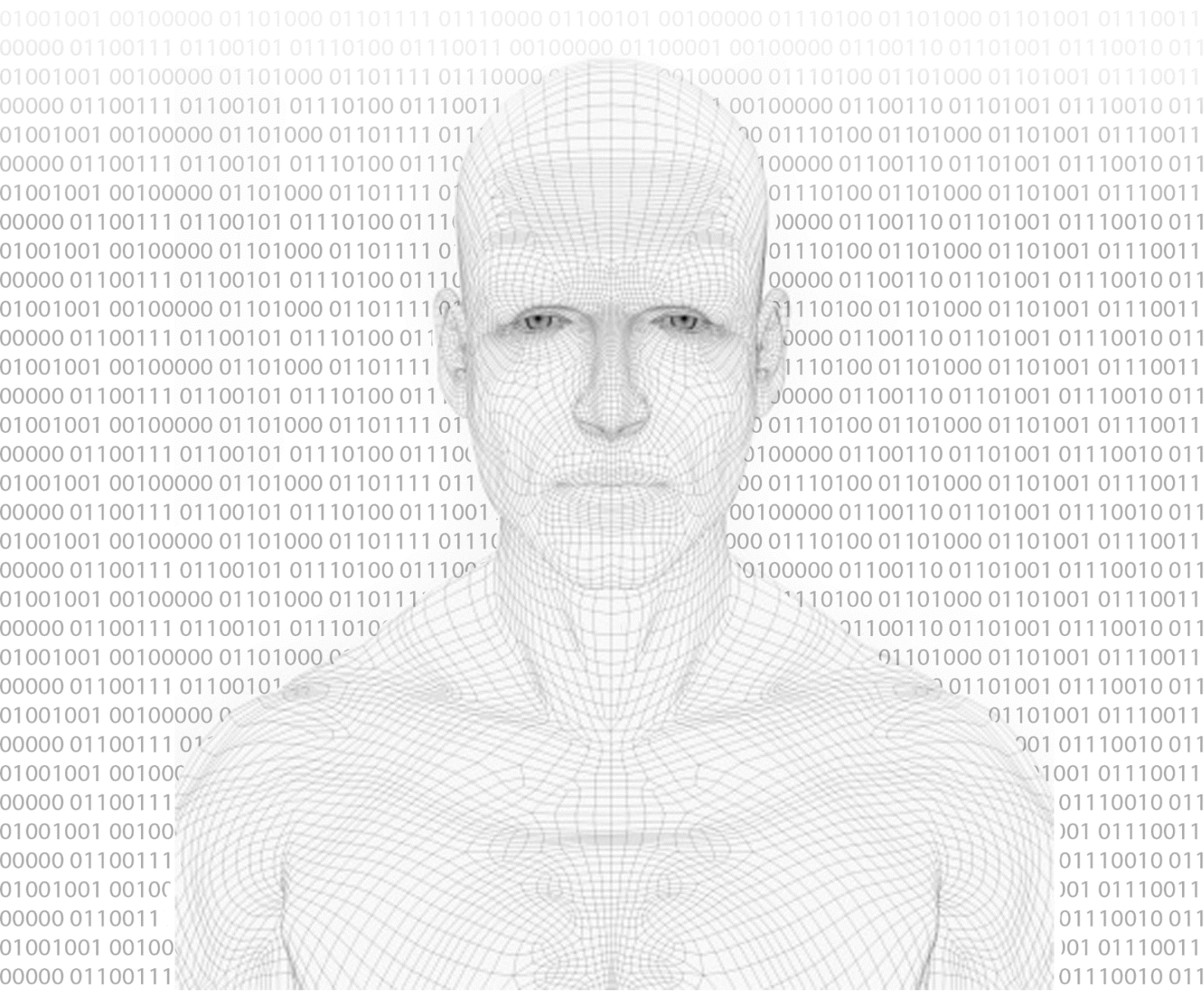


Born Cyborg: Transcending the Human Condition

Anthony Davenport



University of Plymouth

School of Art & Media

Digital Art and Technology

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Abstract:

Traditionally, the idea of a cyborg has been the augmentation of the physical self. Continuing with this trend, we are seeing advancements to technologies such as prosthetics and gene therapy which allow us to improve the limitations of our bodies.

With the dominance of the internet over our society, and with developments into areas such as mind storing and virtual reality, we are seeing a new kind of virtual augmentation.

I aim to explore both of these types of augmentations, showing examples of past and present developments as well as where the technology may be heading. I will extrapolate on what may be in store for us as the physical and virtual augmentations merge and propel us into a deeper 'cyborgian' relationship with our technology, exploring how this relates to the concept of becoming posthuman and transcending our organic bodies.

Chapter 1: Introduction

We are all Cyborgs

We are all cyborgs.

We are surrounded by technology that is enabling us to be more productive, to communicate around the world, to improve our bodies and to live longer. We have augmented ourselves far beyond the limitations of our biology. We use our technology daily and without second thought. Yet when we take a moment to think about how much technology is changing our bodies, our environment and our interaction with it, we can see just how 'cyborgian' we have become.

The idea of a 'cyborgian' society is one in which we, as a species, have augmented ourselves with technology in a way that we have now become cyborgs. Cyborg is an acronym for Cybernetic Organism and was first coined by Manfred Clynes and Nathan Kline in their 1960 publication, 'Cyborgs and Space'. They proposed that rather than trying to create an earth-like environment for astronauts in space, it would be more logical to augment the human body to meet the requirements of space.

"For the exogenously extended organizational complex... we propose the term 'cyborg. The cyborg deliberately incorporates exogenous components extending the self-regulating control function of the organism in order to adapt it to new environments".

(Clynes and Kline, 1960)

As we move further into the 21st century, technology has penetrated into nearly every aspect of our lives. As a result, the way we live and interact, even at the most primal of levels, has adapted to this. Society being connected to this constant digital landscape has,

and will continue to alter aspects of our 'self' from how we communicate with one another to how we see and perceive our identity.

"The infiltration of technology into daily life is transforming our patterns of play, work, love, birth, sickness, and death such that the cyborg is not an imaginative but a metaphor that is lived by. The cyborg is a term of and for our times which aptly maps contemporary bodily and social reality as a hybrid of biology and machine".

(Brasher, 1996)

Humans have been utilising technology since early man first learnt to harness fire and use early tools. In the Oxford Dictionary the definition of technology is, "the application of scientific knowledge for practical purposes" (Oxford University Press. 'Technology', 2013), which leaves a very broad definition of what we could consider the process of man enhancing his abilities through technology. By this definition we could say that the first stone tools used by early mankind were that era's contemporary knowledge used for practical purposes.

In his 2005 paper, 'A History of Transhumanist Thought', Swedish philosopher Dr Nick Bostrom said that, *"the human desire to acquire new capacities is as ancient as our species itself"* (Bostrom, 2005). I believe this can be seen through how we have continuously sought to change our environment and adopt new tools throughout history. There is evidence of stone tools being used as far back as 2.5 million years ago (Institute of Human Origins, 2010).

Bostrom believes that the human species has,

"Always sought to expand the boundaries of our existence, be it socially, geographically, or mentally...there is a tendency in at least some individuals always to search for a way around every obstacle and limitation to human life and happiness".

(Bostrom, 2005)

This merging of humans and our technology has been so successful and widespread because it enables us to improve ourselves and our surroundings. To attain greater knowledge and accomplish more. These are all natural instincts we have as a species and are evident in the historical progress of cognitive technologies from the dawn of language through to the digital age. Technology has had a powerful role in the shaping of civilization.

The sheer enormity of our relationship with technology and all of its developments are near impossible to summarise. It has played a significant role in every aspect of our evolution and progress throughout history. The mediation between contemporary technology and our physical world has become such that the two are becoming ever difficult to differentiate between. Advancement of the technological components within our culture have allowed these devices and mechanics to become an essential method of how our society functions. We are, as Debra Shaw says, “...in effect, constantly ‘plugged in’ to the technology through which this information is disseminated” (Shaw, 2003).

By the standards of past centuries we have become superhuman. We have the ability to see events happening across the entire world. We have constant access to a vast collection of knowledge and information. We now have the ability to communicate in real time with a worldwide network of people. All these and more are extending the abilities of the body through technological augmentation. Should we turn off our ‘cyborgian’ enhancements, turn off the computer, disconnect, all of these abilities are lost.

There are many definitions of the term cyborg. In the Oxford dictionary it is, ‘a fictional or hypothetical person whose physical abilities are extended beyond normal human limitations by mechanical elements built into the body’ (Oxford University Press. ‘Cyborg’, 2013).

I feel that this does not adequately explain the term and is vastly outdated. In the past we augmented ourselves physically with pacemakers, wheelchairs and prosthetics. What we are now seeing alongside physical alterations is a virtual augmentation. It is true that physical augmentations enhance the abilities of the body, but what of these newer virtual technologies? The internet, for example, provides us with a database of knowledge, greater methods of communication and is changing how we interact socially. This virtual technology has changed our way of life far greater than any previous physical augmentation and because of it we are ever more plugged in to cyberspace.

Physical augmentations are reaching new levels of technological breakthrough. We are seeing brainwave controlled prosthetics, advancements in gene therapy and limb transplants. Alongside this we are also starting to see a revolution of virtual technologies such as augmented reality, enhancements to cognitive processing, mind uploading and even changes to identity and our own idea of 'self' in the age of cyberspace. These two augmentations are propelling us deeper into our symbiotic relationship with technology and as a result we may be moving towards being what many consider to be 'posthuman'.

Chapter 2:

Physical Augmentation

Physical augmentation is the changing of a biological subject's body for either a medical or non-medical reason. This is not some far off futurist technology, but something that has been upon us for thousands of years. The earliest known writing about prosthetic limbs are found within the Hindu texts, 'The Vedas', written between 3500 and 1800 BC. Inside it, the warrior Queen Vishpla had her leg amputated in battle and an iron leg was fitted to enable her to walk again (Weir, 2008).

I would argue that even the glasses we wear for our eyesight cause us to become, in part, a cyborg, with glasses being augmentations that alter and improve the limitations of our bodies. Yet this technology has become so widely accepted that many would not give it a second thought, despite one of their most basic senses being augmented well beyond its original condition.

Two other types of physical augmentation that have become widely adopted and accepted by society are pacemakers and hearing aids.

The pacemaker, a common medical instrument for over 50 years, is a small medical device that is placed inside the chest. It uses electrical impulses to regulate the beating of the heart. Having one fitted has become one of the most common types of heart surgery, with over 40,000 people in England being fitted with one in 2010 alone (NHS, 2012). Most pacemakers can be programmed externally to adjust the rate of the electrical pulses in response to the wearer's needs. A doctor can reprogram the pacemaker at will to change the pace of the patient's heartbeat.

This physical augmentation is also seen in hearing aids. An electro-acoustic device, modern hearing aids are digital instruments that amplify soft sounds and are typically placed behind the ear or inserted into the canal to aid the hearing of someone with hearing loss.

With these two types of devices, organs are being augmented by technology, allowing us to reprogram our own bodily functions wirelessly and on demand. We are physically attaching devices to ourselves in order to improve deficits caused by the body's own design.

What I find interesting about pacemakers is that, although they are now accepted as a hugely beneficial medical breakthrough, they were originally seen as controversial, with opponents suggesting it akin to reviving the dead (Chaikhouni, 2010). Today this argument would seem strange now that the technology's benefits have been seen in how it has improved the lives of millions. I wonder if contemporary arguments about modern technology, such as stem cell research, will also be seen this way a few decades from now. A quick glance at how technology throughout history is often controversial before ultimately being understood and adopted would suggest that this may well be the case.

There have also been huge developments within the medical industry regarding prosthetics.

Matthew Nagle was the first to use a brain-computer interface to restore bodily functions after being paralyzed from the neck down. After agreeing to participate in a clinical trial with Cyberkinetics' BrainGate Neural Interface Systems, Nagle had a chip implanted into his brain. A computer registered thought patterns and assigned them with movements Nagle wished to make. This enabled him to control artificial limbs and thoughts, move a

cursor on a screen, control television, draw, open and close a prosthetic hand and other simple tasks (BBC, 2005).

"I can't put it into words. It's just—I use my brain. I just thought it. I said, "Cursor go up to the top right." And it did, and now I can control it all over the screen".

(Nagle, 2005)

Further to this, researchers at the University of California have created a device which allows a person to walk using brain signal controlled mechanical legs. It is controlled by electroencephalogram (EEG) signals generated by small voltages within the brain. These are then measured through the use of a cap worn atop the users head. The user imagines themselves walking or standing and the device assigns an action based on brain activity associated with each thought. This then causes the mechanical legs to start or stop walking (Lewis, 2012).

Being able to move robotic limbs with the mind could possibly eradicate the idea that someone can be disabled. If they had full use of their robotic limbs in the same way that we have with our organic limbs, they would not be faced with any physical challenges as would someone such as a wheelchair user or someone with a non-moveable prosthetic. They could be enhanced with far greater physical capabilities than what our own bodies could provide. Between two people, one with robotic legs capable of running 60mph, jumping great distances and lifting heavy weights, and the other with organic legs, who is the more disabled?

A new technology advancing the replacement of body parts comes in the form of 3D printing. This is the process of taking a digital model, and from it, making a three-dimensional solid object by printing material layer on top of layer. With this technology, researchers are beginning to be able to replace damaged bone. In March 2013, a man in the

United States was the first to have a 3D-printed skull-replacement fitted. The 3D printed bone, created by Oxford Performance Materials, replaced 75 percent of the bone in his skull (Brunner, 2013).

New research has also created the first 3D-printed human embryonic stem cells. Researchers at Heriot-Watt University used the cells as the material for a 3D-printer and then printed them in a pattern that allowed them to remain viable and capable of turning into several different cell types. They hope to one day build 3D printed organs and tissues. (Boyle, 2013).

Jason King, a research developer at Roslin Cellab believes that this would provide organs for transplants without the need for donations (King, 2013).

With this technology we are augmenting the human condition. With the ability to replace our failing body parts and alter our bodies on a cellular level, we are transcending that basic nature of being human, mortality. With the ability to manufacture our bodies and overcome our limitations through technology, it is the very essence of transhumanism.

We can imagine where this technology may take us, giving us the ability to print and replace bones and limbs to change, fix and upgrade our bodies. Stelarc, an artist whose work focuses on the extensions of the body, says that,

"The body is neither a very efficient nor a very durable structure. It malfunctions often and fatigues quickly; its performance is determined by its age. It is susceptible to disease and is doomed to an early and certain death".

(Stelarc, 1991)

In the medical sense this technology would save countless lives around the world, as well as improving the lives of people with disabilities. It does present, however, a huge number of moral questions which will need addressing throughout this century when this technology becomes widespread. What would it mean for aging, when you can simply replace your ailing organic parts with new ones? How would this affect society in our commercial culture as new body parts are marketed and sold? How would we judge sporting accomplishments if the parts propelling the athletes to victory are not their own? This last question has already caused debate in regards to the 2012 Summer Olympics.

Oscar Pistorius is a South African runner often nicknamed 'Blade Runner' due to his use of Flex-Foot Cheetah prosthetic running blades. He qualified and subsequently participated in the 2012 Summer Olympics, which caused controversy over whether it would be fair to the other runners. 400m runner Roger Black stated that it is unclear whether Pistorius is, *"an amazing athlete or a very good athlete with an advantage"* (Black, 2012). Pistorius participation in the 2012 Summer Paralympics also caused controversy after he complained about the length of a rival runners blades. He believed they gave his opponent an unfair advantage over him and that the International Paralympic Committee should tighten the rules of acceptable blade length (Lewis, 2011).

This argument of an unfair advantage over others will only increase with further developments in prosthetic technology. It will not be limited to the sporting arena but present in many other aspects of life.

In this modern society, our technology is starting to merge with our biology in ways only imagined before. Organics and technology are starting to live and operate together in a form of symbiosis, thus we are ever more that cybernetic organism, a cyborg. We are engaging with a ubiquitous technology through which we transcend the previous limitations assigned to our physical bodies.

Chapter 3

Virtual Augmentation

In The Terminator movies, The Terminator's vision of the world is overlaid with data. The cyborgs vision and understanding of the environment is enhanced by captions and calculations. Such an idea of a HUD is common place in works of science fiction and is typically used to describe how a cyborg in the future might view the world. This technology, however, is already upon us.

Augmented reality (AR) is a type of virtual reality. It takes a view of a physical, real-world environment and augments its elements with computer-generated data. In his book "Augmented Reality Browsers for Smartphones", Lester Madden attempts to define augmented reality and states that it is a technology with five distinct features. It must combine the real world with computer graphics, track objects in real-time, provide real-time data and feature recognition of images and feature interaction with objects in real-time (Madden, 2011).

One of the first experiments into the subject of an augmented real world environment came in in 1966, when Professor Ivan Sutherland of Harvard University created 'The Sword of Damocles'. Considered to be the world's first Binocular Omni Orientation Monitor or BOOM, it is what is now commonly referred to as a head mounted display system or HUD. It was technically very limited and its graphical output was a simple wireframe room. The user was able to see the room beyond as the hardware was transparent, and so the device is commonly considered to be the first augmented reality display (McCracken, 2013).

Sutherland envisioned the future of AR in 1965 essay 'The Ultimate Display'.

"There is no reason why the objects displayed by a computer have to follow the ordinary rules of physical reality with which we are familiar. The kinaesthetic display might be used to simulate the motions of a negative mass. The user of one of today's visual displays can easily make solid objects transparent – he can "see through matter!"

(Sutherland, 1965)

More recent developments in AR have been seen in smartphones. In 2009, the Amsterdam based company Layar released the Layar browser, an augmented reality browser for iOS and Android mobile devices. The application is open to developers to create their own 'layer' which the user can access through the browser. One such use of Layar is the tweet finder in which tweets from the social networking website Twitter can be seen overlaid across the cameras view in relation to their location and distance from the user.

Presently, the technology is being used for a wide range of subjects such as gaming, art installations, product advertisements, military training and social networking.

Juniper Research predicts that by the year 2017 there will be over 2.5 billion AR applications downloaded to smart phones per annum (Miller, 2012), which shows how popular this technology has become and how eager we are to adopt this new way of augmenting our interaction with our environment .

One of the most talked about future developments in AR, which is soon to be released to the consumer market, is Google Glass. Google Glass is a monocular head-mounted display computer developed by Google. They are designed to be an imitation of standard wearable glasses. The user is able to see notifications from email and social media, record video and take photos, get results from the web and even set up video calls. All this is controlled by a set of voice commands and occurs right in the field of vision to the wearer without the need to use hands.

The idea of Google Glass is one of ubiquitous computing, a post-desktop model of human-computer interaction in which the internet and computers are integrated into everyday objects and accessible at all times.

Google Glass is designed to provide a way for people to interact with their technology without it distracting them as they are often now. It is intended to create a more human experience which I believe is an interesting paradox. To have a 'human experience' in our current digital age we must now augment ourselves physically with technology.

Such as the cyborgs from science fiction, we are becoming able to augment the images of our real world environment in real time. It would seem as if we may be moving towards a world similar to the one explored in the novel *Rainbows End* by Vernor Vinge. In it, augmented reality has become commonplace, with humans using virtual overlays nearly all of the time. This is done by wearing contact lenses and clothing that can overlay and replace what the eye would normally see with computer graphics (Vinge, 2007).

The internet is one of the most important technological developments to our way of life. With this technology we are seeing a large number of augmentations to ourselves, and to society that are virtual, existing in cyberspace externally from ourselves. Its impact can be seen in the way it has changed, and continues to change so many aspects of society, such as business, culture and media. It also appears to be changing the nature of how we think.

A study has shown that when faced with a difficult question, people are primed to think about using a computer. It also shows that when people anticipate ready future access to information, their recall of the information is lower, but their recall of where to access it is higher (Sparrow, Liu and Wedgner, 2011).

The internet and our use of it has had the effect on our way of thinking in that it has caused the capacity of our memory to be focused more on the location of information rather than the actual content of the information. This is similar to the psychological hypothesis, 'Transactive Memory' by Wegner, Giuliano and Hertel, in which people working in groups would neglect the memory retention of information being passed around. They would instead focus more on memorising which member of the group had that information (Wegner, Giuliano and Hertel, 1985).

Modern neuroscience shows that habitual practices can actually change our neuronal structures. For example, research has shown that the brains of illiterate people are structurally different from those of people who can read (Naughton, 2010). It is interesting to think that our practice of using technology may actually be changing the wiring of our brains.

This is often mentioned in a negative context and it would seem concerning that each individuals own wealth of information retention is being reduced, but it does also provide many positive effects. It enables people to utilise a much larger skill set and database of knowledge without the considerable investment it takes to learn and retain the information, of which may not even be relevant in the future. A survey of 895 technology stakeholders and critics found that 76 percent agreed that the internet has enhanced human intelligence (Anderson and Rainie, 2010).

The internet is a vast expanse of knowledge accessible across the world, and as devices such as smartphones and mobile broadband spread, we are increasingly plugged into this at all times. Instead of retaining information locally, we are progressively storing and retrieving our knowledge in this omnipresent cloud. Because of this, I believe that, in the philosophical sense at least, the internet can be seen as becoming a form of external brain. One that we use to store and retrieve knowledge that is external from ourselves.

The concept of the 'hive mind', a collective consciousness governing the thoughts and actions of the masses, goes back at least to Olaf Stapledon's novel, 'Last and First Men' (1930). It is a common theme in science fiction and is seen in films such as Star Trek, with its Borg, or the Matrix. With all of humanities complexities and differences, the idea that we ourselves could operate under one collective consciousness is highly implausible. Indeed, not being controlled by one single individual or government, the range of opinions and ideologies present on the internet are as complex as they are in the physical world. It is interesting however, how we are quick to adopt the internet as our primary source of data, information and opinions on world events and issues.

The internet has brought with it big changes to how we interact socially and how we present ourselves in this new social space. According to Amber Case, a self-professed cyborg anthropologist, our presence on the web causes us to have a second 'self', one that is thrust across cyberspace for all to see. It is kept online and interacted with by people, even when we are not there. Our profiles on Facebook, Twitter, Google +, LinkedIn and a plethora of other social networking websites and trackers are readily available to be accessed and viewed (Case, 2010). We have to now maintain this second self and learn how to present ourselves in our digital lives in a way now similar to that of our analogue life.

Case believes that people are now starting to go through adolescence twice. They have to go through their primary one, concerning their physical bodies, and then go through their second self's adolescence, where they learn how to interact and present themselves online. She claims that we now have an "ambient intimacy" to our technology, using it socially to feel closer to people we are unable to participate with as closely as we would like in real life (Case, 2012).

This maturing of social identity presents new difficulties for the person, particularly because there is an actual history of what they've gone through online. Without proper maintenance of the online self, that embarrassing comment uttered without an afterthought, does not disappear from memory over time as it would have once did, but in fact still circulates digital space.

Technology is extending further than the physical augmentations, becoming an extension of the virtual self. Because of these virtual extensions, we are now able to have a presence separate from our bodies that exists within cyberspace. We can now communicate seamlessly across the entire world in an instant. Case believes this instant communication has, in essence, enabled us to bend time.

(on smartphones) "I realized that everyone was carrying around wormholes in their pockets. They weren't physically transporting themselves; they were mentally transporting themselves. They would click on a button, and they would be connected as A to B immediately".

(Case, 2010)

Our virtual 'self' is also used to build profiles based on our personal preferences. In the Steven Spielberg film *Minority Report* (2001), the protagonist walks into a shopping centre and is greeted by digital advertising. This advertising pitches to him by name and based on products he most frequently buys. It does this by scanning his eyes to access his shopping profile. The advertisements are displayed via holograms projected upwards from the floor so they inhabit space in the environment.

This technology may not be that far off in the future it seems. Instead of scanning our eyes, context-awareness program Gimbal created by Qualcomm, the largest maker of mobile phone processors, instead scans your mobile phone. It is a new form of location based advertisement that the company calls interest sensing. It analyses where you go, how often

you make phone calls and to whom, which apps you use the most often and other statistics in order to build a profile in the user. This happens inside the Qualcomm chip powering the mobile phone and thus is non-optional (Downey, 2013).

Further to this, Japanese tech company NEC has created an advertising system called the 'Next Generation Digital Signage Solution' that can determine the gender and age of a person within a 10 year margin in order to offer personalised advertisements for that demographic of people (Mcglaun, 2010).

This seems like quite a startling development in terms of our privacy. Governments, employers and corporations would know where you are, what you spend your money on and even how much money you have. Certainly there are a number of issues that need to be addressed regarding how secure this data is and how it is used. I would argue, however, that this technology actually does not differ that much from what already takes place in information data mining. Our personal information has already long been harvested from search engines, social media and our spending habits. The success of supermarket club cards shows how customers are often more than willing to relinquish information about their spending in return for offers and deals. Using modern technology for this is just another development in a long history of this practice.

Our ever growing reliance on technology has created some new behaviour patterns in society, one being Continuous Partial Attention. Technology writer Linda Stone coined the term Continuous Partial Attention (CPA) in 1998. CPA differs from multitasking in that multitasking is motivated by a desire to be more productive and efficient, whereas CPA is motivated by a desire to be always connected across a network. CPA is post-multitasking adaptive behaviour, an on-going automatic process where our full attention is not required but we are still in a state of continuous partial attention across a large network. We scan incoming data to pull out any relevant information before we move on to the next

data source, only touching the surface of the data without giving it our full attention (Stone, 2012).

An example of this is how we receive some of our data from the internet. In our internet browser we may have numerous tabs open simultaneously, with each one connecting us to different data sources such as social media, work activities, news updates and email. Our attention is often in a state of CPA across all of these mediums on a superficial level. This can lead to a greater difficulty to concentrate on important tasks and cause us to be over stimulated.

"In a 24/7, always-on world, continuous partial attention used as our dominant attention mode contributes to a feeling of overwhelm, over-stimulation and to a sense of being unfulfilled. We are so accessible, we're inaccessible. The latest, greatest powerful technologies have contributed to our feeling increasingly powerless".

(Stone, 2012)

In his book, Future Shock (1970), Alvin Toffler explored the rapid development of technology and social change and believed that it caused disruptions in society as people struggle to adjust to the pace of the change. He believed the change left people, 'future shocked', suffering from feelings of disconnection, stress and confusion. In the book, Toffler popularized the term "information overload", and the term has now become popular for how people can receive too much information in an information age.

"When the individual is plunged into a fast and irregularly changing situation or a novelty-loaded context ... his predictive accuracy plummets. He can no longer make the reasonably correct assessments on which rational behaviour is dependent".

(Toffler, 1970)

One area in which research into 'information overload' has been conducted is the health care industry. The National Cancer Institute stated in their 2003 Health Information National Trends Survey that,

"The 'information revolution' of the 1990s began breaking down the distinction between previously restricted scientific communication channels and mass communication channels available to the public".

(National Cancer Institute, 2003)

This has led to a plethora of information on health care becoming easily accessible, particularly on the internet, from a large number of different sources which often have varying degrees of credibility. It has led to cancer patients receiving inaccurate or misleading information. The 2003 survey which featured the results of 6,369 people showed that seven in ten Americans felt that the number of recommendations and advice regarding cancer left them confused and 46% of Americans believed that everything causes cancer. Of the people surveyed, 2,171 reported that they felt they had suffered from information overload. (National Cancer Institute, 2003).

Our minds are changing, adapting to their new environment of virtual augmentations. There is no doubt that there are a huge number of benefits these technologies can bring us, but it seems we do not fully understand what negative effects these will bring nor their implications on society.

Society was quick to adopt mobile phones as a means to improve connectivity and communication. Now studies are suggesting a link between attention deficit hyperactivity disorder in children and their use of mobile phones (Grohol, 2013). These kinds of unintended negative side effects are often unknown until after the technology has already been widely adopted. As we further augment our minds and identity in this way we are certainly going to see more issues arise.

Despite these issues I believe the virtual augmentation of ourselves will be by far the most important improvement we can perform on our bodies. In particular, the ability to augment our intelligence. Although many of these augmentations may seem very technological, what is interesting is, as Amber Case points out, when we map out connections such as the internet, they do not look technological in nature but look very organic. She believes that the most successful technology is the ones that get out of the way and enable us to get on with our lives, and as a result, the technology ends up being more human than technological. With the internet, we are still connecting to each other, it is just done in a different way. As Case states, “We are increasing our ‘human-ness’” (Case, 2010).

As humanity develops and expands, we face an enormous amount of obstacles to overcome, from environmental to economic. The ability to have greater knowledge, understanding and problem solving far beyond what our current biological brains can provide will be our greatest asset in this time.

Chapter 4

Augmented Future and Human Transcendence

Our habit of augmenting ourselves with technology is as ancient as our species and the new developments in our augmentations of ourselves are simply a continuation of this practise. Prosthetics are starting to be controllable via our minds and RFID chips are being implanted into skin. Through the internet we are using technology that is external from our body to enhance our knowledge and communication. We will soon be able to wear glasses to enhance our vision and connect us to cyberspace.

We are currently undergoing a bionic revolution. We are implanting devices into the body, replacing limbs with artificial prosthetics and enhancing our minds through virtual space. We are taking evolution into our own hands, augmenting our bodies and minds to make up for the deficit caused by our original biological self. Biologist Stuart Newman believes that these augmentations will radically change our identity and that they will blur the distinction between what is the human and what is the artefact (Newman, 2003).

We can imagine where this technology will take us. Science fiction has long depicted visions of our future where virtual reality, advanced cybernetics and artificial intelligence are abundant. In his book, *Physics of the Future*, Michio Kaku believes that all this progress in our technology and augmentations will lead us to, “become like the gods we once worshipped and feared” (Kaku, 2011). He believes that by the year 2100 we will be able to,

“...manipulate objects with the power of our minds. Computers, silently reading our thoughts, will be able to carry out our wishes. We will be able to move objects by thought alone, a telekinetic power usually reserved only for the gods. With the power of

biotechnology, we will create perfect bodies and extend our life spans.....with the power of nanotechnology, we will be able to take an object and turn it into something else”.

(Kaku, 2011)

Current developments in our technology are bridging the gap between virtual and physical augmentations and we can see the merger of these augmentations propelling us further into our cyborgian relationship with technology. These changes to ourselves are hailed as the next step in human evolution by members of the transhumanist movement.

Transhumanism is a cultural and intellectual movement that aims to further the possibility of transcending the human condition through the development of technology. The movement believes that technology should be used to enhance and extend the abilities of our bodies beyond their original capabilities in order for us to become posthuman. It also advocates technology as a strategy towards tackling issues such as improving quality of life, eradicating disease and improving impoverished nations, and is a major driving force behind the research into eliminating aging in humans.

“Transhumanism is a class of philosophies that seek to guide us towards a post-human 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”.

(More, 1990)

As our technology has made leaps and bounds, particularly in the 21st century, the number of individuals who identify themselves as transhumanist has increased greatly. There are organisations who aim to research and develop transhuman goals. One such transhuman organisation is Humanity+.

Founded in 1998 and originally called the World Transhumanist Association, Humanity+ is an international, non-profit organization. Its philosophy states that its theoretical interests are primarily focused on topics of the singularity, extinction and mind uploading. Humanity+ holds conferences and funds research and development that advocates, “the ethical use of technology to expand human capacities” (Humanity+, 2011).

At its core, transhumanism is about becoming more than we are and being in control of our evolution. As all biological entities are, humans are vulnerable and weak, plagued by disease, physical limitations and an ageing process which weakens the body over time, eventually resulting in permanent death. By developing science and technology, transhumanists believe we can extend our own bodies to enable capabilities that our present selves can only imagine, and to become posthuman.

There are opponents to the transhumanist movement. Political scientist and author Francis Fukuyama described it as one of the world’s most dangerous ideas in his 2004 Foreign Policy article. He suggests that one of the victims of transhumanism is equality. By improving ourselves and leaving behind our limited mortal beings we will be creating a superhuman with advanced capabilities beyond our original human form. Fukuyama expresses concern for those who are left behind and wonders, “What rights will these enhanced creatures claim, and what rights will they possess when compared to those left behind?” (Fukuyama, 2004).

It is an interesting question and raises the issue of how augmentations of ourselves can give us advantages over others, perhaps unfairly. I would suggest that this is already the case. Western civilization has long been using technology to give it an advantage over less developed countries, from using muskets against spears in the Boer war, to unmanned drone strikes in the Middle East. As Bostrom said, we have always sought to acquire new capacities. To expand the boundaries of our existence, be it socially, geographically, or mentally (Bostrom, 2005). This extends to our desire for an advantage over our fellow

man. To compete against one another and to war. Fukuyama asks, “If some move ahead, can anyone afford not to follow?” (2004), but I would argue that this has always been the case throughout human history, with civilizations unable to keep up with the advancements of science and technology, left behind, overcome and conquered.

Futurist Kurzweil states that the current rate of developments in technology mean that we are moving near the creation of a technological event horizon, the singularity. The singularity, Kurzweil believes, is what happens when a non-biological intelligence is able to improve itself in a design cycle that increases each time, eventually reaching the point where technical progress occurs at a rate far beyond the capabilities of human intelligence to follow or understand it (Kurzweil, 2005).

The rate that technology advances is exponential, with Moore’s Law observing that the number of transistors on circuits doubles every two years, and with it, processing power and memory capacity. Kurzweil believes that this rate of growth will lead us towards the singularity around 2045, when technological advancements reach the point of ultra-intelligence. Where machines themselves could design better machines, and advancements in computational power occurring instantaneously at one point in time, creating what an Irving Good calls an “intelligence explosion”.

“The survival of man depends on the early construction of an ultra-intelligent machine.....an ultra-intelligent machine could design even better machines; there would then unquestionably be an “intelligence explosion,” and the intelligence of man would be left far behind. Thus the first ultra-intelligent machine is the last invention that man need ever make, provided that the machine is docile enough to tell us how to keep it under control”.

(Good, 1963)

While the singularity will be a separate entity from us, it could lead to augmentations of our biology which we can only imagine. It would accelerate far beyond the capacities of human intelligence due to the rate of technological progress. Through the use of Nano robotics the singularity will be as Krzweil states,

“Deeply integrated in our bodies, our brains, and our environment, overcoming pollution and poverty, providing vastly extended longevity, full-immersion virtual reality incorporating all of the senses and vastly enhanced human intelligence”.

(Krzweil, 2005)

This could potentially result in a merging between the Singularity and the humans who created it.

An idea steeped in science fiction, the future of artificial intelligence is often depicted as a huge benefit to society, such as Isaac Asimov’s ‘i, Robot’ (1950), or as a threat to mankind as shown in ‘The Terminator’ (1982). It is often a source of hopes for our future and also fears over its uncertainty. The biggest question often asked is, will our creations be controllable? Friend or foe?

Despite the concerns and unpredictability of such a super intelligent machine, the ability to merge our biology with a super intelligence will be possibly the greatest benefit mankind can gain from this technology. This would represent the penultimate augmentation, a combination of both physical and virtual. To become one with the machine. Krzweil says that this will be the only way to keep up with the progress of technology and understand it post singularity (Krzweil, 2005).

By looking at our history with technology there is no doubt that we have been moving along a path of increased symbiosis with it. Our close relationship with technology has brought us huge benefits in productivity, communication and standards of living. There have been ethical issues surrounding the physical augmentation of humans, but the biggest concerns are currently in regards to the new virtual augmentations and their effect on our society, behaviour and ourselves.

I believe this is because they tap into a very fundamental component of what many believe humanity really is. This is the brain, the area where our personality and our 'self' resides. What defines humans is not our physical abilities, but our conscience, our creativity and our ability to reason and to philosophise. Now that our augmentations are tapping into this area, the key question is what would it mean for humanity? It also forces us to re-address questions that have been asked since the dawn of human thinking, what is it to be human?

Each new augmentation will bring with it advancements to our way of life, and also improvements to the human condition, but they will each be accompanied with more ethical and moral implications. We can see some of these issues in the case of mind uploading. If we are able to upload our minds to a separate entity, would this new uploaded mind be the same as us, or an independent being with a separate identity. It is an issue relevant to Plutarch's ancient paradox, 'The Ship of Theseus', which ponders the question, 'if an object has all of its parts replaced, would it still be the same object?' (Cohen, 2004)

Another key issue will be what the implications are of our over-reliance on technology. Using the example of the internet, it has empowered many through its enormous benefits to education, communication, business and more. What would happen in the event of an internet blackout? We would see huge collapses in economic structure. There would be large communications breakdowns across the globe and people would feel an impact to

lifestyles. According to an opinion poll by the Science Museum, 8 out of 10 people feel 'lost' without access to the internet (Science Museum, 2012).

As we increasingly depend on technology, it becomes ingrained into our lives in such a way that we depend on it and it becomes integral to how we interact with the world. Suddenly losing our connection to this technology can bring detrimental effects and I believe this question will be of considerable importance over the next century as our merger with technology increases. As we have seen in the study of how people are starting to use memory capacity to location rather than content, if the location of this content were to be removed as in an internet black out, would we be losing a significant part of our brains?

Despite these concerns, I believe that there is an important fact regarding our use of technology. Elements of our biology may sometimes be slow to adapt to new technological environments, but throughout history humans have always shown a natural ability to adopt technology successfully.

Changing the nature of ourselves and humanity in this way will continue to be highly controversial, as it raises many issues such as economic implications, warfare, and social inequality. It also raises many questions on a philosophical and religious level. We can see this from some technological and scientific developments that are currently being highly debated, such as stem cell research within the United States. A number of people in the US oppose stem cell research, believing that its potential medical benefits pale in comparison to the fundamental moral implications of its use.

Any technology which augments how humans function and behave will likely cause such heated debates due in part to the vast amount of different beliefs and philosophies around the world regarding what the nature of humanity is and what it means to be human. We can see throughout history how people have often opposed scientific discoveries due to

their existing beliefs, i.e. Galileo being convicted of heresy by the Roman Inquisition in 1633, due to his support of astronomic ideas which are now commonplace.

The rate that technology is advancing means that many of the transhumanist technologies are starting to become a case of not if, but when. Yet in order for them to occur there must be not only advancements to our biology but also social, cultural and political progress to support them. I believe that by looking at some historical developments in technology and observing how many technologies have often been shunned and then in time accepted and commonplace, such as the arguments against the pacemaker, we can predict a similar future for many transhumanist technologies.

Chapter 5

Conclusion

Looking at mankind's evolutionary path we can see that it is almost an absolute certainty that we will become increasingly augmented. I believe that through virtual augmentations we will operate space external to our bodies. Our minds will change as will our behaviour. Our bodies will become increasingly cybernetic. Our augmentations will remove the divide between biological and technological. We will appear, from a contemporary viewpoint, to become less human, more cyborg. Yet I would argue that this process is the most human-like of all.

I believe this process of changing our biology with our technology is not removing our humanity, nor is it from a simple contempt of the flesh, but rather it is a defining feature of what it is to be human, and whilst technological in nature, it is by far one of our most natural behaviours.

"We should regard transhuman transcendence as natural. Nature embodies within itself a tendency to seek new complex structures, to overcome itself to take on new, more effective forms. Overcoming limits comes naturally to humans. The drive to transform ourselves and our environment is at our core".

(More, 1994)

A transhumanist technology is any that improve our capabilities in such a way that we transcend our human limitations to become something more than human. To transition from human to the posthuman. To transcend human limitations.

Technologies such as life extension, mind uploading, gene therapy and cybernetics are often considered to be ones which could enable us to become transhuman. I find this raises the question of where the lines between human and posthuman are. Technology is a way of advancing our capabilities as humans and defined in the Oxford dictionary as ‘the application of scientific knowledge for practical purposes’ (Oxford University Press. *‘Technology’*, 2013).

Early stone tools and fire were amongst the earliest forms of technology and their use was a catalyst for the development of our species. Yet there is plenty of evidence that stone tools were first used around 2.5 million years ago by early Hominids, the Homo Habilis (Institute of Human Origins, 2010). From this we can conclude that the process of using scientific knowledge for practical purposes and in particular, the application of external tools to augment deficits of the body, began long before our current species and has continued up to present day.

Sir Peter Medawar says that, *“The use of tools has often been regarded as the defining characteristic of Homo sapiens, that is, as a taxonomically distinctive characteristic of the species”* (Medawar, 1996). Augmenting ourselves is a natural trait of our species and began long before us. There is then, no true progression into a post human as transhumanists would have us believe. Rather, we have always been and always will be very *human* regardless of how far removed from our original condition we may find ourselves. For our transcendence into the posthuman is the most fundamental trait of humanity there is.

It may be that some of the objections to our heavily augmented future come from a lack of understanding and a fear of change. Tales have often warned man against pushing the limits, from Icarus falling into the sea to Frankenstein killing his creator. Imagine the difficulties there would be in explaining the internet to a civilization a thousand years in the past, and the objections of horror and claims of heresy that may result.

In Plato's Phaedrus, Socrates himself was subject to a fear of technology and the unknown, believing written word would obliterate individual knowledge and self-identity. His argument seems very similar to the ones against the internet, how it effects our patterns of thinking.

"...this discovery of yours will create forgetfulness in the learners' souls, because they will not use their memories; they will trust to the external written characters and not remember of themselves. [It] is an aid not to memory, but to reminiscence, and you give your disciples not truth, but only the semblance of truth; they will be hearers of many things and will have learned nothing".

(Socrates, 360BC)

I believe that whilst we can certainly see many negative issues as a result of our technology and our increased augmentations with it, the positive benefits far outweigh the negative. We will see in time, as so often has been the case of technological adoptions throughout history, how present objections to current and future technology will one day be seen in the same light that the objections to the written letter are today.

Mankind's love affair with technology is driven by that fundamentally human desire, to conquer. To conquer our environment, so we may live safely away from the dangers of the wild. To conquer our fellow man to prevail in conflicts of war. And to conquer ourselves.

The latter has probably been the biggest driving force behind the modern developments in augmentations. The path to overcoming the limitations imposed by our own bodies can arguably be seen as the progression of man's evolution. This evolution is simply a technological one rather than the biological evolution of cell mutation. It is ultimately pushing us to transcend our bodies and thus our mortality.

I believe that all of these developments to our technology seem to point to one eventual conclusion.

The progress of our technological evolution promises to one day usher in an age of infinite knowledge. Of immortality and the ability to manipulate matter. It would seem like far-fetched science fiction, and yet there are serious developments being made into these fields of technology. Technological developments are accelerating immensely and our journey towards the apparent eventuality of all this seems unstoppable.

By transcending our bodies and merging with an ultra-intelligence, mankind will fulfil his ancient desire. To overcome mortality. To become something, *more*.

Arthur C Clarke once said, *"Perhaps our role on this planet is not to worship God, but to create him"* (Clarke, 1972).

Perhaps he was right after all.

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