are looking towards a shift in human nature, moving perhaps towards a post-human condition, and the bioconservatives who see transhuman initiatives as nothing other than de-humanising tendencies.

Three fundamental theological issues

I believe that at present there are three important theological issues which have to be resolved. These issues emerge in various discussions related to different biotechnologies time and time again and they are all important in any discussion of the human-machine interface. One of these issues has to do with God, one with humanity and one with the world.

The first issue is one that has been greatly neglected. It concerns the value of the various orders of the natural world. What value is there in the structures and orders, the species and kingdoms, those previously impenetrable barriers which exist in the natural world between various kinds and forms of life, between animals and plants, between species of animals, and especially between people and animals and people and machines? Is it theologically appropriate to cross these boundaries and create new forms of life?

The second issue concerns the nature of God's action in the world. The question is 'How does God work in the world?' and 'To what extent does God gift humanity with the ability, with the right to modify what is taking place?'. These questions are often expressed negatively in terms of the conviction that humanity should not be 'playing God' whether it is in gene technology, genetically modified crops or, even more problematically in genetically modified people, xenotransplantation (that is, bridging the human-animal barrier) or even cyborgs (bridging the human-machine barrier). Others say that it is necessary to 'play God'.

The third important issue concerns the meaning of being human. In the light of technologies which can modify human nature or mix human, animal, plant and machine, what are the limits of humanity? Is humanity a concept that can be improved upon? Is some form of human-controlled evolutionary development possible or desirable?

These are the questions which must be explored.

The value and the order of the world

Modern, western society is philosophically prone to making dualisms. There is the fundamental epistemological dualism that has produced the sharp distinction between faith and fact, and the subsequent division of private and public. There is also the Cartesian dualism of body and soul. These dualisms flow through into western culture in many ways. One of them is the analytical process seen in the university educational system, creating orders, taxonomies, schools and faculties. This is the conquest of knowledge through analysis and division. This is the modern analytical way. Science proceeds by way of the exploration of some area of the natural world with the aim of analysing its inevitable complexity in order to produce a scheme of understanding which enables the development of a theory which allows for the control of that area of knowledge. Research might lead, in chemistry, to the periodic table of elements and the molecular theory it embraces, or, in zoology, to a taxonomy of the species. But until it is analysed and ordered it cannot be controlled, and control is the aim of modern science.

This search for order has, historically, been closely tied to the Christian conviction that, despite any initial appearance of bewildering complexity and disorder, there is an ultimate order because the Creator is a God of intrinsic order. There is Biblical justification for this conviction, beginning with the Biblical accounts of creation which stress order⁵. Modern eyes see this order very clearly.

The fundamental distinction in this ordered world is between God and the created order. Some have tended to think that the fundamental divide is between humanity and the rest of the created order but although humanity is created in the image of God we are a part of the created order, made of the dust of the earth. As creatures of God we are on the side of the animals and plants. Other distinctions include: human/animal; animal species; male/female; human/machine (not a robot). Sometimes unfortunately, black/white, rich/poor. That is, at times the divine order in the natural world, has been related to social order as well. By extension, order in the natural world was seen in social hierarchy. For example, consider the now rejected verse of 'All things bright and beautiful':

The rich man in his castle,
The poor man at his gate,
He made them, high or lowly,
And ordered their estate.

Because many people, including but not only, many Christians, believe in a world of (divine) order they tend to intuitively believe that it should be left that way. They have a strong theology of creation. God made the plants

⁵ The creation is ordered over six days; there is repeated reference to the creation of various 'kinds'; see Genesis 1-2 and Psalm 8.

and the animals 'of every kind' (Gen. 1:11, 21, 24). The world is established for a reason and this should not be changed.

Many people are concerned about the introduction of any new technology, but there is evidence that they are much more concerned if it seems that the natural order of things is being disturbed. There is a natural concern about the potential dangers of anything new but there is also a fairly widespread acceptance of many of these technologies if people are convinced that they are actually safe. Then there is usually a swing in opinion in favour of them. Often good information and education will help change people to be more positive. But this is not always the case. Some issues are more stubborn. European studies have shown that education has actually increased resistance to some technologies. Some of the qualitative research on attitudes to gene technology shows that there are not only concerns about the usual matters of the physical risk and health matters related to the practicalities of the technology but also concerns which exist in some areas with regard to the deeper, more existential level concerning ontology (the nature of things), including the meaning of human nature and the presence of some fundamental order in the natural world (Deane-Drummond 2001). In the range of issues covered under the heading biotechnology it is quite clear that there are some proposals which are generally very acceptable to people, and others about which there is much more reserve.

My interpretation of this is that while people are often keen to see the good in the various technologies, they also have a strong sense of 'order' about the world, and the more a technology contravenes the perceived order the more they resist it. It is, for many people a question of boundaries and the blurring of boundaries. Theologically, for many people the question is about the nature of order in the world. Are we becoming or trying to become God? The area that causes the greatest concern is the animal/human boundary. Historically, anxiety about maintaining the animal/human boundary was a major source of opposition to Darwin's theory of evolution and the same anxiety was evident in the debate over cowpox vaccination⁶. Concern about the human/animal boundary is also the reason that xenotransplantation is more problematic for many people than human to human transplantation. Cloning of human beings also seems to be a contravention of order in the sense that it seems to bring about a loss of human uniqueness. Although twins occur, the experience more common by far is for people, even siblings, to be different. Merging or crossing natural boundaries, such as merging food and medicine in biopharmaceuticals seems to be problematic. For example, a number of companies are working on producing pharmaceuticals (and nutraceuticals) such as (sheep, goat or cattle) milk with a very high proportion of human proteins in order to deal with disease. And while genetic modifications such as gene splicing are

⁶ Jenner's discovery was opposed by some who objected to the introduction of even a small dose of the cattle disease despite the fact that it has the potential to save millions of lives because it introduced something from a cow into people. In a similar manner there is some opposition to xenotransplantation as well.

often considered to be appropriate there is greater resistance if it means crossing the boundaries of species or even kingdoms. It would, incidentally, be interesting to examine whether cultural issues are involved in this: different parts of the world do have different attitudes. To what extent does a very laid-back Australian attitude, which is not all that concerned about regimentation or proper social orders, castes or classes, contribute towards our innate feelings about crossing genes across species and kingdoms? Research with regard to crossing species barrier has summarised the situation this way: that people often have a sense of given order which is radically challenged by the possibilities inherent in gene technology and, especially, the novelty of something like trans-kingdom gene transfer. Despite this there is also a feeling that in certain circumstances some modifications may be justified – provided that the purposes are the right ones. But there is also a fair degree of cynicism and fatalism that such conditions are unlikely to be met and that more dramatic and less justifiable changes will occur (Deane-Drummond 2001). Another area is the breakdown in sexual distinctions, that is, both homosexuality and trans-sexuality.

Many people find the elimination of these distinctions particularly threatening. Cyborgs—human/machines—are thus seen, perhaps more intuitively than anything, as both de-humanising and a threat to the order of the world. The idea produces existential feelings of insecurity and disorder as though the structure and fabric of society was under threat. This, incidentally, has happened before. In the eighteenth and nineteenth centuries scientific revolution was identified with political instability and revolution, while a more ordered theology of science (such as Paley’s view of God as the divine watchmaker) was used to buttress conservative social order (Brook 1991)⁷.

Leon Kass, US bioethicist has put it this way,

Most of the bestowals of nature have their given species-specified natures: they are each and all a given sort. Cockroaches and humans are equally bestowed but differently natured. To turn a man into a cockroach... would be de-humanizing. To try to turn a man into more than a man might be so as well. We need more than a generalized appreciation for nature’s gifts. We need a particular regard and respect for the special gift that is our own given nature.

Kass 2003.

One of the primary characteristics of post-modernism, however, is ending what are seen to be unhelpful modern dichotomies and distinctions. Others see them as important foundations for the nature of society and so postmodern, boundary blurring movements are threats to the order of the

⁷ John Hedley Brook notes that, despite the Wesleyan revival, England was not immune from this tendency. During the last decade of the 18th century, there was such a conservative backlash against the horrors of the French revolution that any revolutionary scientific conjecture was liable to start the warning lights flashing. It was during the 1790’s that Joseph Priestley had his house and chemical laboratory destroyed by a Birmingham mob because of his known sympathies with events in France.

world. What is the theological issue in this loss of order? Theologically, does a theology of creation mean that the loss of these boundaries is problematic? Do the various 'kinds' need to be maintained? Does it matter if they are changed? Do individual organisms have an integrity that needs to be maintained? Are there ontological barriers and distinctions which it is important to maintain? What does it mean to respect the integrity of an organism? The unspecific, intuitive concerns people feel about the natural order of things and the possibility of disturbing that order is more than the usual concern about 'playing God'. It is more of an existential concern about the order of things and it conflicts with the more precise and certain, hard, reductionist, views often presented by scientists and companies.

Leave aside the person for a moment, for an easier example. It is very similar to what takes place with trans-kingdom gene transfer. What, for instance, does it mean to respect the 'pigness' of a pig? What damage is done if it is modified in some way? Should we take a utilitarian line and argue that if the process produces good that it should be done? What about the entity involved? To what extent does it have rights? Do some things have a right not to be genetically engineered? What does it mean to be a frog? It is no use asking the frog, because the frog can't tell you, but that doesn't mean, as has sometimes been assumed, that there is no meaning to it.

For some people and community groups, trans-genic manipulation—and this would include the genetic modification of persons, moving towards a cyborg form of human nature—constitutes a threat to the integrity of the organisms involved. It 'blurs the necessary distinctions of organisms' (Moxon 2004). Some have a religious basis for maintaining the distinction between species (Jarvis 2004). For others the most problematic issue concerns respect for the uniqueness of persons, when persons are involved in trans-species gene transfer. Some manipulations are 'outside the limits of what is acceptable' (Nathaniel Centre 2004).

When the Senate produced its report into gene technology prior to the creation of the Gene Technology Act 2000 it surveyed a wide range of people. While it accepted that there was a general feeling that Australia should move ahead with gene technology it reported on this kind of concern and even named the report 'Fish don't lay tomatoes do they?'. This indicated the kind of concern people expressed. When genes come from widely different species then the idea of gene transfer seems more problematic. Of course, the person who is completely involved in looking at the process purely from the molecular level is less likely to see the ethical problems associated with crossing species borders because at the molecular level DNA is simply DNA irrespective of where it comes from. The problem is that there are different ontologies at work – different understandings of the nature of being, of reality, of the person and of nature. It seems that both the lay community and the scientific communities lack the terminology, and the concepts to deal adequately with this issue at a philosophical or theological level. Yet it is an area of some considerable importance.

Theologically, there has been minimal interest in the concept of species. Creation scientists are interested in them to the extent of asserting that they basically do not change. God has established them and that's it. It is part of the opposition to the idea of the evolution of the human person.

From an evolutionary point of view the notion of a static human nature really doesn't fit. The history of the world is full of all sorts of changes. Once, of course, there were no species, now there are five to ten million and they are of ever-increasing number, size, diversity and complexity. Biologically, it is generally argued that large scale fluctuations are vital to the dynamics of large systems and that they actually promote the development of new and more robust species. Palaeontologists suggest that an analogy with pruning is appropriate. Just as pruning gets rid of twigs but leaves the main branches able to grow more vigorously so the loss of some species leaves others with new opportunities. Just as death is essential for individual members of any living community, so too extinction is essential for the global community of life, and the development of new forms of species seems to be an intrinsic part of the created order. In a natural evolutionary context the changes take place unbelievably slowly. In the present technological situation they can change place rapidly and to a far greater extent.

We certainly need a theology of species and transformation because whether we view ourselves as a created co-creator or not, new possibilities are facing us. We are certainly approaching a radically new point in history and we possess new powers and the ability to transform humanity.

The nature of God's action in the world

Does humanity challenge the sovereignty and authority of God by engaging in actions which change the nature of the world, and especially human nature? The question can be asked with respect to all sorts of issues, probably just about anything that is new or innovative, but the question is particularly sharp when it relates to genetic engineering, cloning, xenotransplantation and many other issues as well as the creation of cyborgs. Does God work through people to bring about change to his own world? What does a theology of creation say about this?

It is possible to summarise the responses to this question in three general categories. The first sees humanity simply as creatures made by God; the second sees humanity as co-creators with God; and the third sees humanity as administrators, stewards or, in traditional terms, pro-creators with God.

a. Creatures made by God

All three positions view humanity as being created by God, and persons as creatures. This position, however, stresses the creaturely nature of the person. People are seen as recipients of God's blessing rather than as active innovators. This is the conservative approach which argues that it is inappropriate to 'play God'. It is a theology based on a particular view of the sovereignty and authority of God: God is the Lord of life and death and so is the only one to determine what is to happen. If this is said in such a

way as to exclude careful, prayerful, loving human action then it is deficient. For example, no one who understands the tremendous significance of the act of cloning a human person or of creating a cyborg can possibly avoid serious consideration of the question of whether humanity ought to take into its own hands the responsibility for such an act. The act itself is seen as either a usurpation of the sovereignty of God or a contravention of the created order. In either case cloning or creating a cyborg or whatever else, is simply humanity 'playing God' illegitimately. Protestant objections usually focus on the sovereignty of God while Catholic ones focus on the natural order of the world. But whether expressed in terms of Protestant sovereignty or Catholic natural law the effect is the same: human action should not counter divine prerogatives.

b. Co-creators with God?

Others argue that the appropriate response to this is that humanity is required to 'play God'. Humanity 'plays' a role in the management of this world—a role which is explicitly given by God (Gen.1:28). The question is not really whether we ought to change the world by 'playing God', for in fact we are constantly doing that every day in thousands of ways. The real question is *how* we will change the world. It may well be that creating a cyborg is inappropriate but it cannot be ruled out just by saying we should not 'play God'. This view sees humanity as active participants in God's world.

This approach is firmly associated with the Lutheran scholar Philip Hefner who has argued at length that human beings are God's created co-creators whose purpose is to be the agency, acting in freedom, to birth the future (Hefner 1993). Exercising this agency is God's will for humans. God has brought into being a creature who represents a new stage of freedom and who acts as co-creator to participate in the intentional fulfilment of God's purposes. At this point in history, human decision is the critical factor in the continuing functioning of the planet's systems (Hefner 1993 pp. 27-49).⁸ 'Cyborg' and 'created co-creator' are, according to Hefner, sibling images. 'Cyborg' is an image of the boundary crossing that is so threatening to many. Hefner's view is contrary to that view of the world formed by modern dualisms and distinctions and very different to the traditional 'tending' or 'conservative' views of the role of the person.

Cyborgs are concrete realisations of the theology of the created co-creator. Both 'cyborg' and 'created co-creator' are about freedom and self-creating

⁸ 'Human beings' Hefner argues, 'are God's created co-creators whose purpose is to be the agency, acting in freedom, to birth the future that is most wholesome for the nature that has birthed us – the nature that is not only our own genetic heritage, but also the entire human community and the evolutionary and ecological reality in which and to which we belong. Exercising this agency is said to be God's will for us humans' (Hefner 1993 p. 27). He goes on to claim that 'the human being is created by God to be a co-creator in the creation that God has brought into being and for which God has purposes. The conditioning matrix that has produced the human being – the evolutionary process – is God's process of bringing into being a creature who represents the creation's zone of a new stage of freedom and who therefore is crucial for the emergence of a free creation. The freedom that marks the created co-creator and its culture is an instrument of God for enabling the creation to participate in the intentional fulfilment of God's purposes' (Hefner 1993 p. 32).

humanity, participating in the evolutionary development of the person. Hefner responds to criticisms that his view is blasphemous in that it supplants God by arguing that it is precisely because the particle, 'co,' in the term 'co-creator' borders on the obscene that it must be retained. Because it also borders on the proclamation of radical grace. The image speaks powerfully of God's creation through people. But, despite Hefner's protestations, if the first view says too little about human responsibility this version says too much. There is a better approach.

c. Administrators/stewards and pro-creators for God?

If we are not co-creators with God we are at least (using a more traditional term – although usually used in a slightly different way) 'pro-creators' before God. To procreate means to bear children. Humans are procreators who, under God, possess the power to create life. The 'pro' part of it means to stand before or represent God – much as a proconsul is one who possesses the power of the consul and does so in his place but only at his command. Humans are also 'administrators' (Gen. 1:28) called to care for the world and to be responsible for it. This is not a concept which provides definitive answers – it is perhaps less definitive than either the conservative 'no' or the co-creator 'yes'. It is more of a 'sometimes' – but it establishes an important attitude which recognises both divine and human responsibility.

This view does not give a definitive answer to any particular position. The first view has a conservative approach which recognises that the sovereignty of God and the order of creation stands above any human and tends to rule out much change to the human form at all. The second view has a more creative approach which recognises the way humanity is called to share with God in the care of the world. It stresses human creativity and freedom and is very open to new forms of human life. This third approach shares with Hefner's 'created co-creator' the possibility of humanity sharing in new forms of creation but takes a more conservative approach, stressing human freedom less and the nature of order more. It accepts human responsibility and human freedom within boundaries. But where do these boundaries lie? When does the alteration of the human person damage the integrity of the person? What is the 'integrity of an organism' – whether a human or a rose or a flea? How do we know when that integrity is diminished? What are the boundaries within which human freedom and human inventiveness and human creativity must work?

In seeking to answer these questions we must not only do as the first answer does, and look back at the created nature of the world and the established order of things. But we must see that God has given humanity creativity in order to lead humanity on to something else. A theology of creation must be related to a theology of redemption or of eschatology. The primary focus of much thinking on this topic relates to the theology of creation and providence, but the question of cyborgs is one that requires a theology of the future. When considering the theology of the person, is where we came from most important or where we are going to?

The meaning of being human

Christian belief indicates a number of things about humanity, one of which is that we are not just animals and we are not just robots. We are human people able to relate to God in a way unique to humanity. We can enter into a personal relationship with God in a way that rocks, plants and animals cannot. We are people, and that means being responsible people who are able to interact intelligently with God and with other people and make decisions and affect (if not control) our own lives. In biblical terms the uniqueness of humanity is defined in terms of being 'made in the image of God' (Gen. 1:26–27). Although the concept of *imago dei* is widely considered to be definitive of human nature, the problem is knowing precisely what it means.

Although there have been many, many interpretations, one can say that, broadly speaking they fall into two categories. The matter is simplified by noting that these two categories correspond roughly to the two different kinds of 'images' that one can picture. The first kind of image is the one that is inscribed upon an object, such as the image of a sovereign on a coin. The other is the more intangible kind of image one sees in a mirror.

In the former case it is possible to see the *imago dei* in slightly different but related ways:

The image as substantial: this view holds that the *imago dei* is imprinted on the person just as an image is impressed on a coin. The image is thus some characteristic which reflects the way that God has made humanity and which is intrinsic to who we are. The only issue to be resolved is precisely what that is, whether it is our personality, creativity, rationality, spirituality or something else.⁹

The image as functional: this view holds that the *imago dei* is found in the exercise of 'dominion' and 'stewardship' of the rest of creation (Gen. 1:28 – rule over, have dominion). It may be considered to be almost a subset of the previous view as this particular responsibility is probably more of a consequence of being made in the image of God than being the image itself.

⁹ The image has often been understood to be found in the non-physical aspects of humanity, in human reason, personality, relational ability, spirituality or 'souliness'. This was felt to be necessary because if the image of God was to be found in the body then it seemed to imply that God must have a body too! However, it is not easy to separate physical and non-physical aspects of the person either scientifically or biblically. The connection between the physical and the spiritual is seen in many ways – our genes and hormones and mental states are intimately connected with our personalities, characters, behaviours and even our religiosity and spirituality. Common experience (such as kneeling in prayer) also tells us that the state of our bodies affects our spiritual life. Moreover, Scripture seems to be very reluctant to speak about us being made up of two, distinguishable, separable, independently existing parts. The apostle Paul is quite clear that even in eternal life we are embodied people (1 Cor. 15:44). Thus we cannot be sure that it is right to exclude the physical from the concept of being in the image of God. The general conclusion derived from this is a conservative one, that the body, as a part of the person who is made in the image of God must not be subordinated to purely pragmatic interests and, for example, wholesale changes to the human form by genetic engineering, should be considered as inappropriate as it affects one made in the image of God.

If this approach is taken, with the image as substantial (and/or functional) it is generally related to a strong theology of creation. This is the way that God has made humanity and, by implication, it ought not to be changed by humanity. It is therefore generally taken as a limitation on any sort of attempt to modify human nature. Cloning, human transgenics, cybernetics and so forth are therefore generally considered to be inappropriate. Historically, this kind of approach has been most influential and those who look with concern at what may happen to the human person will probably turn to this image for theological support.

Interestingly, however, in more recent years a different strand of interpretation has become much more prominent. It views the image as being something more dynamic and intangible, just as the image in a mirror can change and be sharper, or less clear, depending upon the conditions and where the object is.

The image as dynamic and relational: this view holds that the *imago dei* is defined by relationships. The reference to being made as male and female (Gen. 1:26), that is, as essentially relational beings—is seen as being of primary importance. This is taken to be typical Hebrew poetic parallelism – two statements: that humanity is created in the image of God, and a third which says humanity was created male and female, making the image of God equivalent to being made male and female.

The image as teleological: closely related to the relational understanding is the notion of the image as a future possibility. The image is what is to be formed in us, it is the goal. As Paul says (Rom. 8:29) we are to be conformed to the image of Christ Jesus.

The more relational and dynamic view of the image is not grounded so much in a theology of creation as it is in a theology of redemption. It suggests that the reason that there is a difficulty in determining which human characteristic is the defining aspect of the image of God in us is precisely because it is not something to be defined in terms of any one aspect of us. The image is not a past tense but a future element and it is formed in us in our being human in being all that we are. There is not one specific characteristic which makes us human, rather, God is found in us in the whole of life. It is a destiny, a direction, a destination rather than a statement about our origin.

Of course, it is quite possible to see that the two elements, the substantial and creational on the one hand and the dynamic and eschatological on the other are not necessarily to be opposed or seen as alternates. They can be synthesised. Yet, it is also possible that an emphasis on the latter may well encourage some to see a justification for enhancing, developing, changing human nature in a way that the more conservative, creational theology would typically not allow. Is there a future for human nature which is different in significant ways than the human nature we now share?

Consider for a moment the changes human life goes through from the point of conception to death. The one cell, eight cell embryo is radically different

in form to an adult human person, yet, I would argue, both reflect the image of God.

And if one considers evolutionary theory as well one becomes aware that God has changed species – humanity emerged out of non-human, perhaps quasi-human form. All in all it seems to me that God is not fixed on what it means to be human. What we see now, and what seems so fixed to us, may just be a fleeting moment in God's plan for the world and for humanity.

However, another equally biblical perspective, is often overlooked in this. We are not only made in the image of God. We are also made of the dust of the earth (Gen. 2:7). The implications of the former are far more often explored than the latter. What does this tell us? It tells us that it is a mistake to see humanity as fundamentally separate from 'the natural world'. We are part of the world. What are the implications of this, for example, for the transfer of genetic material not only from one person to another, but from one species to another?

While the first principle concerning the image of God stressed the uniqueness of humanity, now the focus is upon the continuity of humanity with the natural world. The atomic constituents of our body once existed as some other part of the world and at some stage in the future will do so again. Every seven years we undergo a complete change of body cells. Our commonality is also seen in the fact that about 98% of our genetically determinative DNA is the same as that of apes. Obviously the 2% difference is very important, but we do stand in a line of continuity with all creation. Does it mean perhaps that while there must be restraint, there is no absolute theological prohibition upon such a practice?

Human life must be protected and preserved as human life. But what does it mean to be human? Is it a pliable concept? In what ways is it appropriate to manipulate, change or enhance human life? What are the limits of being human? Obviously, significant physical changes are possible, but what about other aspects of personality change? It has been suggested that it would be a good thing to modify personality characteristics, such as reducing human aggressiveness. But this may not be possible. To attempt to eliminate attitudes such as 'hate' or 'anger' which cause fighting, strife and war, from the human character is to overlook the fact that such attitudes are 'context specific'. That is hate and anger can be good and proper attitudes in certain circumstances. It is right to hate sin and to be angry at injustice. We are angry in such circumstances precisely because we love (God or justice or our neighbour who is suffering injustice). In other words to eliminate anger is to eliminate love. To eliminate anger is not to modify the human character it is to destroy it! Any genetic process which eliminates anger has effectively 'killed' the person—even if there is still a body. It is possible that technology will find new ways of killing people—there is nothing new in that! But I don't believe that some of the extreme forms of modification that some people look for, or fear, will eventuate.

But if we begin the cyborg process I do not think that the most likely reason will be either to create a servant or a soldier. It will be to change ourselves. What is the greatest change, the most attractive change that a cyborg nature might be able to produce? At this point I think that the creation of a cyborg nature will be seen as a continuation of the on-going search which medicine has sought for centuries – the search for immortality.

In the very earliest years of modern medicine Antoine de Concordat, in a mood of medical optimism, established the ultimate goal of medicine in his *Outline of an historical presentation of the progress of the human mind* (1794). He described the ultimate goal of modern medicine as being the abolition, or at least the considerable postponement, of death. This was an expression of the agenda which medical science has pursued vigorously ever since. In the context of a reductionist scientific world-view, everything can be explained by physical and chemical processes and when it comes to the threat of death, medical science provides an alternate form of salvation. As a consequence, de Concordat's vision has not been fully realized because, despite the incredible success of modern medicine, people keep dying of other diseases and disorders. A lot of medical and genetic research is aimed at stopping disease and disorders which kill us. This is important in that it has increased both the average life span and the typical quality of life at all ages, but it has not been very effective in increasing the typical maximum life span which those who survive premature death can expect to achieve. That is pretty much the same now as it always has been. Average life span has increased dramatically as babies stop dying and people live to old age. But there comes a point of diminishing returns. A cure of one problem in old age simply means that one dies of something else! But there is current research which is not focused on solving specific disorders and diseases but which is working at a more fundamental level—at the very structure of aging. And, interestingly, there is a close connection between the search for an ultimate cure for cancer, on the one hand, and the prospect of the discovery of the fountain of youth on the other. One fundamental problem of aging is that there is a point at which cells stop replicating themselves, while the fundamental problem with cancer cells is that they *don't* stop replicating themselves at all and create too many. If one can get to the point of encouraging cells to continue replicating (thus radically increasing longevity) then presumably it will be possible to persuade cancer cells to stop replicating themselves. The prospect of an indefinite lifespan is not ridiculous, indeed there are already predictions that it will be possible in ten or twenty years. That is perhaps optimistic, but it is on the way and nanotechnology and those micro-machines are going to do it!¹⁰

¹⁰ Greatly extended lifespan is not necessarily inappropriate. For God a thousand years is as a day (Ps. 90:4) and a life lived for two thousand years is one which can be lived in honour of God as much as one lived for three score and ten years or a life lived only for twenty minutes. A life lived for seventy years is a life lived 25,000 times longer than a life lived only for a day. Yet both can have their own completeness in God. If people were to be able to live a mere fifty times longer than at present and survive for 5000 years would that detract from the immortality of grace which is an eternity with Christ? I think not. Given the huge amount of time involved in God's work of creation prior to the presence of any human being it is hard to imagine him being concerned about a few thousand years! Extended life

Conclusion

It is not possible to simply read off from biblical material an easy answer to the ethical and spiritual minefield that is brought to us by cyborgs. The very idea is one that challenges our understanding of the world and its order, the nature of divine action and the meaning of being human. It will be some time before any kind of consensus can be reached on this. It may never be possible, but any resolution will need to explore a whole range of 'boundary' issues and will need to be grounded on a strong theology of creation looking back at the origin of humanity and an equally strong eschatology, looking into the future.

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span is a challenge to significant aspects of human life and social relationships but these will have to be dealt with elsewhere.