

# **Persons, Humans, and Machines: Ethical and Policy Dimensions of Enhancement Technologies**

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The University of Manchester  
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## **ABSTRACT**

**Name of University:** The University of Manchester

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**Degree Title:** PhD in Science Ethics

**Thesis Title:** Persons, Humans, and Machines: Ethical and Policy Dimensions of Enhancement Technologies

**Submission Date:** 10 / 03 / 2017

The aim of this thesis is to provide an argument that enhancement technologies are a form of enablement more significant than their physical effects; rather, that enhancement might be a fundamental element of humanity. This allows a refutation of the standard bioconservative position, that to increase capacity beyond that of a "normal" *Homo sapiens* necessarily defeats humanity, or at least nebulous aspects of it. I here argue instead that humanity is affirmed, and furthermore that enhancements are in fact inherently good, valuable, and worthwhile pursuits; on the assumption that it is, as critics of enhancements and transhumanism say, inherently good, valuable, and worthy of preservation to be human. I suggest thus that to enhance is the essence of, and the key to, the continuum of humanity.

In the introduction, I set out the reasons why this type of research is increasingly necessary, namely that it is important to rationally consider the effects which new enhancement and related technologies will have on our persons and on our society. Secondly, it presents my rationales for taking liberal stances on questions such as the scope and definition of enhancement, the supposed therapy- enhancement divide, and on access to enhancement technology; in order to provide a reasoned base from which to build the core themes of the thesis. It goes on to address a number of the archetypical critical arguments against enhancement, in support of these core themes.

Part II of the thesis contains the papers and delivers the main arguments in sequence- firstly, the need for the application of rationality in policymaking and commentary on bioethical concerns, and secondly the importance of considering motivation when attempting to divine the best course of action to regulate beings and technologies that we have not yet experienced, and the manner of which we cannot entirely predict. This is followed by an argument as to whether it is reasonable to treat enhanced or other purported novel beings that could result from these technologies as different from ourselves, and thus warranting such policy considerations. To accomplish this, the thesis delivers a fresh angle on the relationship between *Homo sapiens sapiens*, the human, and whatever is posited to supersede it, the posthuman. A central theme is the idea that humanity is a "matter of sufficiency"- an end-state for moral status, not a stepping-stone which one can be 'post'. These arguments culminate in a contention that it is enhancement that acts as the unifying factor in our evolution and existence, and that there is therefore unlikely to be any good reason to see beings that follow the humans of today as being different in any significant way.

The thesis concludes with an exploration of the progression of these themes, as well as identifying the place of my work amongst the wider academic literature around enhancement and the nature of the human. Finally, the most promising avenues for future research are explored.

# **DECLARATION AND COPYRIGHT STATEMENT**

## **DECLARATION**

3.01% of this thesis, clearly denoted in the text and annotations, is taken from a peer reviewed paper (Lawrence DR. To what extent is the use of human enhancements defended in international human rights legislation? *Medical Law International* 2013, 13(4), 254-278.) that was in turn adapted from work submitted as part of a successful LLM application.

No further portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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*If not for the unwavering and unconditional support of my parents, Helen and Neil, I simply would never have gotten this far.*

*This is for you.*

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I am thankful too to a large group of friends and colleagues, all of whom have contributed in countless ways to my studies and my personal development over the production of this thesis. In no particular order: John Coggon, Nicholas Agar, Nicola Williams, Jenny Krutzinna, Sarah Carter, David Gibson, Gwen Jacques, Catherine Rhodes, Gerald Walther, Viviana María García Llerena, María de Jesús Medina Arellano, Rebecca Bennett, Sacha Waxman, Shawn Harmon, Gill Haddow, Renee Holland, Guy Gibson, Jennifer Ansett, Matthew Murphy, Adam Cunis, and especially Rebecca Gardiner, for her kindness and patience. If I forget anyone the fault is mine, but please know I am grateful.

I am also appreciative of the remarks of a great many reviewers of the published pieces both included in this work and not. Their comments provided a crash course in navigating academic publishing which will stand me in good stead.

Finally, thanks are due to my parents. Their tremendous forbearance and unflinching support throughout my life but most especially during my PhD studies, as well as that of my grandparents Sylvia and David, has been the driving force behind the work before you. Thank you all.

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- Lawrence DR. More Human Than Human *Cambridge Quarterly of Healthcare Ethics*. 2017. 26(3). In press.
- Harris J, Lawrence DR. *New Technologies, Old Attitudes, and Legislative Rigidity*. In: Brownsword, R; Scotford, E; Yeung, K, ed. *The Oxford Handbook of the Law and Regulation of Technology*. Oxford University Press, 2017.
- Lawrence DR. The Edge of Human? The Problem with the Posthuman as the 'Beyond'. *Bioethics* 2016, epub ahead of print.
- Lawrence DR, Palacios-González C, Harris J. Artificial Intelligence: The Shylock Syndrome. *Cambridge Quarterly of Healthcare Ethics* 2016, 25(2), 250-261.

- Lawrence DR, Rhodes C. Editorial: Translational Bodies: Ethical Aspects of Uses of Human Biomaterials. *Health Care Analysis* 2016, 24(3), 175-179.
- Harris J, Lawrence DR. Hot Baths and Cold Minds: Neuroscience, Mind Reading, and Mind Misreading. *Cambridge Quarterly of Healthcare Ethics* 2015, 24(2), 123-134.
- Palacios-González C, Lawrence DR. Substance over style: is there something wrong with abandoning the white coat?. *Journal of Medical Ethics* 2015, 41(6), 433-436.
- Lawrence DR. To what extent is the use of human enhancements defended in international human rights legislation?. *Medical Law International* 2013, 13(4), 254-278.

### **Open Peer Commentaries**

- Palacios-González C, Lawrence DR. Enhancing Sisyphus. *AJOB Neuroscience* 2015, 6(1), 26-27.

## **DESTINATION**

From 1st November 2016 I will be working as a Research Excellence Academy Postdoctoral Research Fellow at the Newcastle University Law School's Law, Innovation, and Society research group.

**“Man is the only creature who refuses to be what he is.”**

— Albert Camus, *The Rebel*.

# **PART I**

# **INTRODUCTION**

## 1.

It is a certainty that advanced technology will affect human lives to an ever greater degree in the coming years. Not only will we see great changes to the ways we live and work, but our place as the dominant species on Earth may well be in question as we give rise to new, more capable beings. The title of this work, *Persons, Humans, and Machines: Ethical and Policy Dimensions of Enhancement Technologies*, is intended to recognise the fact that these technologies are a live issue. They have implications for we who live today; they are not solely an issue for the people of tomorrow.

### **1.1 I Enhance, Therefore I Am**

Over the course of the thesis I intend to argue that enhancement technologies impact on us in a way more significant than their physical effects. I will contend that enhancement might be a fundamental element of not only our daily lives but rather become part of the very essence of who we are as humans. This would allow us to refute the standard bioconservative position that to increase capacity beyond that of a "normal" Homo sapiens necessarily damages some inherent value in humanity, or at least nebulous aspects of it- instead, I would argue that the humanity of a being is affirmed by enhancement. It might indeed be argued that enhancements are in fact inherently good, valuable, and worthwhile pursuits; on the premise that it is, as critics of enhancements and transhumanism say, inherently good, valuable, and worthy of preservation to be and remain human.

Through the works presented here I present an original case for the proposition that to enhance ourselves is to be human, and to do so is to perform an inherently human act. *Amplio, ergo sum*; I enhance, therefore I am.

This idea, I will argue, is the key to understanding and appropriately responding to the ethical and policy dimensions of enhancement technologies. The most important factor in play, that must be held paramount when we consider the policy implications of enhancement, is that we are not likely to be trying to legislate against or around some nebulous 'other', but rather ourselves. This must be the guiding light in any such considerations of the governance of enhancement and related technologies, and it would be a tragic mistake to allow fear or misinformation to direct our futures.

There are a number of questions to be asked and answered that will allow me properly to construct this argument. These are as follows: What does enhancement technology *mean* for the human? What can it *do* for the human? What has it *done* for the human? In order to make the case for enhancement as essential for and implicit in our existence, I must first present the answers to these questions about its effects on the ways in which we see ourselves and believe ourselves to be. I must also ask what will *become* of the human as enhancement technologies take ever greater effect and become more and more pronounced in our society.

These questions are addressed both together and separately throughout the published papers that comprise the core of this work, but they naturally pose their own prerequisite questions. To wit: what do we mean by enhancement? Who do we mean by ‘us’- Homo sapiens, hominids in general, other animals, or some new being? Over the course of the thesis, I intend to answer these questions along with others that have and inevitably will arise from them; and in so doing to develop an insight into what it is that enhancement technology may bring- or indeed has already brought- to the human experience.

## 1.2 The Need for Foresight

Biotechnologies are promising us abilities beyond those of present-day mortal man. Prosthetics, developing at a rapid rate to serve the needs of military amputees, can in some cases now be grafted directly to a patient’s own nerves. In time it will be perfectly feasible technically to endow one of these robotic limbs with strength beyond that such as we possess naturally.<sup>1</sup> Nootropic drugs- cognitive enhancers, akin to those coursing through our nervous systems- offer improved memory, increased metabolism, augmented thought processing, and potentially an extended lifespan. More controversially, perhaps, there are the genetic manipulation techniques which could render us immune to diseases, specify our attributes, or even grant us those we could never have inherited from our parents. As will become clear throughout this work, the ramifications of human enhancement extend beyond the biological; and so it is appropriate to include technologies that will not integrate with our bodies but which will be developed for human-assistive purposes such as artificial intelligences.<sup>2</sup>

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<sup>1</sup> And indeed this is already the case in elite paralympic sport with ‘blade’ prosthetic limbs for sprinters.

<sup>2</sup> Including the current examples one might find inside a modern smartphone.

These are much more than just theories. Enhancement technologies are used and developed by the military now, and cognitive enhancers are becoming increasingly popular in colleges and universities.<sup>3</sup> We hear stories, too, of star athletes banned from competition for ‘doping’.<sup>4</sup> This may be frowned upon as unsporting, but is ultimately another form of human enhancement. Technologies and pharmaceuticals which augment our capabilities are already here, and we use them every day. The difference between these and other potential developments that could fundamentally alter or otherwise affect our society is that we can predict enhancement, we can see it coming and we can determine where and how far it will go. We are the ones who produce the science, and it is vital that we begin now to develop frameworks, policies, and legal provisions for the potential outcomes of these technologies.

Academia is not the only place in which this need is recognised. Serious thinkers and public figures, titans of business and more besides are beginning to speak out about the need to consider the ethical and policy implications of enhancement and related technologies. Elon Musk, founder of Tesla and of SpaceX<sup>5</sup>; Stephen Hawking, physicist and science advocate<sup>6</sup>; even Barack Obama’s White House<sup>7</sup> have all spoken out about the risks and possibilities of artificial intelligences (AI) exploding onto the scene. Each argue the same line- that we should “lay the foundation while humans are still at the wheel”.<sup>8</sup> It is plain to see that the same argument covers all technologies that could affect the nature of humanity, and its position in the world.

### 1.3 The structure of the thesis

The thesis covers a variety of topics, as necessitated by the nature of any discussion on human enhancement. The technologies and sciences involved develop quickly, and commentary upon them requires engaging with a wide range of disciplines and subject

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<sup>3</sup> Pells R. More UK students turning to banned 'brain boosting' drug than ever before. *The Independent*. 6 June 2016. Available at: <http://www.independent.co.uk/student/student-life/noopept-study-drug-legal-high-banned-brain-boosting-students-record-numbers-a7068071.html>. Accessed November 28, 2016.

<sup>4</sup> Providing a list of all anti doping rule violations. *Ukad.org.uk*. 2016. Available at: <http://ukad.org.uk/anti-doping-rule-violations/current-violations/>. Accessed November 28, 2016.

<sup>5</sup> Gibbs S. Elon Musk: artificial intelligence is our biggest existential threat. *The Guardian*. October 27 2014. Available at: <https://www.theguardian.com/technology/2014/oct/27/elon-musk-artificial-intelligence-ai-biggest-existential-threat>. Accessed November 27, 2016.

<sup>6</sup> Cellan-Jones R. Stephen Hawking - will AI kill or save humankind? - BBC News. *BBC News*. October 20 2016. Available at: <http://www.bbc.co.uk/news/technology-37713629>. Accessed November 27, 2016.

<sup>7</sup> Glaser A. The White House Is Finally Prepping for an AI-Powered Future. *WIRED*. May 30 2016. Available at: <https://www.wired.com/2016/05/white-house-finally-prepping-ai-powered-future/>. Accessed September 5, 2016.

<sup>8</sup> *ibid.*

areas: for example, those within these pages range from the nature of moral kinds to palaeoanthropology, taking in science fiction, international human rights law, invasive neuroimaging, and the motivations of artificial persons along the way.

This variety has lent itself to the use of the thesis methodology called<sup>9</sup> the ‘Alternative Method’- simply put, the contents and core of this thesis are largely peer reviewed and published papers, forthcoming papers, or papers presently under review – to be found in **Part II**. The papers- both co-authored and single-authored- were all researched and written with the aim of building up to the greater argument of the thesis when together, but in themselves each seeks to address their own, smaller questions. These questions all contribute to the greater whole; addressing related issues and the implications of particular technologies, or exploring concepts crucial to our greater understanding of enhancement in context.

In brief, the remainder of **Part I** aims to set out the background information on the various debates that are commonplace in enhancement, my reasoning for the positions that I will agree with in order to build further arguments, and an overview of each paper that will follow. **Part II** presents the main body of the thesis, the core papers in which these arguments are presented. Given that the papers included in **Part II** were written with the stipulations of specific academic peer-reviewed journals in mind, the writing style, length, and composition of each article was constrained to the individual requirements of their intended destinations. As consequence, the papers do not necessarily read as might the chapters of a traditional book or thesis, flowing neatly from one thought to another. However, the selection of papers collected in **Part II** provides a thorough examination of what enhancement means to the human. They do so in the following ways, amongst others: by providing explanation of the assumptions and positions on which those which follow are based; by discussing extant and possible examples of the need for a certain kind of consideration to be given towards ethical and policy dimensions of the relevant technologies; by analysing the fears espoused by those who would seek to influence this policy consideration; and by looking both to the future of what beings might succeed us and the past from whence we have come, **Part III** of this thesis provides review and analysis of the arguments previously presented, discussing potential future areas of research and a summation of the ways in which the aims of the thesis have been achieved.

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<sup>9</sup> At the University of Manchester.

## 1.4 A Note on Science and Technology

Enhancement technology and their means of effect are the products of science. Even ‘natural’ tool use and anthropological enhancements, discussed particularly in section [11.0] of this thesis, bring to bear physics and biological science in order to operate. As noted above and laid out more plainly below in my exploration of the definition of the subject, this thesis addresses enhancement in broad terms. This encompasses a wide range of technologies and science; so much so that to offer proper explanations of each would both require another thesis-length document and also dilute the focus of this work. Furthermore, some of these technologies- tool use in animals or super-intelligent synthetic biological androids, for example- require context in order for their relevance to be clear.

By way of illustration **Table 1**, below, lists the technologies and techniques that are substantively discussed at various points of the thesis. It is important to acknowledge that at least two thirds of the technologies that will feature are already extant to a greater or lesser degree or are developments that have already taken place- human enhancement and its related technologies are very much a part of our lives today.

**Table 1- Technologies and Techniques**

Past	Present	Future
<ul style="list-style-type: none"><li>• <b>Tool use in animals</b></li><li>• <b>Stone tool use in hominids</b></li><li>• <b>Use of fire in hominids</b></li><li>• <b>Cookery</b></li><li>• <b>Education</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Heritable Germline Interventions:</b><ul style="list-style-type: none"><li>• <i>Mitochondrial Replacement Therapy</i></li><li>• <i>CRISPR-Cas9 gene editing</i></li><li>• <i>Synthetic Biology</i></li></ul></li><li>• <b>Pharmaceutical:</b><ul style="list-style-type: none"><li>• <i>Cognitive enhancement-nootropic drugs</i></li><li>• <i>Physical enhancement</i></li></ul></li><li>• <b>Neuroimaging techniques:</b><ul style="list-style-type: none"><li>• <i>Functional Magnetic Resonance Imaging</i></li><li>• <i>Electroencephalography</i></li></ul></li><li>• <b>Cloud computing and social media</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Artificial intelligence:</b><ul style="list-style-type: none"><li>• <i>Robotics</i><ul style="list-style-type: none"><li>- Self-replicating machines</li><li>- Exoprostheses</li><li>- Military robotics</li></ul></li><li>• <i>Superintelligence</i></li></ul></li></ul>

These technologies are heavily intertwined throughout the remainder of **Part I** and the entirety of **Part II**. Where any given technology- for example neuroimaging in [7.0], heritable germline alteration in [5.0], or the state of artificial intelligence and robotics in [10.0]- is discussed in depth, I present the relevant information in context and provide such an overview of the state of that technology as is useful.

The thesis is, by necessity, about scientific and technological development. They are the core of the main argument presented here, that enhancement (as embodied by these developments) is the defining element of humanity. The references to them herein vary from direct to oblique, but they remain at the heart of the matters discussed.

## 2. BACKGROUND

We live in strange times. Our future is ever more uncertain. Quite aside from geopolitical and economic unrest, we face changes to “truths” we have known since time immemorial. Human beings, embodied as *Homo sapiens*, have been the dominant species on Earth for as long as we have existed, if we set aside some uncertainty in prehistory caused by our hominid relatives.<sup>10</sup> Some would tell us today that this soon may no longer hold true.

It is human nature to be curious, just as it is to be wary of what is to come. That curiosity has led us to stand on the cusp of a new age, heralded by the biotechnological revolution of recent decades. Gene science, advanced pharmaceuticals, neurotechnologies, robotics and cybernetics, the internet, and breakthroughs in artificial intelligence have all risen to the forefront of science; and even more quickly begun to feature in our daily lives as I will discuss later. For the time being I find myself reasonably content without undergoing genetic modification, but I and many others- even most, in the first world- would struggle if we were separated from the smart devices which reside in our pockets and increasingly elsewhere about our persons. They have become as normal a part of our lives as any technology in history, much like spectacles, and probably more than most.

This is no passing fancy. The trend of technology becoming more pervasive and developing ever faster is the new reality, and it would be wilful ignorance to deny that the world and the human experience have been forever changed by it in such places as the discrepancies of developed and developing world have allowed. So far, we might be able to say that this phenomenon has been positive, something which has brought great benefits to our ways of living. Very few people are true Luddites- almost everyone with access and the means partakes of these technological developments and enjoys the fruits, enjoys the conveniences, and enjoys the ease they bring. Even the Amish, famous for their avoidance of modern technologies, have adapted with the times by periodically reviewing what they will allow as part of their lives- electric lights on their buggies, for instance, or the use of certain motorised agricultural tools.<sup>11</sup>

The revolutionary developments aforementioned- amongst others- are, collectively, those of human enhancement. The definition of the term is an issue to which it is important to return, but suffice now to say that through the application of such sciences one might

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<sup>10</sup> See section [11.0]

<sup>11</sup> Kraybill D. *The Riddle Of Amish Culture*. Revised ed. Baltimore: Johns Hopkins University Press; 2001:98-101, 313.

hope to augment oneself in any of a myriad ways- to improve capacities, to better a life, to realise an ideal. Classically we might talk about the Nietzschean Übermensch- the ‘overman’- or perhaps at the other end of the scale the athlete given greater speed, strength, or stamina through steroids. We might even think of the superhero, or the science-fiction cyborg; or closer to home, the glasses wearer, the vaccinated child, perhaps the smartwatch owner. Human enhancement is what it says on the tin- the enhancement of the experience of being human- and it is already increasingly commonplace.

Yet the promised future technologies are also for some the cause of fear and revulsion. Critics espouse a range of reasons why we might want to avoid enhancing ourselves, as I will discuss at greater length. Some hold that it would be freakish or unnatural to undergo procedures that might alter us from the so-called ‘norm’,<sup>12</sup> or even that it would fly in the face of God by raising man to that station<sup>13</sup>. More argue that we should fear the unknown consequences of our actions, or that we would be embarking on the proverbial ‘slippery slope’.<sup>14</sup> Other quarters warn of the corruption of ‘human dignity’ or the destruction of our individual identities;<sup>15</sup> and still more commentators rail against the risks they perceive of creating a genetic divide, a subclass of unenhanced persons oppressed by the emerging ‘posthuman’.<sup>16</sup>

As vociferous as some of these criticisms may be they are also frequently difficult to defend, or are based on fallacy. The ‘natural’ is far from being the same as the good, and is something of a meaningless term in any case- just as it is something of a smokescreen to hide behind what is ‘normal’, or the concept of dignity. Fear of the unknown is a sure path to stagnation, and though while precaution<sup>17</sup> is often to be lauded, excessive precaution in the face of evidence to the contrary is simply an attempt to retain what is often an ugly *status quo*. The theorised posthuman is another nebulous concept, one which we have no good reason to make such assumptions as listed above about; and it is hard to deny that we, in a sense, play god on a regular basis through such reproductive

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<sup>12</sup> Daniels N. Normal Functioning and the Treatment-Enhancement Distinction. *Cambridge Quarterly of Healthcare Ethics*. 2000;9(03):309-322.

<sup>13</sup> Flaumenhaft H. The Career of Leon Kass *Journal of Contemporary Health Law and Policy* 2003;2:1–2

<sup>14</sup> Eliezer Y. Artificial Intelligence as a Positive and Negative Factor in Global Risk In: Bostrom N, Ćirković M, editors. *Global catastrophic risks*. Oxford: Oxford University Press; 2008: 303

<sup>15</sup> For example: Kass L. *Life, liberty, and the defense of dignity*. San Francisco: Encounter Books; 2002.

<sup>16</sup> McKibben B. *Enough: Staying Human In An Engineered Age*. New York: Times Books; 2003.

<sup>17</sup> The nature of this thesis does not lend itself to an analysis of the precautionary principle. However it does bear noting that there is a vast quantity of literature which does just this; for example: Andorno R. *The Precautionary Principle: A New Legal Standard for a Technological Age*. *Journal of International Biotechnology Law*. 2004;1(1):11-19, and Sunstein C. *Laws Of Fear*. Cambridge, UK: Cambridge University Press; 2005.

technologies as are commonly accepted (for instance, in vitro fertilisation and pre-implantation genetic diagnosis). This thesis will tackle a number of these critical arguments in its pursuit of a greater question.

## **2.1 Enhancement, Fear, And Public Opinion**

This section has a twofold aim. I have made reference to a number of core lines of argument frequently employed by academics who oppose the use of enhancement technologies, and in the next section I present encapsulations of some of these. At the same time, it is important to note that it is not solely the opinions of academics that must be taken into account when developing policy; the views of the lay public- the society which stands to be affected- are also to be thoroughly considered. Here, I will use the motif of the superhero in its capacity as a cultural touchstone and aspirational figure, to illustrate the problem with the bioconservative presentation of public perceptions of enhancement. Despite the frequent arguments of some critics,<sup>18</sup> ‘universal dislike’ of the concept of enhancement does not appear to be the case in truth. If we are societally accepting of the promise of the technologies, then it follows that any policy ought not fly in the face of popular moral feeling.

## **2.2 Enhancement And The Superhero**

Today, the superhero is ubiquitous. No longer the exclusive domain of the young or, as once perceived, the 'geek' or 'nerd'; superhero media is aimed at all ages and almost all demographics- save perhaps the elderly, though many who enjoyed them in their youth enjoy them still. Vast sums are made in merchandising, licensing, and film, to say nothing of theme parks, video gaming, and of course their original medium, the humble comic book.

The superhero, loosely defined, is a being (usually *Homo sapiens*, or at least approximating this in body pattern and appearance) possessed of abilities or capacities beyond those granted by birth to their species-peers, and, crucially, who chooses to use these to do good. These beings may acquire these 'powers' in a variety of ways; including

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<sup>18</sup> Hughes J. *Citizen Cyborg*. Cambridge, MA: Westview Press; 2004.

divinity, as represented by the Mighty Thor<sup>19</sup>; divine blessing- recent Marvel comics have seen the return of the mythological Champion of Asgard, Sigurd<sup>20</sup>; mysticism- soon to be embodied on screen as the Sorcerer Supreme, Dr. Stephen Strange<sup>21</sup>; fictional forces such as the Power Cosmic, wielded by the Silver Surfer<sup>22</sup>; and many more besides. Of particular interest for this thesis, however, are those empowered by technoscientific means- embodied best by the well known characters Iron Man<sup>23</sup>, the Hulk<sup>24</sup>, and Captain America<sup>25</sup>- and also perhaps by genetic factors of birth- mutants, the most popular example being the X-Men.<sup>26</sup>

Technoscientific heroes are particularly interesting in the context of the human enhancement debate. The means by which they gain their increased capacities frequently mirror or at least distil means by which scientists, ethicists, and futurists are anticipating and actively researching in order to modify our bodies and minds. The prime example would be the Iron Man. The combat exosuit or exoskeleton is a technology openly under development for militaries around the world, with US firm Raytheon Sarcos' XOS<sup>27</sup> and XOS2<sup>28</sup> and Lockheed's HULC<sup>29</sup>, amongst others, being surprisingly advanced in their work and having seen extensive field tests. The onboard biometrics, communications devices, strength enhancing systems and fatigue relief systems of these devices need only to be clad in armour to reasonably approximate the character. Other exosuit systems are under development and in use for a range of other commercial and medical assistive applications.<sup>30</sup>

So too are we moving towards the 'super soldier serum' which transforms the weak and feeble Steve Rogers into Captain America. Military pilots and students alike increasingly use Modafinil and similar nootropics to raise their alertness, their capacity to focus, and to

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<sup>19</sup> Lee S. Introducing... The Mighty Thor! *Journey Into Mystery* #83. Marvel Comics; 1962: 1;83

<sup>20</sup> Ewing A. Your Life Is A Story I've Already Written. *Loki: Agent of Asgard* #3. Marvel Comics 2014; 1;3

<sup>21</sup> Doctor Strange (film). Hollywood: Marvel Studios; November 2016.

<sup>22</sup> Lee S. The Coming of Galactus!. *Fantastic Four* #48. Marvel Comics 1966; 1;48

<sup>23</sup> Lee S, Lieber L. Iron Man is Born!. *Tales of Suspense* #39. Marvel Comics 1963; 1;39.

<sup>24</sup> Lee S. The Hulk. *The Incredible Hulk* #1 Marvel Comics.1962; 1:1

<sup>25</sup> Simon J, Kirby J. Meet Captain America. *Captain America Comics* #1 Marvel Comics. 1941; 1:1.

<sup>26</sup> Lee S. X-Men. *X-Men* #1 Marvel Comics. 1963; 1:1

<sup>27</sup> Mone G. Building the Real Iron Man. *Popular Science*. April 9 2008. Available at:

<http://www.popsci.com/scitech/article/2008-04/building-real-iron-man>. Accessed November 28, 2016.

<sup>28</sup> Raytheon unveils lighter, faster, stronger second generation exoskeleton robotic suit. *Raytheon (Press Release)* 2010. Available at: <http://multivu.prnewswire.com/mnr/raytheon/46273/>. Accessed November 28, 2016.

<sup>29</sup> Shachtman N. Lockheed Unleashes 'HULC' Super-Strength Gear. *WIRED*. February 27 2009. Available at: <https://www.wired.com/2009/02/lockheed-exo>. Accessed November 28, 2016.

<sup>30</sup> Gilhooly R. Exoskeletons await in work/care closet. *The Japan Times*. June 172012. Available at: [http://www.japantimes.co.jp/life/2012/06/17/general/exoskeletons-await-in-workcare-closet/#.V\\_wplZMrJE5](http://www.japantimes.co.jp/life/2012/06/17/general/exoskeletons-await-in-workcare-closet/#.V_wplZMrJE5). Accessed November 28, 2016.

operate at their mental peak for longer and longer periods of time without need for rest.<sup>31</sup> Various pharmaceuticals we normally come across in sporting scandal contexts increase physical capacities- to run harder for longer, to develop muscle mass at greatly increased rates. The range of these drugs, known as ergogenics, is vast- from relatively innocuous painkillers, stimulants, and sedatives to the use of human biomolecules including creatine and human growth hormone (HGH),<sup>32</sup> to anabolic steroids for muscle growth. These ergogenic drugs can also provide stimulation of the central nervous system to "... increase alertness, improve focus, decrease reaction time, and delay fatigue, allowing for an increased intensity and duration of training...".<sup>33</sup> One example is the disgraced Lance Armstrong<sup>34</sup>- a man performing at the furthest reaches of his bodily capacity, far beyond that which he could achieve unaugmented. Perhaps our modern Captain America would not arise through one single injection and a sudden enlargement of the muscles, but it is not unrealistic to imagine a human being brought to peak capacity through a series of such procedures, each one an enhancement.<sup>35</sup>

The fact of the matter-that enhancement is a feasible undertaking- is largely uncontroversial. What does draw bioconservative ire and the expression of their fears is whether it is right to go ahead and embark on taking that endeavour further.

### 2.3 Bioconservative Fears

The superhero, in its various forms, can represent these fears, encapsulating them in a dramatic fashion. Thus, they serve as a useful framing device here. The fears themselves are fairly often to be found as a plot element in stories- the fears bioconservatives (those

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<sup>31</sup> Pells R. More UK students turning to banned 'brain boosting' drug than ever before. *The Independent*. June 6 2016. Available at: <http://www.independent.co.uk/student/student-life/noopept-study-drug-legal-high-banned-brain-boosting-students-record-numbers-a7068071.html>. Accessed November 28, 2016; Mehlman M. Cognition-Enhancing Drugs. *The Milbank Quarterly*. 2004;82(3):483-506; Emson D, Vanderbeek R. The use of amphetamines in U.S. Air Force tactical operations during Desert Shield and Storm. *Aviation, Space, and Environmental Medicine*. 1995;66(3):260-3; Woodring J. Air Force scientists battle aviator fatigue. US Air Force Print News. 2004. Available at: <https://web.archive.org/web/20121014113247/http://www.af.mil/news/story.asp?id=123007615>. Accessed November 28, 2016.

<sup>32</sup> Holt R, Ertokritou-Mulligan I, Sönksen P. The history of doping and growth hormone abuse in sport. *Growth Hormone & IGF Research*. 2009;19(4):320-326.

<sup>33</sup> Liddle DConnor D. Nutritional Supplements and Ergogenic Aids. *Primary Care: Clinics in Office Practice*. 2013;40(2):487-505.

<sup>34</sup> Fotheringham W. Timeline: Lance Armstrong's journey from deity to disgrace. *The Guardian*. March 9 2015. Available at: <https://www.theguardian.com/sport/2015/mar/09/lance-armstrong-cycling-doping-scandal>. Accessed December 2, 2016.

<sup>35</sup> Admittedly there is no evidence yet that subjecting someone to a nuclear blast will yield a Hulk, and it is unlikely that this hypothesis will be put to the test. Neither is there any definitive proof that Norse gods walk among us.

who are hesitant or hostile towards biotechnologies and other related developments that threaten the existing social order<sup>36</sup>) discuss being found among incidental characters, directed at our nominal heroes. I will here briefly outline four archetypes of the hardline bioconservative arguments, as they are represented by four of the most popular and recognisable heroes- The Incredible Hulk, The Mighty Thor, Iron Man, and Captain America.<sup>37</sup>

### 2.3.1 The Inhuman Beast

Possibly the most widely touted criticism of radical enhancement is that it would lead us to lose whatever factor it is that makes us human, that we would become ‘othered’ in some way.<sup>38</sup> This idea is, as discussed above, a main focus of many of the articles presented in **Part II** of this thesis; and speaks directly to my research questions. The particular arguments used by critics are expanded upon at length in **[9.0]- *The Edge of Human***, but a useful example is the position of Francis Fukuyama, who claims when decrying the potential advent of the posthuman that:

...in the end, biotechnology will cause us in some way to lose our humanity- that is, some essential quality that has always underpinned our sense of who we are and where we are going, despite all of the evident changes that have taken place in human history. Worse yet, we might make this change without recognising we have lost something of great value.<sup>39</sup>

Fukuyama, then, would have us believe that to lose our humanity would be inherently a bad thing. It bears mentioning at this point that he, as do other critics of a similar mind, fails to acknowledge that any posthuman being which arose through this loss of humanity would likely have its own sense of self.

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<sup>36</sup> Carrico D. The Trouble with “Transhumanism”: Part Two. *leet.org*. 2004. Available at: <http://ieet.org/index.php/IEET/more/carrico20041222/>. Accessed November 28, 2016.

<sup>37</sup> I here use four male characters, not due to a lack of female analogues but because I suspect these particular examples are the most likely to be recognisable to readers.

<sup>38</sup> Annas, G; Andrews, L; Isasit, M. Protecting the endangered human: Towards an international treaty prohibiting cloning and inheritable alterations. *American Journal of Law & Medicine* 2002. 28(2&3): 151-178.

<sup>39</sup> Fukuyama F. *Our Posthuman Future*. New York: Farrar, Straus and Giroux; 2002:101-102.

This fear of lost humanity is probably best represented in popular culture by The Incredible Hulk.<sup>40</sup> Hulk is a colossal, green-skinned humanoid, and of course green skin has been shorthand for ‘other’ throughout literature for many years.<sup>41</sup> Increased strength is a trite example of an enhancement, but Hulk has unfathomable levels of it, which he gains at a cost. He is pure *id*,<sup>42</sup> a savage and wild being with none of the traits we hold as essential to humanity, at least in Fukuyama’s estimation. He cannot reason, he cannot even feel any emotion other than rage; whilst being enhanced in all physical capacities vastly beyond the human limit.

Perhaps more frighteningly, he is the product of an accident. In this sense he represents the fear of the unknown and of carelessness, that we do not know what will happen if we radically augment ourselves- The Hulk could perhaps be thought of as the demon behind the precautionary principle, who frightens commentators enough to call for moratoria on various biotechnologies.<sup>43</sup>

### 2.3.2 The Superior Being

Thor of Asgard, another Marvel character (supposedly the mythological figure of Viking legend), could represent the fears elucidated by some commentators regarding a higher being having a licence for cruelty by virtue of possessing a higher moral status than the human. The fear is that a superior being, or beings, might dominate society to the detriment of baseline *Homo sapiens* and we would of course be powerless to prevent this, becoming an underclass<sup>44</sup>. Alan Moore’s Miracleman,<sup>45</sup> a Superman analogue, is a good example- at the series end, Miracleman assumes totalitarian control of the world, which is presented as the logical conclusion to having godlike beings walking among us- perhaps this is taking things to extremes, but it is more or less the image which so concerns critics. This also harks back to eugenic fears, with the destruction of ‘undesirable’ ‘lower orders’ of being- something we *Homo sapiens* have at times endorsed. Thor is the embodiment of

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<sup>40</sup> *op. cit.* 24

<sup>41</sup> An informed and interesting discussion of this idea is available throughout: DeGraw S. *The Subject Of Race In American Science Fiction*. Routledge; 2007.

<sup>42</sup> At least in the popular consciousness- Hulk has been written in various periods in many different ways.

<sup>43</sup> Lanphier E, Urnov F, Haecker S, Werner M, Smolenski J. Don’t edit the human germ line. *Nature*. 2015;519(7544):410-411.

<sup>44</sup> Warwick K. I, *Cyborg*. London: Century; 2002.

<sup>45</sup> Miracleman was originally published as Marvelman, in: Moore A. Marvelman- A Dream of Flying. *Warrior* #1 Quality Communications 1982; 1.

the ‘posthuman god’<sup>46</sup>- freed of the constraints of our species, he is so powerful that we can’t comprehend him as one of us.<sup>47</sup>

To the bioconservatives, Thor could crush us and never think twice about it. We might be beneath his notice as a being both more powerful and of a higher moral plane. It’s worth noting, however, that in the fiction Thor- our superior- does not do this. Indeed he sees himself as the protector of the human race, our champion. His superiority creates a duty of beneficence to *Homo sapiens*, which he discharges at frequent sacrifice to himself. I explore this idea in more depth in [9.0] and [10.0], but there is no reason to assume any other superior being would act in this fashion- Thor has faced many threats to mankind which equal or exceed his capacities. We are led to ask the question as to why it is assumed that a superior being would necessarily be malicious: the only basis we have is those beings of high status who do and have walked amongst us. Whilst that group includes such men as Stalin and Mengele, it also includes exceptional or beloved beings such as athletes, film stars, and the Nobel laureates. One major argument of this thesis is that there is no good reason to consider a supposed superior being as anything other than ‘one of us’- which is precisely how Thor acts.

### 2.3.3 The Commodified Cyborg

Iron Man, as discussed above, represents technological enhancement through prosthesis, implantation, and computerisation. We can attribute two of the major fears of enhancement to him, including the fear of an overclass created through privatisation of technology<sup>48</sup>. Tony Stark, the alter ego of Iron Man is a billionaire, and well able to afford his technology- and he does not share this.<sup>49</sup> In fact, he uses it to make himself even more money, and more technologies for his own purposes- without giving access to the increased capacity he enjoys to anyone else. He is a sovereign entity by dint of his riches, reflecting the fear that enhancement will be a cold, capitalist pursuit in which we routinely upgrade ourselves like computers and cars, without sentiment- the body becoming commodified, and new capacities exclusive to those who can afford them. The Iron Man in

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<sup>46</sup> Bostrom N. The Transhumanist FAQ. *NickBostrom.com*. 2003. Available at: <http://www.nickbostrom.com/views/transhumanist.pdf>. Accessed December 2, 2016.

<sup>47</sup> Much as in ‘Shermer’s Last Law’, in which “any sufficiently advanced extraterrestrial intelligence is indistinguishable from God”. Shermer M. Shermer’s Last Law. *Scientific American*. 2002;286(1):33-33.

<sup>48</sup> Allhoff F, Lin P, Steinberg J. Ethics of Human Enhancement: An Executive Summary. *Science and Engineering Ethics*. 2010;17(2):201-212.

<sup>49</sup> *op. cit.* 23

many ways represents the distributive justice issues discussed further in section [2.4] of this work.

More interesting might be the idea that cybernetic enhancements such as those of Iron Man are the very nadir of "self-indulgent, uncontrolled power-fantasies" envisioned by the contempt of the flesh argument.<sup>50</sup> He cannot perform his feats or fulfil his capacities with his organic body-but by replacing or augmenting it, he is transformed. This is, as Hayles puts it, the body as instrument.<sup>51</sup> The notion subscribed to by many bioconservatives of natural being good and unnatural bad would dictate that this then is to be avoided, a thing of dystopian, dehumanising horror; but this fallacy is insufficient a reason to avoid enhancement in and of itself.

### 2.3.4 The Super Soldier

The last archetype I will mention is probably the most potent, and also the simplest.

The problems with Captain America are unsubtle- the character is a man created by military technoscience to be the perfect human, for the express purpose of enforcing his will upon others. He is in many regards a fascistic ideal which once again raises the spectre of the overclass, of war between the human and posthuman.<sup>52</sup> It would be a simple comparison to make between the enhanced Steve Rogers and with any eugenic ideal one would care to consider, whether liberal such as that espoused by Agar<sup>53</sup> or the more well known negative form taken to horrifying ends by the Nazi regime.<sup>54</sup> The fear of the genetic divide between humans and enhanced beings is that we might develop a two-tier society wherein those who are enhanced are raised above those who are not, with greater freedoms and a better quality of life.<sup>55</sup> It is not hard to imagine that this situation could come about through the use of force, as has been historically the case where an advantaged population has subdued another, and though it is a blunt example, the enhanced soldier, Captain America, could be the face of this.

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<sup>50</sup> Midgley M. *Science As Salvation*. 1st ed. London: Routledge; 2002.

<sup>51</sup> Hayles K. *How We Became Posthuman: Virtual Bodies In Cybernetics, Literature, And Informatics*. 1st ed. Chicago, Ill.: University of Chicago Press; 1999.

<sup>52</sup> McKibben B. *Enough: Staying Human In An Engineered Age*. New York: Times Books; 2003.

<sup>53</sup> Agar N. *Liberal Eugenics: In Defence Of Human Enhancement*. Malden, MA: Blackwell; 2004.

<sup>54</sup> Captain America was originally designed by two Jewish comic book writers and artists- Joe Simon and the great Jack Kirby- as a World War 2 hero fighting the Nazis and fascism in general. It is ironic that his character emerged as the mirror of his foes.

<sup>55</sup> Silver L. *Remaking Eden: Cloning And Beyond In A Brave New World*. New York: Harper Perennial; 1997.

He is also the enhancement ideal- better than any baseline human in every regard, he is stronger, faster, and more intelligent; and so he could be seen as the perfect example of all the above fears and arguments that we see from anti-enhancement camps. If the ideal is so undesirable as the conservative argument portrays it, we should shun enhancements wholesale for fear of achieving our goal.

Such critics decry the idea of an enhanced being as unnatural, dangerous, and as frightening. By extension, many laypeople will come to the same conclusion when asked, albeit largely from an 'yuck factor' response, that the idea is intrinsically wrong in some way they cannot articulate. Portrayed as I have here, these characters embody every facet of the anti-enhancement argument. If the bioconservatives are right, audiences should fear them, revile these characters as villains and figures to avoid at all costs. They represent great risk and potential suffering for 'normal' humans. It is strange, then, that we do not denounce them.

## 2.4 Cultural Acceptance of Enhancement

The reality is quite the opposite. We accept all these characters as a part of our popular culture unquestioningly. Marvel's Avengers- comprising the four characters I use above- is the fifth highest-grossing picture of all time, taking more than \$1.5 billion and climbing still in the home media market.<sup>56</sup> Almost any merchandising item one can imagine can be found branded with a superhero's logo or image. This is far more of a cultural assimilation than a cynical marketing ploy: public service campaigns often utilise superheroes for their recognisability but more interestingly, for their reputation and their symbolism. Superman, a paragon of purity and clean living, has 'campaigned' against smoking.<sup>57</sup> Spider-Man, friendly neighbourhood guardian, against drink-driving and drugs.<sup>58</sup> Captain America was and still is promoted and held up as the champion of Truth, Justice, and the American Way. He was a propaganda tool on his introduction in WWII and used repeatedly as such in subsequent US conflicts, as a symbol of hope, as a man that we should aspire to be. The Hulk is reined in by his fundamental humanity: he unleashes the monster as a bastion, not as a destroyer. Thor sees himself as the protector of the human race, our champion. His superiority creates a duty of beneficence to *Homo sapiens*, which he

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<sup>56</sup> All Time Worldwide Box Office Grosses. *Boxofficemojo.com*. 2016. Available at: <http://www.boxofficemojo.com/alltime/world/>. Accessed December 2, 2016.

<sup>57</sup> Jacob M. Superman versus Nick O'Teen -- a children's anti-smoking campaign. *Health Education Journal*. 1985;44(1):15-18.

<sup>58</sup> McDuffie D. Skating on Thin Ice!. *The Amazing Spider-Man: Skating on Thin Ice #1* Marvel Comics. January 1, 1990

discharges at frequent sacrifice to himself. Though the Iron Man does not hand out his power, the fruits of his technology benefit us all.

Superheroes, then, are thoroughly integrated into western culture and consciousness, popular and otherwise. They are used as role models, shown to children as examples of how they should act- to be brave like them, to eat healthily so one might be strong like them, and so on. We teach our children, effectively, to aspire to be more than *Homo sapiens*; to be like Captain America, or Captain Marvel- to be like enhanced beings.

This reality does not sit well with the bioconservative arguments listed above. It is difficult to both idolise something and condemn what makes that idol what it is. The argument could be made that superheroes are nothing more than fantasy, and therefore not something to be actually realised. However, the fact that we treat fictional heroes as real-life role-models makes this idea falter. It is Captain America's strength and preternatural fortitude- stemming from his biochemical enhancements- which render him able to embody the American ideal. Without his abilities he would certainly not represent the danger of a superior race, but he would also no longer be an aspirational figure. The situation cannot be had both ways: the tensions revealed here are somewhat paradoxical.

To demonise enhancement necessarily demonises superheroes, rendering it inappropriate to hold them up as aspirational figures of right and goodness. How can we embrace these characters and yet reject what makes them who they are? How can it be inappropriate for adults to actually achieve that which we deem acceptable for children to fantasise about? Phenomena we frown upon or condemn in society which do serve to dehumanise or debase the species- for example, cannibalism- do not receive positive portrayals in entertainment media. Where they are the focus, they can hardly be said to be being promoted. The Friday 13th film series made around \$500 million, and was extremely popular- but we do not hold murder to be desirable character trait. Human enhancements, on the other hand, are held in cultural high regard.

If enhancements are so morally repugnant, it follows that we ought to be railing against their portrayal as a force for good. Alternatively, we might recognise them for the reality of what they are- tools to help us improve ourselves.

### 3. KEY DEBATES IN ENHANCEMENT

For now, we might say that human enhancement is subject to fierce debate within certain sections of global bioethics (broadly conceived), and it is a topic that will likely never be agreed upon. The fires of both sides burn too hot, as with any concern of perceived great import to our natures, and vast quantities of ink have been spilled on both sides. A vast proportion of literature concerning human enhancement is to some extent morally partisan, arguing from solidified pro- or anti- enhancement positions. Well-reasoned discourse in the field is not rare; however, whilst the debate broadly concentrates on the virtues of pursuing the technologies, it is likely to remain at an academic stalemate. It is not the purpose of this work to try and lay this divide to rest.

Instead I wish to look at the implications of what is likely to come to pass, regardless of which side we may agree with, and advance discourse around human enhancement beyond binary moral debate. Furthermore, the debate is to some extent moot- enhancement technologies are extant and will inevitably become more widespread, for good or ill. It is certainly the case that the approval and use of more restrained iterations such as Modafinil or other cognitive drugs is a growing reality. I contend, therefore, that there is a need for research which reaches beyond affirming or decrying enhancement, and instead examines its societal role and how the technologies may affect the ways in which we perceive ourselves (and other beings) as they become ‘normal’.

However, I believe it is also worthwhile to engage with some of the key divisions that have been the focus of debate within the field. These debates have shaped attitudes in the academic community and indeed my own attitudes. As such, they are an important background to the original research presented later in this thesis, which must be acknowledged.

In its December 2013 issue, *Medical Law International* published my article entitled *To what extent is the use of human enhancements defended in international human rights legislation?*<sup>59</sup> That paper derived from my Master’s dissertation and marked a starting point for my research forming the foundation of the original papers at the core of this doctoral thesis and here presented in **Part II**. In what follows in this Part of the thesis I draw heavily on that paper.

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<sup>59</sup> Lawrence D. To what extent is the use of human enhancements defended in international human rights legislation?. *Medical Law International*. 2013;13(4):254-278.

I now set out many of the assumptions and the rationale on which core papers build. Drawing on my 2013 paper, I propose that it is necessary to determine a working conception of ‘human enhancement’ through a thorough exploration of the idea that the term refers specifically to ‘technoscientific’ interventions as opposed to including wider cultural and anthropological aspects such as education and tool use. Furthermore, it argues that there exist rights of ‘enablement’, which relate to the practice of self-realisation; legislatively backed through rights to personality, personhood, and self-determination. I argue that human enhancements can act as the means by which these rights are given effect. Denied these means, one is denied the exercise of personhood. I discuss, too, that the enablement provided by enhancement technology is required for true societal equality and ‘real freedom’ through provision of opportunity.

Portions of the following, noted as such in subheadings, are taken from this 2013 paper.

### **3.1 Definition of Enhancement<sup>60</sup>**

As I have noted earlier, there is much debate as to what human enhancement actually may be. This is discussed in more specific depths in [11.0] but warrants some exploration here. In general, human enhancement technologies refer to various means by which we are able, or will be able, to augment the capacities of our bodies and brains to accomplish tasks. This could range from improving physical speed, stamina, and strength to improving our mathematical computational abilities, eidetic memory, or general intelligence. More abstractly it may be possible to enhance motivation or moral codes (section [6.0]); or alternatively enhancement could constitute abilities which we have never before possessed.

This range is problematic for the academic debate.<sup>61</sup> Definitions of human enhancement can vary wildly, as the following pair of examples illustrate. Enhancement is:

an intervention- a human action of any kind- that improves some capacity (or characteristic) that normal human beings ordinarily have or, more radically, that produces a new one.<sup>62</sup>

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<sup>60</sup> Part of this section is adapted from *ibid*, at 258.

<sup>61</sup> Bostrom N. A history of transhumanist thought. *Journal of Evolution and Technology*. 2005;14(1):1-25.

<sup>62</sup> Buchanan A. *Better Than Human: The Promise And Perils Of Enhancing Ourselves*. 1st ed. Oxford University Press; 2011:5.

Or perhaps:

a modification aimed at improving individual human performance and brought about by science-based or technology-based interventions in the human body...Excluded... are improvements of human performance which are realised by the use of devices which are not implanted or not robustly fixed to the body<sup>63</sup>

The former definition, from Buchanan, is particularly liberal and effectively grants license to describe any technique by which we can gain in capacity as enhancement. The latter, from the European Parliament, is much more limited in scope and is representative of the viewpoints of many bioconservative commentators. It is my contention that enhancement is best approached as an all-inclusive term in a similar manner to Buchanan.<sup>64</sup>

For example, it is beyond doubt that consuming the correct nutrient balance and undertaking physical exercise will increase muscle strength and cardiovascular endurance.<sup>65</sup> Doing so utilises only the body's natural processes and capacities for growth, without biotechnological intervention; and critics of enhancement such as Ida<sup>66</sup> contend therefore that no alteration has been made- one fulfils latent physical capacities rather than expanding the capacities themselves. Conversely, it has been argued<sup>67</sup> that education, another anthropological aspect of social and cultural development, is a direct form of cognitive enhancement. It has been found that:

...functional neuroimaging data indicate[s] that certain aspects of phonological processing may not be acquired spontaneously, but are modulated by learning an alphabetic written language, that is, learning to read and write... [which alters] the interaction between Broca's area and

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<sup>63</sup> Coenen C, Shuijff M, Smits M et al. *European Parliament Science And Technology Options Assessment: Human Enhancement Study (EP STOA)* For The European Parliament Directorate General For Internal Policies Department A: Economic And Scientific Policy. Brussels; 2009. 13

<sup>64</sup> This is also compatible with Harris' view in Harris J. *Enhancing Evolution*. 1st ed. Princeton: Princeton University Press; 2010.

<sup>65</sup> See, for example: Wilmore JK, Knuttgen H. Aerobic Exercise and Endurance. *The Physician and Sportsmedicine*. 2003;31(5):45-51; de Vos N, Singh N, Ross D, Stavrinos T, Orr R, Fiatarone Singh M. Optimal Load for Increasing Muscle Power During Explosive Resistance Training in Older Adults. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*. 2005;60(5):638-647; World Health Organisation *Promoting fruit and vegetable consumption around the world*. WHO. 2004. Available at: <http://www.who.int/dietphysicalactivity/fruit/en/>. Accessed December 5, 2016.

<sup>66</sup> Ida R. Should We Improve Human Nature? An Interrogation from an Asian Perspective. In: Savulescu J Bostrom N, eds. *Human Enhancement*. 1st ed. Oxford: Oxford University Press; 2009:56.

<sup>67</sup> Bostrom N, Sandberg A. Cognitive Enhancement: Methods, Ethics, Regulatory Challenges. *Science and Engineering Ethics*. 2009;15(3):311-341.

the inferior parietal cortex as well as the posterior-midinsula bridge between Wernicke's and Broca's area.<sup>68</sup>

In other words, in becoming literate the individual has undergone physiological changes in the brain, affecting the route and method by which language is processed. Consider the European Parliament stipulation- that an enhancement must be “a modification aimed at improving individual human performance...”<sup>69</sup> - we might surmise that the above effect of education fulfils it; *ipso facto* weakening the basis of the exclusivity stance. This is particularly true if we note that “conventional [anthropological] interventions often produce more permanent neurological changes than do drugs.”<sup>70</sup> These principles can also be applied to the aforementioned diet and exercise- the latter having been described as “a health-related resilience enhancer”<sup>71</sup>. As Harris states in *Enhancing Evolution*:

Shelter, learning and teaching, tool using, body decoration, clothing, gathering and hunting, cooking, storing, co-operation, cultivation, animal taming and domestication, farming, social living, language, education are all enhancement techniques or technologies. With the help of some of these tools we have built institutions...<sup>72</sup>

Human enhancement technologies (both ‘natural’ and artificial) are already in widespread use, particularly among first-world populations. As an example, we might consider the ‘functional food and beverage’ industry, perhaps best recognised in such popular products as Red Bull™ and Yakult™, which has been estimated to have a 2013 global market worth of 176.7 billion dollars<sup>73</sup>; or herbal products such as Ginko biloba which is valued at hundreds of millions of dollars annually.<sup>74</sup> We might also consider the common cup of coffee, possessed of the same enhancing attributes as the aforementioned soft drink, which has long been a cultural feature of many countries.<sup>75</sup> If we deny that anthropological

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<sup>68</sup> Petersson K, Reis A, Askelöf S, Castro-Caldas A, Ingvar M. Language Processing Modulated by Literacy: A Network Analysis of Verbal Repetition in Literate and Illiterate Subjects. *Journal of Cognitive Neuroscience*. 2000;12(3):364-382.

<sup>69</sup> *op. cit.* 63. 13.

<sup>70</sup> *op. cit.* 67.

<sup>71</sup> Miah A. Ethical Issues Raised by Human Enhancement. In: Gonzalez F, ed. *Values And Ethics For The 21St Century.*. Spain: BBVA; 2011:199-231.

<sup>72</sup> *op. cit.* 64. 13

<sup>73</sup> Data provided by BCC Research, quoted in Roberts W. Article: *Benefiting Beverages*. Preparedfoodscom. 2009. Available at: <http://www.preparedfoods.com/articles/107718-article-benefiting-beverages-august-2009>. Accessed December 5, 2016.

<sup>74</sup> van Beek T. Chemical analysis of Ginkgo biloba leaves and extracts. *Journal of Chromatography A*. 2002;967(1):21-55.

<sup>75</sup> For background, see: Weinberg Bealer B. *The World Of Caffeine : The Science And Culture Of The World's Most Popular Drug*. New York: Routledge; 2001.

practices and culturally-embedded phenomena can constitute enhancements, we are necessarily denying the inclusion of acts perpetrated by billions daily- and it is difficult to defend a suggestion that caffeine, for example, does not enhance your cognitive capacity and alertness.

Furthermore, although academics such as Rothman<sup>76</sup> and those on the (former) President's Council on Bioethics<sup>77</sup> have questioned exactly what might be classed as a benefit and what as the pursuit of vanity or self-regard, I would highlight cosmetic surgeries. They do not increase any capacities, *per se*, but they do alter physical characteristics. In effect (and assuming success), from the subjective position of the patient, their physical appearance is being enhanced and they are benefiting from the scientific and surgical advancements which make this possible.

### **3.2 Enhancement and Medicine<sup>78</sup>**

Scientific advancement in the enhancement field is generally closely related to research for medical purposes. Buchanan's contention that "[a]t present, biomedical enhancements don't come through the front door. They come through the back door, as spin-offs of efforts to treat diseases or disorders"<sup>79</sup> is borne out by examples such as the herb *Melissa officinalis*, or lemon balm, which is commonly used as a herbal remedy. The extract of the herb has been observed to significantly improve the speed of mathematical processing in human trials<sup>80</sup>, acting as a nootropic when used in larger doses of around 300mg. Equally, levels of vitamin D- used as a supplement- have been found to be in positive correlation with improved cognitive function.<sup>81</sup> We can be assured that medical research with wholly different aims than enhancement frequently makes discoveries which contribute to the technology.

The International Covenant on Economic, Social, and Cultural Rights (ICESCR) holds that one is entitled to "the highest attainable standard of physical and mental health"<sup>82</sup>. This

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<sup>76</sup> Rothman S, Rothman D. *The Pursuit Of Perfection*. New York: Pantheon Books; 2003.

<sup>77</sup> Kass L. *Beyond Therapy: Biotechnology And The Pursuit Of Happiness*. Washington, D.C.: President's Council on Bioethics (Harper Collins); 2003.

<sup>78</sup> *op. cit.* 59. 271

<sup>79</sup> *op. cit.* 62. 7.

<sup>80</sup> Kennedy D, Little W, Scholey A. Attenuation of Laboratory-Induced Stress in Humans After Acute Administration of *Melissa officinalis* (Lemon Balm). *Psychosomatic Medicine*. 2004;66(4):607-613.

<sup>81</sup> Buell J, Scott T, Dawson-Hughes B *et al.* Vitamin D Is Associated With Cognitive Function in Elders Receiving Home Health Services. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*. 2009;64A(8):888-895

<sup>82</sup> United Nations. *International Covenant On Economic, Social And Cultural Rights*. Office of the High Commissioner; 1966. Article 12.1

throws the relationship between enhancement and medicine into sharp relief. The right specifies that the best possible healthcare be made available- this does not require interpretation, it is simply the statement of the Covenant. If an enhancement technology could act positively on the health of a subject, then it follows that their potential health could be improved. *Ergo*, the subject's possible health is above that which they currently possess- and the right to the means of attaining this potential is explicitly defended by the ICESCR.

However, academics differ on the scope of a key issue which may help determine whether we can extend this right from applying to those who are below normal health into a right to improve one's health, where possible, beyond normal limits.

### **3.3 Therapy- Enhancement Divide<sup>83</sup>**

The question as to whether enhancement and therapy should be considered as being mutually exclusive or one and the same has received a lot of attention, with specific papers<sup>84</sup> and conference presentations<sup>85</sup> centred around it, and so it is beyond the scope of this introduction to give a full discussion. However, it is appropriate that we examine the debate for an answer to our question. Positions on the topic generally follow the same lines described earlier as pertaining to the wider issue of human enhancement, with critics usually maintaining that the two fields are separate and cannot be treated in the same manner, and pro-enhancement thinkers broadly in agreement that they are indistinguishable for practical concerns.

The argument against is based on the assumption that, as Laura Colleton puts it, one “use[s] the terms ‘treatment’ and ‘therapy’ interchangeably to mean any substance, procedure, or other intervention required to correct a disorder or restore a patient to health.”<sup>86</sup> Enhancements, conversely, would therefore be classed as improving health beyond “the norm for humans”<sup>87</sup>. As before, the idea of a ‘normal’ human is fundamentally flawed; what may be one person’s standard level of health is not necessarily the same as

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<sup>83</sup> *op. cit.* 59. 272

<sup>84</sup> Such as; Tännsjö T. Medical Enhancement and the Ethos of Elite Sport. In: Savulescu J, Bostrom N, ed. *Human Enhancement*. Oxford: Oxford University Press; 2009:315-326.

<sup>85</sup> Such as; Schwartz, R, *The Medicalization of Body Modification and the Ethical Obligations of Health Care Providers*, Stanford Institute for Ethics and Emerging Technologies conference on Human Enhancement Technologies and Human Rights, (Stanford, 27 May, 2006)

<sup>86</sup> Colleton L. The Elusive Line Between Enhancement and Therapy and Its Effects on Health Care in the U.S. *Journal of Evolution and Technology*. 2008;18(1):70-78.

<sup>87</sup> *op. cit.* 13

that of the next- as Buchanan states, “a ‘well’ elderly person... has stiff, painful joints, reduced libido, compromised mental functioning, and poor physical stamina.”<sup>88</sup> Colleton’s conception of health, however, would require it to be a status quo- where illness is a negative value and the purpose of therapy would be to return the scale to zero, which must be consistent for every patient. Even allowing for the implausible assumption of identical health levels, this attitude is incoherent- it fails to give any reason why one cannot tip the balance, to continue the metaphor, into a positive value. Can one be considered ‘too’ healthy? Again, the ICESCR right to “the highest attainable standard”<sup>89</sup> of health would tend to imply that one can be more healthy than the mere recovery from illness would allow.

Colleton’s viewpoint should not be viewed in isolation, however. Boorse<sup>90</sup> held that disease (or reduced health) constitutes an impairment in species-typical function. It is possible to see a reflection of the balanced scale analogy here, in that bioconservatives such as Daniels<sup>91</sup> have extrapolated that therapy is a means of restoring typical function. In other words, a therapy can only treat illness or reverse a debilitation, be that through deformity or wound. We might consider this view to be shortsighted- as Harris points out, “restoring species-typical functioning is enhancing for the individual concerned... most of what passes for therapy is an enhancement *for the individual* relative to her state prior to therapy.”<sup>92</sup> We might envisage a procedure which stimulates proliferation of a certain immunological cell, which when applied to a patient who has a deficiency through illness would bring the number of cells to a level commensurate with the average expected in a non-sufferer. If the process is applied to an individual whose cell count is already at this threshold, raising it (and for the sake of discussion, their immune response) to levels ‘beyond the norm’, Daniels and others would categorically deny that it is therapy. However, the procedure is exactly the same as in the patient, and the physiological effects identical. Undeniably, the second subject has been enhanced- but what differentiates the two cases, other than the nebulous ‘typical function’? The exclusivity argument cannot seem to give an answer, and for this reason we have no option other than to accept the premise that enhancement and therapy are in effect one and the same. In context of whether a right to health would include enhancement, the above suggests that it should. It makes no sense to reduce health to a status quo which must be balanced; and so I

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<sup>88</sup> *op. cit.* 62. 174.

<sup>89</sup> *op. cit.* 82 Article 12.1

<sup>90</sup> Boorse C. On the Distinction between Disease and Illness. In: Cohen M, Nagel T, Scanlon T, ed. *Medicine And Moral Philosophy*. Princeton: Princeton University Press; 1981.

<sup>91</sup> Daniels N. Normal Functioning and the Treatment-Enhancement Distinction. *Cambridge Quarterly of Healthcare Ethics*. 2000;9(03).

<sup>92</sup> *op. cit.* 64. 44. Emphasis added.

maintain that the ‘highest attainable’ health must therefore encompass levels above what is ‘species typical’.

### 3.3.1 Preventative Medicine and Enhancement<sup>93</sup>

Note that another aspect of health which bioconservatives fail to adequately address with regard to enhancement is the field of preventative medicine. I imagine that no moderate critic, unbounded by the constraints of certain religions, cultures, or erroneous beliefs, would deny their child vaccination against diseases such as measles, tetanus, or meningitis. Although Silvers claims that “[e]nhancing people’s immune systems may seem equivalent to strengthening the persons”<sup>94</sup>, preventative medicine of this nature could potentially be termed therapy- under Daniels’ understanding above- if it is framed as bringing the recipient to an immunity level similar to that of the wider populace. However, those same critics might balk at genetically altering their children to have that same immunity. The reason for their opposition may be exemplified in Sandel’s vague assertion that “[g]enetic manipulation seems somehow worse- more intrusive, more sinister- than other ways of enhancing performance and seeking success.”<sup>95</sup> This distaste- also known as the wisdom of repugnance<sup>96</sup>- is a questionable defence. Although Kass defends it, claiming that “in crucial cases...repugnance is the emotional expression of deep wisdom, beyond reason’s power fully to articulate it”<sup>97</sup>, it has no evidentiary or theoretical backing and as such cannot be taken seriously in debate as a legitimate rationale.

Furthermore, the ICESCR states that:

[t]he steps to be taken... to achieve the full realization of [the right to health] shall include those necessary for:... (c) The *prevention, treatment and control of... diseases.*<sup>98</sup>

This presents an express obligation to utilise preventative medicine, embodied here by the enhancing technique of vaccination.

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<sup>93</sup> *op. cit* 59. 273

<sup>94</sup> Silvers A. The right not to be normal as the essence of freedom. *Journal of Evolution and Technology*. 2008;18(1):79-85.

<sup>95</sup> Sandel M. *The Case Against Perfection: Ethics In The Age Of Genetic Engineering*. 1st ed. Boston: The Belknap Press of Harvard University Press; 2009. 61.

<sup>96</sup> Kass L. The Wisdom of Repugnance. *The New Republic*. 1997;216(22):17-26.

<sup>97</sup> *ibid.*

<sup>98</sup> *op. cit.* 82. Article 12.2. Emphasis added.

### 3.4 Access to Enhancement<sup>99</sup>

One point of contention around enhancement is the issue of distributive justice.<sup>100</sup> This does not differ from its mirrors in other fields- the fact that some may have access when others cannot, for whatever underlying socioeconomic or geopolitical reasons, is problematic. Questions of equality abound, and there is an argument to be made that well-off demographics in a position to pay and access enhancement technology would ‘widen the gap’ between them and those unable to partake. This, again, is no different to the same issue in other fields, including public health, education, and global wealth.

I make no claim in this thesis towards addressing this issue. Rather, the thesis operates on the notion that- as mentioned- enhancement technology has existed and shaped us, is in use today in a range of forms, and is in future going to become an ever larger element of our lives. The likelihood is that due to the nature of technology as being developed largely by private concerns, enhancement will be, at least for the foreseeable future, a commercial phenomenon. Without radical overhauls of the structures of political and financial ideologies, this situation is unlikely to change. For my present purposes, though, it will suffice to give the reason that informs the assumption on which this thesis operates- that where enhancement is indistinguishable from therapy and is in some cases a constituent part of medical treatment, as above, there is an inalienable right to enjoy its benefits. This right is represented in legislation through a pair of fundamental human rights, as follows.

The rights to health and to access to science are difficult to extricate from one another. It stands to reason that health technology is a product of scientific endeavour, and this alone perhaps justifies treating the pair in conjunction. It is important to remember that they are separately stated and reasoned rights in and of themselves, presented in multiple instruments of international rights law- and so they are given foundation and basis here individually.

The Universal Declaration of Human Rights (UDHR) states, in Article 25, that

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<sup>99</sup> Part of this section is taken from *op. cit.* 59: 266

<sup>100</sup> Juengst E, Moseley D. *Human Enhancement*. Stanford Encyclopedia of Philosophy Archive. 2015. Available at: <https://plato.stanford.edu/archives/spr2016/entries/enhancement/>. Accessed December 6, 2016; Allhoff F, Lin P, Moore D. *What Is Nanotechnology And Why Does It Matter*. Malden, MA: Wiley- Blackwell; 2010:127-131.

[e]veryone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services ...<sup>101</sup>

This principle is reiterated in Article 12.1 of the ICESCR, as we might expect given that document's relationship to the UDHR in the International Bill of Human Rights. The article goes on to expand somewhat on the position taken by the UDHR, in a manner which we will discuss in more depth subsequently, but for our present purpose it is sufficient to observe that:

[t]he States Parties to the present Covenant recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health.<sup>102</sup>

Documents outside the IBHR also recognise the right to health as universal. The Oviedo Convention is particularly explicit, which is appropriate given specific concern of that document with the 'application of medicine':

Parties, taking into account health needs and available resources, shall take appropriate measures with a view to providing, within their jurisdiction, equitable access to health care of appropriate quality.<sup>103</sup>

The right to health is clearly presented as being of utmost importance- it is only preceded in the document by the right to the "primacy of the human being"<sup>104</sup>, which is arguably a statement of purpose for all human rights law (though this has been questioned in the face of the necessity for progress in medical science to benefit the many<sup>105</sup>). The right is also nodded to by non-legal documents, such as in the preamble of the World Health Organisation (WHO) constitution, which states that:

the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction...<sup>106</sup>

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<sup>101</sup> UN General Assembly. *Universal Declaration Of Human Rights*. 217 A (III); 1948. This particular right should be noted to be a basic right, and may not extend to all technologies and treatments, but it serves as a foundation (and inspiration) for those to which I subsequently will refer.

<sup>102</sup> *op. cit.* 82, 3.

<sup>103</sup> Council of Europe. *Convention For The Protection Of Human Rights And Dignity Of The Human Being With Regard To The Application Of Biology And Medicine (Oviedo Convention)*. Oviedo: 4 June 1997. Article 3.

<sup>104</sup> *ibid.* Article 2

<sup>105</sup> Parker C. The moral primacy of the human being. *Journal of Medical Ethics*. 2010;36(9):563-566.

<sup>106</sup> World Health Organisation. *Preamble To The Constitution Of The World Health Organization As Adopted By The International Health Conference*. New York; 1946.

Although this document is not an instrument of international law, its phrasing bears distinct similarities to that of the ICESCR. This may be unsurprising, given that the latter is a product of the UN General Assembly and the WHO is itself a chartered agency of the UN, but I venture that it is possible to interpret the very existence of the Organisation as a validation of the right.

The right to health, then, is very strongly represented in the literature. It cannot be denied that the right to health is one of primary importance and is inarguably well-founded. The same can be said of the right of access to science, or more specifically to the benefits of science, as stated in Article 27 of the UDHR:

Everyone has the right to freely participate in the cultural life of the community, to enjoy the arts *and to share in scientific advancement and its benefits.*<sup>107</sup>

Presented thusly, the right appears twofold- one is entitled to partake in the benefits provided by scientific endeavour, and also to engage with scientific progress and developments without there being a requirement for direct personal profit. The former, more simple formulation is given support in other instruments of international law- as we may expect, it is present in the ICESCR's Article 15, which asks that:

[t]he States Parties to the present Covenant recognize the right of everyone... [t]o enjoy the benefits of scientific progress and its applications....<sup>108</sup>

Further support is present in the European Convention on Human Rights and Biomedicine, although it is not explicitly presented as a right. Instead it is alluded to in the preamble of the document, by:

[a]ffirming that progress in biology and medicine should be used for the benefit of present and future generations[.]<sup>109</sup>

Given the positioning of this statement, in the section laying out fundamental principles which are taken to be true in order to rationalise the subsequent articles, we can infer that

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<sup>107</sup> *op. cit.* 101 Article 27. Emphasis added

<sup>108</sup> *op. cit.* 82. Article 15.1(b)

<sup>109</sup> *op. cit.* 103. Preamble

the drafters of the Oviedo Convention believe and wish to present the right to benefit from the results of biomedical research to be of utmost importance.

With the grounding of these two human rights established it appears clear that there is reason to understand that they defend the use of enhancement technologies, where we understand enhancement to be an extension of medicine. If this is the case then it is difficult to hold any view other than that these technologies ought to be available to all. Unfortunately what *ought* to be and what *is* are not the same. Resource availability and the distribution of wealth both within societies and globally render any ideas of a ‘positive’ right moot- much as with healthcare, it would be impossible to provide the infrastructure and materiel to all who might desire enhancement (and attempting to do so may hinder attempts to fulfil more essential positive rights such as nutrition). However, a ‘negative’ right, which would hold that enhancement technologies should not be denied to anyone with the means to access them, would not be impeded and would also be a realisation of the arguments above. This stance runs directly counter to the bioconservative agenda, which is generally to deny the use of enhancement. For the purposes of this thesis, I will hold the mandate for enhancement provided by these rights and by the reasoning provided in the previous sections as justification enough to approach each paper from a bioliberal and pro-enhancement viewpoint, supporting this negative right to enhance.

#### 4. PAPER OVERVIEWS

With the assumptions and rationales I will utilise made clear in the previous section, I will now present a summary of the articles that build upon them in **Part II** of this work. It cannot be understated that we are already in a world affected by the influx of enhancement in various forms, so it is important to recognise what surrounds us and becomes ever more relevant to our daily lives. Not only does enhancement technology see use in students or the military, we also see an increasing acceptance of it within popular culture- potentially the ultimate moral arbiter of our times [2.4]. I also present a number of legal cases in which related novel technologies have shown their potential impact in worrisome ways. In an age of augmentation, of cyborgs, and of artificial intelligence, what might become of the human is a natural question to ask. Here it is answered through a number of papers addressing the likely results of these technologies, and more pertinently what impact they might have. The advent of new types of conscious beings- either organic or synthetic- will, undoubtedly, shake the foundations of our society, and may lead us to expand our understanding of ourselves in very fundamental ways. So

too might a deeper consideration of what enhancement has done for us throughout history- one paper in particular delves into the specific mechanics by which it has affected our evolution and development, both as a species and as a moral community.

To accomplish the goal of establishing what this all *means* for us, and consequently how we should see the ethical and policy dimensions of enhancement, the thesis needs above all else to deliver a fresh angle on the relationship between *Homo sapiens sapiens*, the human, and whatever is posited to supersede it: the posthuman. Furthermore, there is the question of the android- the synthetic human. In considering the human community and issues of moral status and moral sufficiency, it may stand to reason that artificial intelligences satisfying these thresholds ought not to be othered in the same way as the purported posthuman. A major theme that emerges when taking the papers here provided together is the idea that humanity is a “matter of sufficiency”- an end-state for moral status, not a stepping-stone which one can be ‘post’.

The human sets itself apart through cognitive (and self-determinative) ability, and it may be the case that enhancing this capacity must therefore increase one’s humanity rather than decrease it. This idea links to those of ‘moral community’ and non-finite personhood. Furthermore, I have previously argued elsewhere<sup>110</sup> that there exist rights of ‘enablement’, which relate to the practice of self-realisation; legislatively backed through rights to personality, personhood, and self-determination. Human enhancements can act as the means by which these rights are given effect, and denied these means, one is denied the exercise of personhood. By discussion of the manner in which enhancement has been essential for *Homo sapiens* to evolve and survive up to the present, I hope to lend credence to the idea that it is enhancement that allows us to be ‘human’ and thereby counter the argument that it may cause our demotion as the dominant beings on the planet.

#### **4.1 Paper 1- New Technologies, Old Attitudes, and Legislative Rigidity**

The first paper included in its entirety, *New Technologies, Old Attitudes, and Legislative Rigidity*<sup>111</sup> addresses heritable changes to the human genome, notably through CRISPR (Clustered regularly interspaced short palindromic repeat) technology and mitochondrial

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<sup>110</sup> *op. cit.* 59

<sup>111</sup> Harris J, Lawrence DR. New Technologies, Old Attitudes, and Legislative Rigidity. In: Brownsword R, Scotford E, Yeung K, eds. *Oxford Handbook On The Law And Regulation Of Technology*. 1st ed. Oxford University Press; 2017:Forthcoming.

replacement therapy (MRT), which at the time of writing remain a major topic of regulatory and policy-focused debate. These two genetic technologies have revived interest in, and in some quarters a very familiar panic concerning, so-called germline interventions. The possibility of using either of these techniques in humans has encountered the most violent hostility and suspicion. My co-author and I counter the stance of the US NIH and its supporters- that wholesale condemnation of heritable germline interventions needs no justification as it is disliked by others- by showing that differing global moralities are free to exist unimpeded under international biolaw regimes, which do not in any way represent unified opinion against such technologies. Furthermore, we suggest a more rational approach to evaluating them through analysis of similar technologies which have caused past controversy; and this type of consideration will be vitally important when tackling other enhancement technologies likely to come under regulative scrutiny in the near future. The article provides a basis for using this approach to directly tackle my research questions, and gives a number of arguments against a commonly held and divisive viewpoint that the technologies in question will affect who and what types of beings our children might become. The paper was written in conjunction with Professor John Harris as a contribution to an Oxford Handbook on the Law and Regulation of Technology.

#### **4.2 Paper 2- Enhancing Sisyphus**

I then present an example of the application of this rational approach, in the short paper *Enhancing Sisyphus*,<sup>112</sup> a commentary for the American Journal of Bioethics: Neuroscience. In this, César Palacios-González and I argue that motivational enhancement, a theoretical but potentially highly impactful form of cognitive intervention, is not inherently morally problematic as has been claimed. A key element, as will be discussed in later chapters, of being ‘human’ is the desire to better oneself and live what might be called ‘a good life’. It would be ethical, therefore, to pursue such a life, and in the service of this goal to improve one’s experience. In this case, a motivational enhancement would only serve in the same way as listening to music might- the means, themselves, are not morally significant (providing they do no harm to others). Meaning is not lost in life or endeavour if one increases wellbeing by palliating symptoms of unpleasant circumstances, and this holds true for all enhancements. Using enhancements as assistance in life is no different from any other technique or tool we might use to overcome whatever might face us. This is a key issue throughout the thesis and is of great

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<sup>112</sup> Palacios-González C, Lawrence DR. Enhancing Sisyphus. *AJOB Neuroscience*. 2015;6(1):26-27.

importance to the research questions outlined earlier: enhancement technology is seldom different in any meaningful way to actions we already take toward our own benefit.

#### **4.3 Paper 3- Hot Baths and Cold Minds**

The third complete published paper in this thesis is entitled *Hot Baths and Cold Minds: Neuroscience, Mind Reading, and Mind Misreading*<sup>113</sup> and is written again in partnership with John Harris. Mind reading in whatever form we can technologically achieve would be without doubt an enhancement: a shortcut to something we strive to accomplish on a daily basis to do in any given interaction with another person. The idea—the possibility—of reading the mind, from the outside or indeed even from the inside, has exercised humanity from the earliest times. If we could read other minds both prospectively, to discern intentions and plans, and retrospectively, to discover what had been “on” those minds when various events had occurred, the implications for morality and for law and social policy would be immense. The article is a direct illustration of one of the things that enhancement is able to do for the human in the real world, as well as highlighting the implications of attaining such an ability.

Recent advances in neuroscience have offered some, probably remote, prospects of improved access to the mind, but a different branch of technology seems to offer the most promising and the most daunting prospect for both mind reading and mind misreading. The chapter concerns itself with the dawn of neuroimaging techniques, including functional magnetic resonance imaging (fMRI) and ‘brain fingerprinting’ or electroencephalography (EEG), which are increasingly being used in research to reconstruct experiences and to identify thoughts, comparing impulses or the activation of areas of the brain to vast databases of reactions to various images and concepts. There is interest- and have been attempts- to utilise this technology in legal contexts, as a lie-detector; and this raises serious concerns about the risks of mistaken conclusions from imperfect technology, or philosophically troubling concepts of mind. Parallels are drawn with police usage of internet histories and ‘the cloud’ as a way of inferring a suspect’s thoughts, and the insecurity of these services. If we misread- through misuse or misunderstanding of our newfound enhanced abilities to communicate or ‘see’ thoughts- then there are, indeed, serious policy and ethical questions. It is a further, sobering

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<sup>113</sup> Harris J, Lawrence DR. *Hot Baths and Cold Minds: Neuroscience, Mind Reading, and Mind Misreading*. Cambridge Quarterly of Healthcare Ethics. 2015;24(02):123-134.

example of the need for a rational approach to technology and how it can impact us, rather than an emotional one.

#### **4.4 Paper 4- The Shylock Syndrome**

Motivation is the ultimate driver of behaviour, and one of the foundations of what it is to be human. Motivation has shaped our actions and led us to being who and what we see ourselves to be. If motivations are compatible between what conservative commentators might like to divide into ‘us’ and ‘them’, there ought be no conflict of interest. The fourth standalone article in this thesis, *The Shylock Syndrome*<sup>114</sup>, is a multi-authored piece centred on this concept and its relation to artificial intelligence. It seems natural to think that the same prudential and ethical reasons for mutual respect and tolerance that one has vis-à-vis other human persons would hold toward any newly encountered paradigmatic but nonhuman biological persons, perhaps produced through enhancement technologies. One also tends to think that they would have similar reasons for treating we humans as creatures that count morally in our own right. This line of thought transcends biological boundaries—namely, with regard to artificially (super)intelligent persons—but is this a safe assumption? The issue is one of ultimate moral significance: the significance possessed by human persons, persons from other planets, and hypothetical nonorganic persons in the form of artificial intelligence (AI). This article investigates why our possible relations to AI persons could be more complicated than they first might appear, given that they might possess a different nature to us, or different goals; even to the point that civilized or peaceful coexistence in a determinate geographical space could be threatened. Our use of AI as a means of enhancing our own existences will very likely affect what it is to be a human, and our position in society, in the future. The indications of the paper are instructive in how future human-affecting technologies should be embraced—one must consider closely the moral significance of the act of their use, but also that of what they might produce or cause to exist.

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<sup>114</sup> Lawrence DR, Palacios-González C, Harris J. Artificial Intelligence: The Shylock Syndrome. *Cambridge Quarterly of Healthcare Ethics*. 2016;25(02):250-261

#### **4.5 Paper 5- The Edge of Human**

The fifth article included, *The Edge of Human: The Problem with the Posthuman as the Beyond*<sup>115</sup> applies this approach to more of the core questions of the thesis. Many critics articulate fears of the so-called ‘posthuman’ without giving any real basis for them. This paper asks whether enhancement can truly lead to something beyond humanity, or whether it is, itself, an inherently human act. The ‘posthuman’ itself is an uncertain proposition. What, exactly, would one be? Many commentators suggest it to be an endpoint for the use of enhancement technologies, yet few choose to define the term outright; which frequently leads to unnecessary confusion. Characterising and contextualising the term, particularly its more novel uses, is therefore a valuable enterprise. The abuse of the term ‘Human’, especially in the context of the enhancement debate and the myriad meanings ascribed to it, could give ‘posthuman’ very different slants depending on one’s assumptions. There are perhaps three main senses in which the term ‘human’ is employed- the biological, the moral, and the self-idealising. In the first of these, ‘human’ is often conflated with *Homo sapiens*, and used interchangeably to denote species; in the second, ‘human’ (or ‘humanity’) generally refers to a community of beings which qualify as having a certain moral value; and the third, the self-idealising sense, is more descriptive; a label denoting the qualities that make us who we are as beings, or ‘what matters about those who matter’. So, I ask, what might enhancement make us- a novel species or genus of hominid; or perhaps a morally more valuable being than a regular human? There is also a third option: that a posthuman is a being which embodies our self-ideal more successfully than we do ourselves- one “more human than human”. The chapter concludes that, in truth, it is unlikely that there would be some morally significant distinction between the human and posthuman, but rather that they might be one and the same. Attempting to draw division, on the other hand, proves problematic. I argue, too, that ‘posthuman’ is an inaccurate term to use- there is no reason to assume that enhanced or otherwise augmented beings will be ‘beyond’ or temporally surpassing of baseline humanity. At the close of the chapter, I suggest the term ‘Metahuman’, which may carry a different inference- ‘alongside, but not separate’- if, indeed, we need discriminate at all.

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<sup>115</sup> Lawrence DR ‘The Edge of Human: The Problem with the Posthuman as Beyond’ *Bioethics Online* 2016 doi:10.1111/bioe.12318

#### **4.6 Paper 6- More Human Than Human**

The next articles in the thesis follow the implications of these findings. The sixth paper, *More Human Than Human*,<sup>116</sup> explores more directly what the ramifications of such beings becoming extant are likely to be for humankind and for *Homo sapiens*. Within the literature surrounding nonhuman animals on the one hand and cognitively disabled humans on the other, there is much discussion of where beings that do not satisfy the criteria for personhood fit in our moral deliberations. In the future we may face a different but related problem, that we might create (or cause the creation of) beings that not only satisfy but exceed these criteria. The question becomes whether these are minimal criteria, or hierarchical, such that those who fulfil them to greater degree should be afforded greater consideration. This paper questions the validity and necessity of drawing divisions between beings that satisfy the minimum requirements for personhood; considering how future beings- intelligent androids, synthetoids, even alternate-substrate sentiences- might fit alongside the ‘baseline’ human. I ask whether these alternate beings ought be considered different to us, and why this may or may not matter in terms of a notion of ‘human community’. The film Blade Runner, concerned in large part with humanity, and its key synthetoid antagonist Roy Batty form a framing touchstone for the discussion in the chapter. Batty is stronger, faster, more resilient, and more intelligent than *Homo sapiens*. His exploits, far beyond the capability of normal men, are contrasted with his frailty and transient lifespan, his aesthetic appreciation of the sights he has seen, and his burgeoning empathy. The chapter reinforces the idea that our relationship with enhancement technologies and our relationship with the future of humanity are intertwined; and that if we are to retain the one we must perforce embrace the other. Again, the conclusion must be drawn that we are not likely to be significantly different from whatever novel beings arise from enhancement or other developments of science, and it would therefore behove us to prepare for their potential emergence in a manner which respects this.

#### **4.7 Paper 7- *Amplio, Ergo Sum***

The seventh and final paper collected here strikes to the heart of the case I am building and is in many ways the key article. It is fitting therefore that it comes last, with the weight of all prior argument behind it and able to build upon them. One might be led to think that if, as is argued throughout, the effects of enhancement technologies are not morally

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<sup>116</sup> Lawrence D. More Human Than Human. *Cambridge Quarterly of Healthcare Ethics*. 26(3):Forthcoming 2017.

significant; and the beings that might arise from them could qualify as persons and even as members of humanity then there may be a connection to be drawn. *Amplio, ergo sum* is a paper presently under review focused on where humanity has come from for us to have developed our notions of what and who might be a part of it. The paper makes a case for a ‘human continuum’ throughout evolutionary history, and finds that this continuum is likely to have been forged and guided by the use of enhancement technologies. These technologies may not be those that we might initially think of as enhancement today, but there is a strong case to be made arguing against the bioconservative position that non-permanent, non-invasive, or non-‘technoscientific’ technologies and behaviours are just as, if not more, befitting of the description than the modern and futuristic concepts that are discussed. The indication of the argument presented is that technology is an essential element of this human continuum, and *Homo sapiens* is by its very nature an enhanced being. If so, there are powerful reasons to consider our attitudes to any proposed novel being created through enhancement (or other) technology- just as we look back upon our ancestors from whom we have enhanced ourselves, so might the posthuman look back upon us. This final paper presents the ultimate answer to my research question regarding what enhancement technology means for the human, and has done for the human- but it also speaks to the future of humanity, and the idea that the human is a changeable feast, forever shaped by means of enhancement. I enhance, therefore I am.

# **PART II**

# **PAPERS**

## **5.0 NEW TECHNOLOGIES, OLD ATTITUDES AND LEGISLATIVE RIGIDITY**

**John Harris and David R. Lawrence**

*The collaborative and cooperative manner of writing this paper does not lend itself to identifying the specific contributions of each author by section or word count. Each contributor has agreed on an equal share of authorship of the paper, i.e. 50%*

Harris J, Lawrence D. New Technologies, Old Attitudes, and Legislative Rigidity. In: Brownsword R, Scotford E, Yeung K, ed. *Oxford Handbook On The Law And Regulation Of Technology*. Oxford University Press; 2017: In Press.

### **5.1 Abstract**

Two genetic technologies capable of making heritable changes to the human genome have revived interest in, and in some quarters a very familiar panic concerning, so-called germline interventions. These technologies are most recently the use of CRISPR/Cas9 to edit genes in non-viable IVF zygotes and Mitochondrial Replacement Therapy (MRT). The possibility of using either of these techniques in humans has encountered the most violent hostility and suspicion. Here, we counter the stance of the US NIH and its supporters by showing that differing global moralities are free to exist unimpeded under international biolaw regimes, which do not in any way represent unified opinion against such technologies. Furthermore, we suggest a more rational approach to evaluating them through analysis of similar technologies which have caused past controversy.

### **5.2 Introduction**

The concept of altering the human germline in embryos for clinical purposes has been debated over many years from many different perspectives, and has been viewed almost universally as a line that should not be crossed... Advances in

technology have given us an elegant new way of carrying out genome editing, but the strong arguments against engaging in this activity remain.<sup>1</sup>

Thus spake the director of the US National Institutes of Health, Francis Collins. As we shall see, however, this public statement is somewhat misleading.

The statement was issued in the wake of the media furore<sup>2</sup> engendered by the publication of research by Liang *et al*,<sup>3</sup> in which the genome of a human embryo was edited to correct mutations which are the basis of potentially severe β thalassemia type blood disorders.

The controversy rolls on with the recent application by UK researchers for a licence to conduct similar experiments using the Crispr/Cas9 system.<sup>4</sup>

It is should be noted at this point that in the Chinese research as well as the proposed UK research, the embryos were/would be destroyed once the success or failure of the procedure was determined. At no point were any of the involved embryos proposed for implantation or otherwise bringing to fruition. In a broader sense, the collective human germline remains unaffected by research in this manner; an idea to which we will return later.

Collins' claim regarding germline modification being "universally" shunned is intriguing. He does not elaborate on how this has been demonstrated, legally or otherwise. Marcy Darnovsky, Executive Director of the bioconservative Centre for Genetics and Society, suggests in a statement supporting Collins' that it would be in the USA's interest to follow (or institute anew) "international agreements, along the lines of the Council of Europe's Convention on Biomedicine and Human Rights and UNESCO's Universal Declaration on the Human Genome and Human Rights".<sup>5</sup> The inference perhaps being

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<sup>1</sup> Collins F. Statement on NIH funding of research using gene-editing technologies in human embryos. *National Institutes of Health (NIH)*. 2015. Available at: <https://www.nih.gov/about-nih/who-we-are/nih-director/statements/statement-nih-funding-research-using-gene-editing-technologies-human-embryos>. Accessed October 28, 2016.

<sup>2</sup> Including the entertainingly titled Stanley T. Three parent babies: unethical, scary and wrong. *Telegraph* Feb 3 2015. Available at: <http://www.telegraph.co.uk/news/health/11380784/Three-parent-babies-unethical-scary-and-wrong.html>. Accessed September 27, 2015.

<sup>3</sup> Liang P, Xu Y, Zhang X et al. CRISPR/Cas9-mediated gene editing in human tripronuclear zygotes. *Protein & Cell*. 2015;6(5):363-372.

<sup>4</sup> Cressey D, Abbott A and Ledford H, UK Scientists Apply for Licence to Edit Genes in Human Embryos *Nature News*, 18 September 2015. Available at <[www.nature.com/news/uk-scientists-apply-for-licence-to-edit-genes-in-human-embryos-1.18394](http://www.nature.com/news/uk-scientists-apply-for-licence-to-edit-genes-in-human-embryos-1.18394)> accessed 25 November 2015

<sup>5</sup> Centre for Genetics and Society. NIH Statement on Gene Editing Highlights Need for Stronger US Stance on Genetically Modified Humans, Says Public Interest Group. *Geneticsandsociety.org*. 2015. Available at: <http://www.geneticsandsociety.org/article.php?id=8544>. Accessed October 28, 2016.

that the named legislation represents Collins' universal consensus, though this notion is questionable at best.

The Council of Europe's Convention on Human Rights and Biomedicine (henceforth ECHRB or 'the Convention') was intended to constitute a binding reference for patient rights and general human rights in the context of advancements in biotechnology and medical science. It has, numerically speaking, been quite successful in its uptake. The official listings<sup>6</sup> published by the Council indicate that out of 47 member states, 35 are signatories and of these, 29 have ratified the Convention. We cannot, however, necessarily take these figures at face value; particularly when we consider the idea of "agreements" in the spirit in which it is employed by, for example, Darnovsky, who is representative of those broadly favourable to the spirit of Collins' statement.

Several of the leading European nations at least as far as genetic science goes, for example the United Kingdom, Germany, and Belgium, made clear their disagreement with the Convention by choosing not to sign at all. Largely, these disagreements were over Article 18, regarding cloning human embryos for research, amongst other "significant articles that conflict with [UK] legislation".<sup>7</sup>

The Convention required only five states (Article 33.3<sup>8</sup>) to ratify in order for it to enter into force, and within eight months of its opening it had gained 23 signatures- a sufficient number of which ratified to allow an entry into force on January 12<sup>th</sup> 1999.<sup>9</sup>

Further ratifications quickly followed, giving a total of 13 within five years of publication. It is important to note that roughly two thirds of the present day signatures on the ECHRB were made in 1997, while in the last ten years there has been only one new signatory: Albania in 2011.<sup>10</sup> Though, this is perhaps unsurprising since it might be expected that most of those who were ever going to sign had done so by this point. In signing the

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<sup>6</sup> Treaty Office of the Council of Europe, *Convention for the protection of Human Rights and dignity of the human being with regard to the application of biology and medicine: Convention on Human Rights and Biomedicine* CETS No.: 164. Oviedo, 1997. Available at <http://conventions.coe.int/Treaty/Commun/CercheSig.asp?NT=164&CM=&DF=&CL=ENG> Accessed 5 October 2015

<sup>7</sup> UK Parliament. Select Committee On Science And Technology Fifth Report. <http://www.publications.parliament.uk/pa/cm200405/cmselect/cmsctech/7/704.htm> Accessed 5 October 2015; 2005.

<sup>8</sup> *op. cit.* 6

<sup>9</sup> A date at which, we might note, human germline editing of the type currently being discussed was not a reality, let alone a concern of policymakers.

<sup>10</sup> *op. cit.* 6

Convention, nations do not necessarily “express their consent to be bound by it”<sup>11</sup> and so, if we are to treat this literally, we may not consider that this act in itself constitutes an accord with the ideals espoused within.

Frances Millard<sup>12</sup> has suggested that nine of the ten post-communist central and eastern European states all signed and quickly ratified the ECHRB, “with no indication of engagement by parliamentary deputies, specialist committees, professional bodies, or the wider public.” We must ask, then, whether what might be termed “mimetic” uptake of legislation without proper and mature consideration in this manner can be truly considered to represent consensus. Noting Millard’s views on a perceived need by these nations for international ‘legitimization’, we must consider that for the most part, the newly sovereign states lacked specialist bioethical and patient rights legislation,<sup>13</sup> having had to construct and legislate a recently democratized state. Much human rights policy was formed on the basis of Council of Europe guidelines, and it is of importance that we note that most of the Constitutions of these nations hold that the norms of ratified international treaties are directly applicable in the national legislation; so courts can rule based on the texts of international treaties, even if national laws have not yet been adopted after the ratification.<sup>14</sup> This effectively means that in the Convention, these states were presented with ready-made legislation covering gaps in their own, which was fully and legally applicable with no further domestic lawmaking required. None of the states engaged in meaningful debate over any part of the Convention, if at all, and so ratifications came quickly and without dissent. We might also note that the provision of Article 1—namely, that “Each Party shall take in its internal law the necessary measures to give effect to the provisions of this Convention”<sup>15</sup>—becomes self-fulfilling in respect to the aforementioned style of constitutional absorption of international non-binding conventions.

Instantly, then, from holding no position on the matters addressed by the Convention, these post-communist nations aligned in consensus with it. Of course it is possible that one or more of these nations may eventually consider holding future debate on any of these issues and then be in a position to join a genuine consensus or not on the basis of something approaching informed consent.

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<sup>11</sup> *ibid.*

<sup>12</sup> Millard F. Rights Transmission by Mimesis: the Biomedicine Convention in Central Europe. *Journal of Human Rights*. 2010;9(4):427-444.

<sup>13</sup> Birmontiene T. Health Legislation in Eastern European Countries: the Baltic States. *European Journal of Health Law*. 2004;11(1):77-86.

<sup>14</sup> Goffin T, Barry P, Dierickx K, Nys H. Why eight EU Member States signed, but not yet ratified the Convention for Human Rights and Biomedicine. *Health Policy*. 2008;86(2-3):222-233.

<sup>15</sup> *op. cit.* 6

If morally derived laws such as the ECHRB do not reflect the moral standpoint of a particular nation, then such laws are unlikely to reflect either any contribution to a consensus nor yet any evidence for democratic support. While this can be held to be true under any theory of ethics, it has been argued that:

we need not adopt a quietism about moral traditions that cause hardship and suffering. Nor need we passively accept the moral norms of our own respective societies, to the extent that they are ineffective or counterproductive or simply unnecessary.<sup>16</sup>

This is to say that the subjective values of a culture or nation are worthy of defence, and as such we do not have to accept contraventions of these from within or without. The method by which we defend our values on a national scale is through the enactment of laws, and so it may follow—as Darnovsky appears to agree—that to prevent encroachment from abroad one must pass international legislation.

To examine this, we might utilise the example once more of the ECHRB, which is nominally aimed solely at member states of the Council of Europe. It is important to note that the Convention is not global legislation. Although it allows for the accession of non-member states (“After the entry into force of this Convention, the Committee... may... invite any non-member State of the Council of Europe to accede to this Convention”<sup>17</sup>), the Convention contextualises itself as pertaining to the benefit of the Council of Europe in its Preamble: “Considering that the aim of the Council of Europe is the achievement of a greater unity between its members...”<sup>18</sup> This passage can be interpreted as specifying the area of influence of the document, and as such makes it clear that it is intended to protect or rather promote a coherent expression of values within that area.

The issue which remains, then, is that while protection of one’s own values is acceptable, it is quite another action to impose such laws on others. This would usually constitute a contravention of human rights ideals and also steps somewhat beyond a defence, becoming an attack upon the values held by the subject. There are two ways in which we can consider this dilemma.

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<sup>16</sup> Blackford R. Book Review: Sam Harris' The Moral Landscape. *Journal of Evolution and Technology*. 2010;21(2):53-62.

<sup>17</sup> *op. cit.* 6. Article 34.1.

<sup>18</sup> *ibid.* Preamble. Emphasis added.

The first line of inquiry requires us to endorse the notion that international disagreement, represented by a failure of consensus amongst the drafting agents of a document, leads to a weak compromise designed to placate all parties. Such a criticism was levelled at the then-draft Universal Declaration on Bioethics and Human Rights by John Williams, who called it “a document that does not advance international bioethics in any way” and went on to suggest that “a genuinely significant international [declaration]... is essentially unrealisable.”<sup>19</sup> This problem would appear to be a necessary result of formulating proposals for legislation to maximise acceptability, as would be one provision for law from a morally relativistic position; and so it lends itself as evidence in support of the idea that international laws have legitimacy issues.

Secondly, nations are free not to accept the terms of any international instrument. For example, as mentioned earlier several states refused to sign, let alone ratify, the ECHRB.<sup>20</sup> Whether for reasons of protecting values already enshrined in domestic biolaw,<sup>21</sup> or for reasons of cultural morality as given in India’s explanation for voting against the Universal Declaration on Human Cloning (that “some of the provisions of the Declaration could be interpreted as a call for a total ban on all forms of human cloning”<sup>22</sup>, when India supports therapeutic cloning); it is unquestionably the case that nations are able to protect their own values by refusing to accede. We might (wryly) note that the UDoHC was originally intended to be a binding Convention, but was downgraded due to disagreement.<sup>23</sup>

Therefore, we may assume that differing global moralities are free to exist unimpeded under international biolaw regimes, and they do not in any way represent unified opinion against a technology such as germline modification; despite the way that supporters of the NIH’s stance may seek to justify their condemnation.

Having noted that appeals to moral and legislative consensus on the permissibility or even wisdom of germline interventions may be premature, it is now time to examine in more detail what might constitute a basis for a rational approach to new technologies in this field. To do so we will examine the emergence- or re-emergence- of three new such

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<sup>19</sup> Williams J. Unesco's Proposed Declaration On Bioethics And Human Rights - A Bland Compromise. *Developing World Bioethics* 2005;5(3):210-215 at 215

<sup>20</sup> *op. cit.* 6

<sup>21</sup> *op. cit.* 7

<sup>22</sup> United Nations. *Press Release GA/10333. Fifty-Ninth General Assembly Plenary 82<sup>nd</sup> Meeting*. 2005. Available at <http://www.un.org/News/Press/docs/2005/ga10333.doc.htm> Accessed October 5 2015

<sup>23</sup> *ibid*

technologies that involve germline interventions. In the following sections the discussion follows lines explored by one of the present authors in two recent research papers.<sup>24</sup>

### 5.3 Altering the human germline in embryos: A case study

The human embryo modification debate opened with the birth of Louise Brown, the first IVF baby on July 25th 1978 (for description of the technique, see Harris, 1983<sup>25</sup>; and for discussion of some possible advantages of human cloning, see Harris, 1985<sup>26</sup> and 2004<sup>27</sup>). However the defining event was of course the birth of another instantly famous female baby in the United Kingdom, which was announced in *Nature* on February 27, 1997.<sup>28</sup> This baby was named “Dolly”, allegedly because she had been cloned from a mammary gland which instantly reminded those responsible of Dolly Parton. Louise and Dolly proved to be healthy and, as far as is publicly known, happy individuals; who like the over 5 million babies since born worldwide via IVF owe their existence to British science and in particular to the work of Bob Edwards and Patrick Steptoe.<sup>29</sup> We may hope that a very large proportion of these children are glad to be alive and glad their births were not prevented by the suppression of the science that made them possible...more of which anon.

Louise Brown and Dolly are related also by the unfortunate prejudice against them and denunciation of their respective births of those who objected and continue to object to the technologies and indeed the scientists that produced them.

Two genetic technologies capable of making heritable changes to the human genome have revived interest in, and in some quarters a very familiar panic concerning, so-called germline interventions. These technologies are most recently the use of CRISPR/Cas9 to edit genes in non-viable IVF zygotes<sup>30</sup> and Mitochondrial Replacement Therapy (MRT) the

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<sup>24</sup> Harris J. Germline Modification and the Burden of Human Existence. *Cambridge Quarterly of Healthcare Ethics*. 2015;25(01):6-18.

20. Harris J. Germline Manipulation and Our Future Worlds. *The American Journal of Bioethics*. 2015;15(12):30-34.

<sup>25</sup> Harris J. In Vitro Fertilization: The Ethical Issues (I). *The Philosophical Quarterly*. 1983;33(132):217.

<sup>26</sup> Harris J. *The Value Of Life*. 1st ed. London: Routledge & Kegan Paul; 1985.

<sup>27</sup> Harris J. *On Cloning*. 1st ed. London: Routledge; 2004.

<sup>28</sup> Wilmut I, Schnieke A, McWhir J, Kind A, Campbell K. Viable Offspring Derived from Fetal And Adult Mammalian Cells. *Cloning and Stem Cells*. 2007;9(1):3-7.

<sup>29</sup> Brian K. The amazing story of IVF: 35 years and five million babies later. *The Guardian*. July 12 2013. Available at: <https://www.theguardian.com/society/2013/jul/12/story-ivf-five-million-babies>. Accessed November 24, 2016.

<sup>30</sup> *op. cit.* 1.

use of which was approved in principle in a landmark vote earlier this year by the United Kingdom Parliament.<sup>31</sup> The possibility of using either of these techniques in humans has encountered the most violent hostility and suspicion. However it is important to be aware that much of this hostility dates back to the fears associated with IVF and other reproductive technologies and by cloning; fears which were baseless at the time with both having proven to be highly beneficial to humanity and to be effectively regulated and controlled.

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) publishing their Universal Declaration on the Human Genome and Human Rights, on 11 November 1997,<sup>32</sup> endorsed “The preservation of the human genome as common heritage of humanity”. Article 13 of the ECHRB provides:

An intervention seeking to modify the human genome may only be undertaken for preventive, diagnostic or therapeutic purposes and only if its aim is not to introduce any modification in the genome of any descendants.

How any such modification could be made without having the aim of introducing such “modification in the genome of any descendants” the Council of Europe does not explain. And, Article 1 of the Additional Protocol specifically aimed at banning cloning provides:

1. Any intervention seeking to create a human being genetically identical to another human being, whether living or dead, is prohibited.
2. For the purpose of this article, the term human being "genetically identical" to another human being means a human being sharing with another the same nuclear gene set.<sup>33</sup>

Those who appeal to the common heritage of humanity in this way have also come to see the present evolved state of the human genome, not only as the common heritage of

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<sup>31</sup> UK Parliament. *The Human Fertilisation and Embryology (Mitochondrial Donation) Regulations 2015 No. 572* London: March 2015 [http://www.legislation.gov.uk/uksi/2015/572/pdfs/uksi\\_20150572\\_en.pdf](http://www.legislation.gov.uk/uksi/2015/572/pdfs/uksi_20150572_en.pdf) Accessed 5 October 2015

<sup>32</sup> UN Educational, Scientific and Cultural Organisation (UNESCO), *Universal Declaration on the Human Genome and Human Rights*, 11 November 1997, available at: <http://www.refworld.org/docid/404226144.html> Accessed 23 October 2015

<sup>33</sup> Treaty Office of the Council of Europe *Additional Protocol to the Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine, on the Prohibition of Cloning Human Beings*. 1998 <http://conventions.coe.int/Treaty/en/Treaties/Html/168.htm>. Accessed 5<sup>th</sup> October 2015

humanity, but as involving the, almost always un-argued, assertion that the human genome must be “frozen”, as far as is possible, in perpetuity at this particular evolutionary stage.

The consensus against germline interventions *per se*—a consensus that one of us long ago argued was ill-conceived<sup>34</sup>—is now crumbling. The recent vote in the UK Parliament<sup>35</sup> to change the law concerning germline interventions (along with the previously mentioned recent application to conduct such research in human embryos) and the willingness of the United States Institute of Medicine of the National Academies to make a serious and objective re-assessment of these issues,<sup>36</sup> are just two examples.

UNESCO (and many before and since) conveniently ignore the fact that cloning is the only reproductive method that actually does preserve the human genome intact. Indeed it copies it (though sometimes only almost) exactly. Other forms of human reproduction on the other hand randomly vary the human genome with each combination of the genetic material of two or more different individuals. What human reproduction does not do very well is improve it. As Harris has argued, the human genome in its present state is a very imperfect “work in progress”.<sup>37</sup> The problem is that progress via Darwinian evolution is extremely slow and the direction unpredictable, save only that it will facilitate gene survival.<sup>38</sup> We surely need to accelerate the development of better resistance to bacteria, disease, viruses or hostile environments or of the technologies that will be eventually necessary to find, and travel to, habitats alternative to the earth.

#### 5.4 Mitochondrial Replacement Therapy (MRT)

As mentioned, recent papers, editorials, and news items discuss possible research and therapy using various genome modification techniques, and have been followed by the announcement that a group in China had used such techniques in human embryos.<sup>39</sup> In the light of these and other developments we urgently need to re-assess the safety,

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<sup>34</sup> Harris J. *Wonderwoman And Superman*. Oxford [England]: Oxford University Press; 1992: Ch 8.

<sup>35</sup> Vogel G, Stokstad E. U.K. Parliament approves controversial three-parent mitochondrial gene therapy. *ScienceInsider*. 2015; February 3. Available at <http://news.sciencemag.org/biology/2015/02/u-k-parliament-approves-controversial-three-parent-mitochondrial-gene-therapy>. Accessed 7th April 2015

<sup>36</sup> *op. cit.* 24 and, also, Claiborne A, English R, Kahn J. *Mitochondrial Replacement Techniques*. National Academies; 2016.

<sup>37</sup> Harris J. *Enhancing Evolution*. Princeton: Princeton University Press; 2010.

<sup>38</sup> Dawkins R. *The Selfish Gene*. Oxford: Oxford University Press; 1989.

<sup>39</sup> Cyranoski D. Ethics of embryo editing divides scientists. *Nature*. 2015;519(7543):272-272.; Cyranoski D, Reardon S. Chinese scientists genetically modify human embryos. *Nature* (online). 2015. Available at <http://www.nature.com/news/chinese-scientists-genetically-modify-human-embryos-1.17378>. Accessed 23 October 2015

efficacy and ethics of the use of such techniques in humans and move towards a new consensus as to the appropriate conditions for their ultimate acceptability<sup>40</sup> emphasize the need for such work to be carried out “in countries with a highly developed bioscience capacity” and ones in which “tight regulation” of such science exists or can be established.

In the UK any further such modifications that would end up in the genome of an implanted human embryo would have to be licensed by the UK regulatory body, the Human Fertilisation and Embryology Authority (HFEA) as established by Act of Parliament in 1990.<sup>41</sup> Such measures would probably also need to be approved separately by the UK Parliament, as has recently happened in the case of MRT.<sup>42</sup> In the UK we have for more than 25 years had, so far adequate and robust, safeguards in place. However, these safeguards result from prior years of wide public consultation, scholarly research and authoritative reports,<sup>43</sup> resulting in a broad consensus on the way forward, established and continually reviewed by Parliament.

MRT is considered (by the above standard) as now “safe enough” for use in humans, remembering that there is no such thing as “safe”. What is “safe enough” is context-relative and always involves risk benefit analysis appropriate to the context. For example almost all chemical therapies used in the treatment of cancer are highly toxic and as a result, unlike most other pharmaceuticals licensed for human use, have never been tested on “healthy adults” before clinical adoption. They are however considered safe enough by cancer patients, their families and clinicians in the light of the lethal nature of the alternatives.

MRT will enable some 2500 women in the UK to have children genetically related to them and also avoid that child suffering terrible disease. Mitochondrial disease can be very serious, causing conditions like Leigh’s disease, a fatal infant encephalopathy, and others that waste muscles or cause diabetes and deafness.

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<sup>40</sup> Baltimore D, Berg P, Botchan M et al. A prudent path forward for genomic engineering and germline gene modification. *Science*. 2015;348(6230):36-38.; Cyranoski D. Ethics of embryo editing divides scientists. *Nature*. 2015;519(7543):272-272.; Lanphier E, Urnov F, Haecker S, Werner M, Smolenski J. Don’t edit the human germ line. *Nature*. 2015;519(7544):410-411. doi:10.1038/519410a.; Vogel G. Embryo engineering alarm. *Science*. 2015;347(6228):1301-1301.

<sup>41</sup> UK Parliament. The Human Fertilisation and Embryology Act 1990 c.37.

<http://www.legislation.gov.uk/ukpga/1990/37/contents>. As amended by the Human Fertilisation and Embryology Act 2008 c.22. <http://www.legislation.gov.uk/ukpga/2008/22/contents>. Both accessed 7 April 2015.

<sup>42</sup> *op. cit.* 7.

<sup>43</sup> Warnock M. *Report Of The Committee Of Inquiry Into Human Fertilisation And Embryology* ('The Warnock Report'), Cm 9314. Department of Health and Social Security, 1984. Available at: [http://www.hfea.gov.uk/docs/Warnock\\_Report\\_of\\_the\\_Committee\\_of\\_Inquiry\\_into\\_Human\\_Fertilisation\\_and\\_Embryology\\_1984.pdf](http://www.hfea.gov.uk/docs/Warnock_Report_of_the_Committee_of_Inquiry_into_Human_Fertilisation_and_Embryology_1984.pdf). Accessed February 13, 2017.

#### 5.4.1 Future Generations

Many objections to germline interventions emphasise that such interventions differ in affecting “generations down the line”<sup>44</sup>. However, this is true not only of all assisted reproductive technologies, but of all reproduction of whatever kind. This so-called “uncharted territory”<sup>45</sup> naturally involves trade-offs between benefits to people now and concerns about future dangers. The introduction of all new technologies involves uncertainty about long-term and unforeseen events.

This is, of course, also true of “normal” sexual reproduction, a very dangerous activity indeed, and one often described as a “genetic lottery”:

Every year an estimated 7.9 million children - 6 percent of total birth worldwide - are born with a serious birth defect of genetic or partially genetic origin. Additional hundreds of thousands more are born with serious birth defects of post-conception origin, including maternal exposure to environmental agents, (teratogens) such as alcohol, rubella, syphilis and iodine deficiency that can harm a developing fetus.<sup>46</sup>

Sexual reproduction, with its gross inefficiency in terms of the death and destruction of embryos—according to Ord,<sup>47</sup> the estimated survival rate to term is in the region of only 37%, with around 226 million spontaneous abortions— involves significant harm to future generations but is not usually objected to on these grounds.

If the appropriate test for permissible risk of harm to future generations is sexual reproduction, other germline changing techniques (other than sexual reproduction, that is) would need to demonstrate severe foreseeable dangers in order to fail. MRT will prevent serious mitochondrial disease and the suffering it causes for women with mitochondrial disease, their own children and for countless future generations. This looks like a reasonable cost benefit strategy to attempt.

Moreover, as John Harris<sup>48</sup> points out in a comprehensive discussion of these issues,

In the case of Mitochondrial disease we know that many women will continue to desire their own genetically related children and will continue to have them if

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<sup>44</sup> Jardine, L quoted in Sample I. Regulator to consult public over plans for new fertility treatments. *The Guardian*. 2012. Available at: <https://www.theguardian.com/science/2012/sep/17/genetics-embryo-dna-mitochondrial-disease?newsfeed=true>. Accessed April 8, 2015.

<sup>45</sup> *ibid*.

<sup>46</sup> The March of Dimes Birth Defects Foundation. *March Of Dimes Global Report On Birth Defects*. New York: White Plains; 2006.

<sup>47</sup> Ord T. The Scourge: Moral Implications of Natural Embryo Loss. *The American Journal of Bioethics*. 2008;8(7):12-19.

<sup>48</sup> *op. cit.* 24

denied or unable to access MRT. The denial of access to MRT will not prevent serious disease being transmitted indefinitely through the generations whereas access to MRT can be expected significantly to reduce this risk. The choice here is not between a germline intervention which might go wrong and as a result perpetuate a problem indefinitely and a safe alternative. It is between such a technique and no current alternative for women who want their own genetically related offspring and who will also act so as to perpetuate the occurrence of disease.

In other words, the alternative to MRT involves a greater known risk.

#### **5.4.2 Three parent families**

The popular press usually labels MRT as the “three genetic parents” process despite the fact that the third-party DNA contained in the donated mitochondria comprises much less than 1% of the total genetic contribution, and does not transmit any of the traits that confer the usual family resemblances and distinctive personal features in which both parents and children are interested. The mitochondria provide energy to cells, and when they are diseased cause inheritable harm – hence the need for mitochondria replacement therapy. No identity-conferring features or other familial traits are transmitted by the mitochondria. In any event, to be a parent properly so called, as opposed to a mere progenitor, involves much more than a genetic contribution to the child and often not even a genetic contribution.

#### **5.5 The use of CRISPR/Cas9 in embryos**

Many of the arguments rehearsed above also apply to objections to other germline modification techniques. To return to our starting point, Francis Collins<sup>49</sup> has further stated:

[T]he strong arguments against engaging in this activity remain. These include the serious and unquantifiable safety issues, ethical issues presented by altering the germline in a way that affects the next generation without their consent...

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<sup>49</sup> *op. cit.* 1

“Serious and unquantifiable” safety issues feature in all new technologies; what is different here? Collins thinks one important difference is absence of consent.

### 5.5.1 Consent

Consent is simply irrelevant here for the simple and sufficient reason that there are no relevant people in existence capable of either giving or withholding consent to these sorts of changes in their own germline. We all have to make decisions for future people without considering their inevitably absent consent. All would be/might be parents take numerous decisions about issues that might affect their future children, and they/we do this all the time without thinking about consent of the children; how could they/we not do so? There are decisions first and foremost in most cases of sexual reproduction, about what genetic endowment is likely to result from a particular paring (or more complex combination) of sets of chromosomes. George Bernard Shaw and Isadora Duncan were famous, but only partial and possibly apocryphal<sup>50</sup> exceptions. When she, apparently, said to him something like: “why don’t we have a child... with my looks and your brains it cannot fail” and received Shaw’s more rational assessment... “yes, but what if it has my looks and your brains!”. Although unlike most would-be parents they did think about what combination of their collective genes would be advantageous or otherwise, even they did not think (unlike Collins) their decision needed to wait for the consent of the resulting child. Nobody does! All parents decide for their present and future children until such children are capable of consenting for themselves. This is not of course to say that parents and scientists should not decide responsibly on the best available combination of evidence and argument, this they must do. What it is to say is that the basis of their decision-making cannot for obvious reasons include the consent of the future children.

This is of course Derek Parfit’s famous “non-identity problem”.<sup>51</sup> Thus disregard of the relevance of such consents is this potential child’s only chance of existence and therefore so long as the best guess is that the child’s eventual life would not be unacceptably awful, it would be in that child’s interests to be created.

Notice that those who raise issues of consent in relation to non-existent beings, or indeed in relation to beings incapable of consent, only do so in circumstances when they wish to

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<sup>50</sup> ‘Actually,’ said Shaw, ‘it was not Isadora who made that proposition to me. The story has been told about me in connexion with several famous women, particularly Isadora Duncan. But I really received the strange offer from a foreign actress whose name you wouldn’t know, and which I’ve forgotten. But I did make that reply.’ (Gibbs A. Shaw: *Interviews And Recollections*. 1st ed. Iowa City: University of Iowa Press; 1990.: 417, 419)

<sup>51</sup> Parfit D. *Reasons And Persons*. 1st ed. Oxford [Oxfordshire]: Clarendon Press; 1984:351-377.

claim that the relevant children would not, or should not, have consented rather than the reverse, and therefore that those potential children should not be or have been born.

If there is a discernible duty here it is surely to create the best possible child. That is what it is to act for the best, “all things considered”<sup>52</sup>. This we have moral reasons to do; but they are not necessarily overriding reasons.<sup>53</sup>

### 5.5.2 Transgenerational Epigenetic Inheritance

One further possibility that has, we believe, so far entirely escaped attention in this context is the fact that heritable changes are not necessarily confined to conventional germline genetic effects.<sup>54</sup> As noted recently: “The transmission of epigenetic states across cell divisions in somatic tissues is now well accepted and the mechanisms are starting to be unveiled. The extent to which epigenetic inheritance can occur across generations is less clear...”<sup>55</sup> For example, how can UNESCO’s absurd claim already noted concerning the obligation to preserve “the human genome as common heritage of humanity” be applied to epigenetic effects which may only be apparent *post hoc*? Should we be alarmed or comforted by this apparent crack in the armour? These issues have been discussed recently elsewhere<sup>56</sup> and they are issues on which the authors continue to work.

For now we need not panic, rather we need to recognise that we are the products of a germline altering process called evolution, which uses the very hit and miss experimental technology sometimes politely called “sexual reproduction” (and sometimes not). That process is mind-bogglingly slow but it has not stopped and we cannot stop it except by our own extinction. We know for sure that in the future there will be no more human beings and no more planet earth. Either we will have been wiped out by our own foolishness or by brute forces of nature or, we hope, we will have further evolved by a process more rational and much quicker than Darwinian evolution; a process described by both John

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<sup>52</sup> John Harris develops the importance of this imperative, “to act for the best all things considered”, in his new book *How To Be Good*. 1st ed. Oxford: Oxford University Press; 2016.

<sup>53</sup> *op. cit.* 24, and Harris J. Rights and Reproductive Choice. In: Harris JHolm S, ed. *The Future Of Human Reproduction: Choice And Regulation*. 1st ed. Oxford University Press; 1998:5-37.

<sup>54</sup> Reardon, S. US Congress moves to block human-embryo editing. *Nature* (Online) 25 June 2015 Available at <http://www.nature.com/news/us-congress-moves-to-block-human-embryo-editing-1.17858>. Accessed 27<sup>th</sup> June 2015.

<sup>55</sup> Announcement of a workshop: Transgenerational Epigenetic Inheritance - October 2015 *The Company of Biologists*. 2017. Available at: <http://www.biologists.com/workshops/transgenerational-epigenetic-inheritance/>. Accessed February 13, 2017.

<sup>56</sup> *op. cit.* 24.

Harris<sup>57</sup> and David Lawrence.<sup>58</sup>

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<sup>57</sup> *op. cit.* 37.

<sup>58</sup> Lawrence D. To what extent is the use of human enhancements defended in international human rights legislation? *Medical Law International*. 2013;13(4):254-278.

## 6.0 ENHANCING SISYPHUS

César Palacios-González and David R. Lawrence

*The collaborative and cooperative manner of writing this paper does not lend itself to identifying the specific contributions of each author by section or word count. Each contributor has agreed on an equal share of authorship of the paper, i.e. 50%*

Palacios-González C, Lawrence D. Enhancing Sisyphus. *AJOB Neuroscience*. 2015;6(1):26-27. doi:10.1080/21507740.2014.995320.

Kjærsgaard makes the central claim that if a person decides to treat her motivational problems by means of consuming motivationally enhancing drugs she risks, in the long run, not solving such problems; which in turn could make the whole enterprise ethically problematic. Dealing with motivational problems is paramount, he suggests, because they “can be part of other problems concerning the larger structures of meaning in a person’s life, that are connected to important choices about which direction one’s life should take.”<sup>1</sup> In other words, someone’s conception of the good life necessarily involves multiple projects that they must try to accomplish at certain times; and having motivational difficulties engaging with certain specific projects might indicate that a person is alienated from them. In turn, this could mean that they are not conducive to what that person conceives as the good life, or an intrinsic part of the good life. If someone decides to use motivational enhancers in order to engage with projects from which they are alienated, says Kjærsgaard, they risk spending more time than is necessary acting in a manner that would not be conducive to their final goal (i.e. the good life or an intrinsic part of the good life); and it is this which is ethically problematic.

In this commentary we will highlight an important subset of cases – those wherein an alienating circumstance is unavoidable in practice (which we will call cases of hard alienation) – that Kjærsgaard’s treatment of motivational enhancement does not address. Relying on the myth of Sisyphus to explain this hard alienation we will argue that these cases illustrate a counterpoint to Kjærsgaard’s claim.

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<sup>1</sup> Kjærsgaard T. Enhancing Motivation by Use of Prescription Stimulants: The Ethics of Motivation Enhancement. *AJOB Neuroscience*. 2015;6(1):4-10.

Using Elliot's account of alienation,<sup>2</sup> Kjærsgaard asserts that: "Alienation is defined as an incongruity between the self and external structures of meaning."<sup>3</sup> If we accept this, we can further divide alienation into two subclasses: soft alienation and hard alienation. The alienated agent can eliminate soft alienations without imposing substantive negative externalities onto themselves or others (e.g. someone economically well-off quits a monotonous job, thus eliminating the alienation). Hard alienation, conversely, even when it can be eliminated imposes such substantive negative externalities onto the agent or others that it is as if the agent *cannot* eliminate it (e.g. during a national economic crisis, a single mother is alienated from her unfulfilling job and could quit- but quitting would deprive her, and her children, from necessary healthcare). In determining if a case of alienation is soft or hard we need not only to take into account what the agent can or cannot do but also their prevailing socio-cultural circumstances.

According to Apollodorus, Zeus punishes Sisyphus with the task of rolling a boulder to the top of a hill. This seems easy, but the problem is that the boulder always rebounds backward making Sisyphus start all over again.<sup>4</sup> For Sisyphus, eternally pushing a boulder up a hill only to see his work undone is an activity that i) comprises his whole existence, ii) is devoid of meaning in itself, iii) is devoid of instrumental meaning, and iv) is a punishment which necessarily means that is not something that he would have enjoyed. Thus we can state that Sisyphus, at least according to the classic myth, would be an example of a hard alienation case (strictly it would be a case of *truly* unavoidable alienation, given that he is divinely compelled!). At this point we should also acknowledge that there are at least two subtypes of hard alienation cases: autonomously and non-autonomously elected – represented respectively by our single mother and our mythological character.

Now, if we apply Kjærsgaard's ethical assessment of motivational enhancement to the case of Sisyphus, we would have to conclude that it *would* be ethically problematic to motivationally enhance him. The enhancers would, most certainly, treat only the *symptoms* of alienation – problems concerning the larger structures of meaning of his life – and would not solve the root of his problems.<sup>5</sup> In sum, according to Kjærsgaard, it would be ethically problematic for Sisyphus to use motivational enhancers because they would be only a superficial salve, and it would remain the case that pushing a boulder for eternity does not contribute to what he may construe as a good life.

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<sup>2</sup> Elliott C. Pursued by Happiness and Beaten Senseless Prozac and the American Dream. *The Hastings Center Report*. 2000;30(2):7-12.

<sup>3</sup> *op. cit.* 1.

<sup>4</sup> Apollodorus. Apollodorus: The Library, Volume I: Books 1-3.9. Translated By Frazer JG. 6th ed. London, New York: Harvard University Press; 1921. at 1.9.

<sup>5</sup> *op. cit.* 1

This analysis is problematic. Kjærsgaard does not take into account that Sisyphus cannot do otherwise – and this in fact changes the ethical mien of his situation. Even if Sisyphus did not want to push the boulder up the mountain, he cannot escape his circumstances. He cannot subcontract someone else to push the boulder up the mountain, nor can he decide to quit and get another job that actually relates to the structure of meaning of his life. Real life Sisyphean circumstances, as stated earlier, would be those an agent cannot renounce due to the amount of negative externalities that that would impose onto them or others (i.e. hard alienation cases). Consider our example: a single mother that in the middle of national economic crisis takes what she considers a menial job in order to provide and have healthcare benefits for herself and for her children. Working in such a job deprives her of the time to realise work related projects that are intrinsic to large structures of meaning of her personal life. Given the existence of such hard alienation cases, we need to reevaluate Kjærsgaard's conclusion.

If we agree that these cases can occur, then we need to ask if increasing the wellbeing – by means of increasing motivation – of an agent who autonomously elected to enter an alienating situation would be ethically problematic. For example, would it be ethically problematic for our single mother to listen to her favourite music while stacking shelves if listening increases her wellbeing at the cost of palliating the symptoms of her elected alienation? We do not think so. Using certain means to increase one's wellbeing in an unpleasant circumstance does not imply that we do not know, or that we do not want to deal with the fact, that we are sacrificing a large part of the structure of meaning of our lives. In this sense, Kjærsgaard appears to miss that the structure of meaning of one's life is subdivided and there are certain *meaningful* and *intrinsically valuable* divisions (e.g. work life) that can be sacrificed in order to fulfill other *meaningful* and *intrinsically valuable* divisions (e.g. family life).

In this new light it is difficult to see what is ethically problematic with our single mother's decision to use motivational enhancers for coping with a menial job that provides her and her children with healthcare. We think that as long as we pursue a rationally reflected conception of the good life it is not ethically problematic to sacrifice a large part of the structure of meaning of our life, in order to achieve other meaningful elements of it; and it is also not ethically problematic to employ certain means to increase our wellbeing while we are alienated. Finally, it is important to point out that the mother's case is different from Kjærsgaard's example of a student using a motivational enhancer to pass a *single subject*, in that in the mother's case she is treating symptoms of an alienation related to a *large*

*structure of meaning* of her life- i.e., her work.

## **7.0 HOT BATHS AND COLD MINDS: NEUROSCIENCE, MIND READING, AND MIND MISREADING**

**John Harris and David R. Lawrence**

*The collaborative and cooperative manner of writing this paper does not lend itself to identifying the specific contributions of each author by section or word count. Each contributor has agreed on an equal share of authorship of the paper, i.e. 50%*

Harris J, Lawrence D. Hot Baths and Cold Minds: Neuroscience, Mind Reading, and Mind Misreading. Cambridge Quarterly of Healthcare Ethics. 2015;24(02):123-134.  
doi:10.1017/s0963180114000425.

### **7.1 Abstract**

The idea—the possibility—of reading the mind, from the outside or indeed even from the inside, has exercised humanity from the earliest times. If we could read other minds both prospectively, to discern intentions and plans, and retrospectively, to discover what had been “on” those minds when various events had occurred, the implications for morality and for law and social policy would be immense. Recent advances in neuroscience have offered some, probably remote, prospects of improved access to the mind, but a different branch of technology seems to offer the most promising and the most daunting prospect for both mind reading and mind misreading. You can’t have the possibility of the one without the possibility of the other. This article tells some of this story.

### **7.2 Preamble**

Our story of mind reading begins with poetry. The science of the brain—neuroscience—is, at least in part, in the mind-reading business. Neuroscience attempts, *inter alia*, to replace the eyes as windows to the soul. We start with poetry because, historically, poets have been the neuroscientists who have best understood the ways in which the mind works. And we are concerned with hot baths because one of the greatest of all poets, Homer, used this image as a metaphor for the human condition, a condition that not only appreciates hot baths but also notices their absence and understands the wider meaning of both these states.

In a wonderful essay on Homer's *Iliad*, Simone Weil analyzes Homer's portrayal of the moral realities and ironies of human life in a memorable passage. She starts with these famous lines from *The Iliad*, in which Andromache, Hector's wife, awaits Hector's return from battle:

She ordered her bright-haired maids in the palace  
To place on the fire a large tripod, preparing  
A hot bath for Hector, returning from battle.  
Foolish woman! Already he lay, far from hot baths,  
Slain by grey-eyed Athena, who guided Achilles' arm.<sup>1</sup>

Weil comments: "Far from hot baths he was indeed, poor man. And not he alone. Nearly all the *Iliad* takes place far from hot baths. Nearly all of human life, then and now, takes place far from hot baths."<sup>2</sup> She might have said, for it is surely consonant with the wistful regret of both Homer and her own commentary, that nearly all of human life takes place far from comfort or understanding.<sup>3</sup> But this passion for understanding the hearts and minds of others, even far from hot baths, reminds us of both its attraction and importance.

Hector's last words as he lies dying at the hand of Achilles and as far as it is possible to be from hot baths, takes up our theme: "Hector of the flashing helmet spoke to him once more at the point of death. 'How well I know you and can read your mind' he said."<sup>4</sup>

### 7.3 Introduction

Soul-searching is not identical to mind reading, nor is mind reading identical to a complete description of brain activity (even if it were possible to achieve such a thing). An analogue here may be the relationship between genetics and epigenetics. Many neuroscientists and philosophers of neuroscience seem stuck in an era equivalent to genetic essentialism and oblivious to the era of epigenetics and its cerebral equivalent. Our suggestion is that desires, motives, intentions, and attitudes, and both external and first-person access to these, relate to a map of the brain or a description of brain activity as understanding the

<sup>1</sup> Homer. *The Iliad (Book XXII)*. Harmondsworth: Penguin; 1966:403-473, at 409.

<sup>2</sup> Weil S. The *Iliad*: A poem of force. In: Meyer P, ed. *The Pacifist Conscience*. Harmondsworth: Penguin; 1966:293.

<sup>3</sup> One of the present authors talks about different aspects of this dimension of "la condition humaine" (apologies to André Malraux) in Harris J. Life in the cloud and freedom of speech. *Journal of Medical Ethics*. 2013;39(5):307-311.

<sup>4</sup> *op. cit.* 1. 406.

behaviour or functioning of a creature relates to the map of its genome. We know from contemporary epigenetics that the behaviour of genes—gene expression—is influenced by the coding of the genes but also by environmental factors as well as, for example, being modulated by patterns of inhibitors and promoters other than DNA that are set up within the cell and are self-perpetuating.

Wittgenstein famously remarked in connection with establishing a reference—the object referred to—in speech: “If God had looked into our minds he would not have been able to see there of whom we were speaking.”<sup>5</sup> Why wouldn’t he?

Consider the questions: Is this murder? Or is this rape? The answers to questions such as these are not to be found in states of the brain, not least because, in the case of rape, the consent or otherwise of the other party is not to be found in the brain state of the putative rapist and because, in the case of murder, whether or not the act of killing might constitute self-defense is likewise not to be found in brain states.

Relatedly, we have the illusion that memories are traces of experienced events, thoughts and feelings brought to mind sometime after the experiences themselves. But although memory is pretty certainly due to brain states, two further “things” are not. First, one hypothesis casts doubt on whether what we ‘remember’ actually happened and therefore whether or not it is in fact a memory. The second hypothesis is that our memory is a recalled trace of earlier experiences, including thoughts and feelings occasioned by something in the world. We simply do not reliably know whether apparent memories are simply memories of a previous memory, which itself involved many hypotheses about events both in the mind and elsewhere in the world.

We return to these issues in a moment.

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<sup>5</sup> Wittgenstein L. Trans. Anscombe GEM. *Philosophical Investigations*. Oxford: Basil Blackwell; 1968:Part IIxi at 217. Because this is a translation, we have taken the liberty of improving on Elizabeth Anscombe’s grasp of English grammar.

## 7.4 Mind Reading: First Folio

### 7.4.1 Windows of my mind<sup>6</sup>

Mind reading and the relationship between the face, particularly the eyes, and the contents of the mind or indeed of the soul have been and remain a fascination for humankind. This preoccupation reflects a fact about human beings. We want to read minds, including our own; we want this so that we understand what kind of person the bearer<sup>7</sup> of the mind is—who we have to deal with, how they are likely to behave, what they want, what they are likely to do, and what they have done. And we need to know these things about ourselves quite as much as about others. What manner of man am I? What sort of woman are you?

Mind reading, if and in so far as it can be done, would be a powerful cognitive enhancer and, like all knowledge, a significant source of power.

The image of the eyes or the face as windows into mind or the soul often plays a seminal role in the imagery we use to discuss the project of mind reading. Perhaps the earliest references to the eyes as windows to the soul come from Cicero, who is here expanding on the nature of oratory—formal speechmaking: “The countenance itself is entirely dominated by the eyes. . . . For delivery [oratory] is wholly the concern of the feelings, and these are mirrored by the face and expressed by the eyes.”<sup>8</sup>

Leo Tolstoy, in *War and Peace*, talks of the “moral physiognomy” that reveals the mind in the face. In Book VI, he notes a change in Natasha after the departure of Prince Andrew:

But a fortnight after his departure, to the surprise of those around her she recovered from her mental sickness just as suddenly and became her old self again, but with a change in her moral physiognomy, as a child gets up after a long illness with a changed expression of face.<sup>9</sup>

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<sup>6</sup> With apologies to Dusty Springfield.

<sup>7</sup> This turn of phrase is borrowed from Shakespeare’s Brutus: “Think not, thou noble Roman, That ever Brutus will go bound to Rome. He bears too great a mind” (Act 5, Scene 1). All Shakespeare quotations are from: Shakespeare W, Proudfoot R, Thompson A, Kastan D. *The Arden Shakespeare Complete Works*. Walton-On-Thames: Thomas Nelson and Sons; 1998.

<sup>8</sup> Cicero, Marcus Tullius. *De Oratore* III, 221. In: Trans. Rackham L *Cicero On The Orator*. M.A. and London: Harvard University Press; 1942:177.

<sup>9</sup> Tolstoy L. *War And Peace*. Trans Maude L, Maude A.. 1st ed. London: Oxford University Press; 1965:Book VI, chap. XXIV. at 88.

Let's continue in perhaps the most promising place, with a few reflections by one of the greatest of all neuroscientists, William Shakespeare.

### 7.4.2 Introspection

We should not forget that one important dimension of mind reading involves reading the mind from the inside, that is, introspection. But this is not more reliable than any other of the forms of mind reading, not least because of the tendency we humans have for self-justification and self-deception.

Hamlet, confronting his mother, Queen Gertrude, with the infamy of the murder of his father, and of what Hamlet regards as her “incest” with her new husband, his father’s brother, elicits this response:

O Hamlet, speak no more  
Thou turn’st my eyes into my very soul,  
And there I see such black and grained spots  
As will not leave their tinct.<sup>10</sup>

In *Macbeth* we find Duncan lamenting his inability to detect treason in the Thane of Cawdor,<sup>11</sup> whom he has just executed for that treason.

There’s no art  
To find the mind’s construction in the face:  
He was a gentleman on whom I built  
An absolute trust—<sup>12</sup>

In *A Midsummer Night’s Dream*, Helena insists:

Love looks not with the eyes, but with the mind,  
And therefore is wing’d cupid blind;

Helena is saying that love is not interested in superficialities like beauty, which is only skin deep, but in what lies behind. Love springs from imagined understanding, often leavened

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<sup>10</sup> Shakespeare W. *Hamlet*. In: Shakespeare 1998 (*op. cit.* 7), Act 3, Scene 4, lines 89ff, at 316.

<sup>11</sup> The name of this thane is not mentioned in the text. Macbeth himself subsequently assumes this title.

<sup>12</sup> Shakespeare W. *Macbeth*. In: Shakespeare 1998 (*op. cit.* 7), Act 1, Scene 4, lines 12ff, at 775.

with a strong yeast of hope or optimism about the nature of what lies beneath the surface, beyond the physical gaze. But she also insists that only the mind can deliver the required understanding of what others are like, and this it constructs from many sources, as we shall see.

But it is in *Richard III* that Shakespeare comes nearest to our present preoccupations. Richard, newly crowned but insecure, wants Buckingham's approval of the murder of the "Princes in the Tower" (Edward V of England and Richard of Shrewsbury, Duke of York—Edward being the "legitimate"<sup>13</sup> heir to the crown worn by Richard of Gloucester, of England, the third of that name). Richard III is initially reluctant to spell out his murderous plans and so expects the Duke of Buckingham to anticipate his wishes, the function of all good courtiers from time immemorial:

KING RICHARD

Ah, Buckingham, now do I play the touch,  
To try if thou be current gold indeed.  
Young Edward lives—think now what I would speak.<sup>14</sup>

That is to say, "read my mind." Later he makes this thought clearer to the "dull" Buckingham:

Shall I be plain? I wish the bastards dead,  
and would have it suddenly perform'd.<sup>15</sup>

## 7.5 Thought-Identification Technologies: Second Folio

It is probably correct to assume that we are a long way from a neuroscientific breakthrough in mind reading. However, recent developments in neuroscience,<sup>16</sup> and in particular in brain imaging, have created expectations that, for example, criminal intent might be detectable in brain states. If this is really possible, which we personally doubt, then this information might be used as evidence justifying restraint or detention prior to any offence being committed. John Harris served on a working party of the Royal Society

<sup>13</sup> Scare quotes are used not because Edward was rightly fearful but because the claim of Edward IV, his father, was in many ways also problematic, like that of all the Yorkists.

<sup>14</sup> Shakespeare W. *King Richard III*. In: Shakespeare 1998 (*op. cit* 7.), Act 4, Scene 2, line 8, at 726.

<sup>15</sup> *ibid.* line 21, at 726.

<sup>16</sup> The discussion here follows lines elaborated in Harris 2013 (*op. cit*. 3).

in 2010–2011 that examined these issues, and although that working party emphatically concluded<sup>17</sup> that the case was not proven for the use of brain-state evidence in criminal trials, this situation may well be subject to future revision.<sup>18</sup>

“Thought-identification” technologies, as they might be properly termed, are advancing implacably; though in an arena as complex as the human brain, great leaps in technology may not equate to commensurate leaps forward toward our goal of reliably and clearly reading thoughts.

Much of the focus has been on fMRI (functional magnetic resonance imaging) techniques and the information recorded by these types of scans, which build on traditional MRI by virtue of their ability to indicate neuronal activity within three-dimensional spaces, or voxels, ranging from 4 to 1 mm<sup>3</sup>.<sup>19</sup> This sensitivity is reliant on the blood oxygen level dependent (BOLD) signal<sup>20</sup>—the para- and diamagnetic properties of oxygenated and deoxygenated blood, respectively, in the vicinity of a neuronal cluster, as caused by the particular haemodynamics necessitated by the operation of those neurons.

Thought-identification research that has utilised fMRI data depends on the BOLD signal to figuratively illuminate regions of the brain that are known to be associated with a particular neurological activity. For instance, one widely discussed study by Nishimoto and Gallant<sup>21</sup> recorded visual cortex response activity while subjects viewed a wide range of imagery. By collecting several thousand hours of data, it was possible to map particular voxels to particular stimuli. Subsequently, the researchers were able to develop a modeling algorithm that could identify and (crudely) reconstruct the images and video from the neural activity data itself; thereby “reading” what the brain saw. In a similar fashion, other researchers<sup>22</sup> have mapped activity resulting from merely thinking about a number of

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<sup>17</sup> Royal Society. *Brain Waves Module 4: Neuroscience And The Law*. London: Royal Society; 2011. available at <http://royalsociety.org/policy/projects/brain-waves/responsibility-law/> Accessed 7 June 2014.

<sup>18</sup> See also Bufkin J, Luttrell V. Neuroimaging Studies of Aggressive and Violent Behavior. *Trauma, Violence, & Abuse*. 2005;6(2):176-191. ; Raine A, Yang Y. Neural foundations to moral reasoning and antisocial behavior. *Social Cognitive and Affective Neuroscience*. 2006;1(3):203-213; Eastman N, Campbell C. Neuroscience and legal determination of criminal responsibility. *Nature Reviews Neuroscience*. 2006;7(4):311-318; Brown TR, Murphy ER. Through a scanner darkly: Functional neuroimaging as evidence of a criminal defendant's past mental states. *Stanford Law Review* 2010;62:1119-1207

<sup>19</sup> Huettel SA, Song AW, McCarthy G. *Functional Magnetic Resonance Imaging*. 2nd ed. Sunderland, MA: Sinauer; 2009, at 214–220.

<sup>20</sup> As originally presented here: Ogawa S, Lee TM, Nayak AS, Glynn P. Oxygenation-sensitive contrast in magnetic resonance image of rodent brain at high magnetic fields. *Magnetic Resonance in Medicine* 1990;14(1):68–78. See also Gibson WG, Farnell L, Bennett MR. A computational model relating changes in cerebral blood volume to synaptic activity in neurons. *Neurocomputing* 2007;70:1674.

<sup>21</sup> Nishimoto S, Vu AT, Naselaris T, Benjamini Y, Yu B, Gallant JL. Reconstructing visual experiences from brain activity evoked by natural movies. *Current Biology* 2011;21(19):1641–6.

<sup>22</sup> Shinkareva SV, Mason RA, Malave VL, Wang W, Mitchell TM, Just MA. Using fMRI brain activation to identify cognitive states associated with perception of tools and dwellings. *PLoS ONE* 2008;3(1): 1394.

simple known images—a screwdriver or celery—and can accurately predict which of these a subject is considering. Similarly, it has been demonstrated that this technique can be utilized for auditory information- reconstructing speech as digital sound from the mapped neural activity.<sup>23</sup>

This technique can only use “live” activity—that is, when the subject is actively inside the hardware and actively viewing the images—but, last year, a study from Cornell had some success in reconstructing imagination using a similar fMRI process. Instead of viewing images, subjects were asked to visualize people with particular sets of personality traits. They were then asked to imagine how these “personality models” might react or behave in a number of circumstances. The analysis that followed:

examined how protagonist identity and trait information interact, or how the brain associates specific personality traits with a given protagonist . . . suggest[ing] that personality information is integrated in the [medial prefrontal cortex], producing a model for behaviour predictions.<sup>24</sup>

In other words, the study was able to “read,” in simple fashion, the thoughts of the subject regarding these imaginary constructs without the need for active input.

The detection of intention is also in its infancy and is limited to simpler motor functions rather than such complex, abstract plans of action as may be required for criminal enterprise. Chun Siong Soon, Marcel Brass, Hans-Jochen Heinze, and John-Dylan Haynes<sup>25</sup> published research in which they were able to predict the use of the right or the left hand in a button-pushing exercise by identifying BOLD “readiness potentials”—up to 1,000 ms before the action took place. Of course, 10 seconds is perhaps less than desirable for *Minority Report*<sup>26</sup>—style pre-crime prosecution.

Nonetheless, there has been much research into using fMRI and the BOLD effect for the detection of falsehood.<sup>27</sup> Utilising processes of baseline determination not dissimilar to

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<sup>23</sup> Pasley BN, David SV, Mesgarani N, Flinker A, Shamma SA, et al. Reconstructing speech from human auditory cortex. *PLoS Biology* 2012;10(1).

<sup>24</sup> Hassabis D, Spreng R, Rusu A, Robbins C, Mar R, Schacter D. Imagine All the People: How the Brain Creates and Uses Personality Models to Predict Behavior. *Cerebral Cortex*. 2013;24(8):1979-1987

<sup>25</sup> Soon C, Brass M, Heinze H, Haynes J. Unconscious determinants of free decisions in the human brain. *Nature Neuroscience* 2008;11(5):543–5.

<sup>26</sup> *Minority Report*. 20th Century Fox: Dir: Spielberg, S; 2002.

<sup>27</sup> This research includes but is by no means limited to the studies cited in notes 7–10, and the following sources: Langleben DD, Moriarty JC. Using brain imaging for lie detection: Where science, law, and policy collide. *Psychology, Public Policy, and Law* 2012;19(2):222-234; Kaylor-Hughes CJ, Lankappa ST, Fung R, Hope-Urwin AE, Wilkinson ID, Spence SA. The functional anatomical distinction between truth telling and

those detailed previously, these studies generally concluded that, in the words of one study, “attempted deception is associated with activation of executive brain regions”<sup>28</sup>—in other words, that certain regions are more active when formulating a lie than when formulating the truth. However, the studies are inconsistent as to the specific regions they indicate; their various suggestions include the “right anterior frontal cortices,”<sup>29</sup> “the anterior cingulate cortex, the superior frontal gyrus, . . . the left premotor, motor, and anterior parietal cort[ices],”<sup>30</sup> and the “temporal and sub-cortical [regions],”<sup>31</sup> effectively indicating that large swathes of the brain are activated by falsehood. There are also important questions about the specificity of such studies—for example, it is not clear whether fMRI techniques can differentiate between deliberate deception and more innocent falsehood.<sup>32</sup>

Another technology has been used specifically to attempt to read minds for the purposes of lie detection: electroencephalography (EEG), or “brain fingerprinting.” This technique differs from fMRI in that it does not image the brain itself but rather records the patterns of electrical activity within it through electrodes placed on the scalp, in this case with particular focus on the wavelength and frequency of P300, an event-related potential that “signal[s] an individual’s recognition of a unique or meaningful item.”<sup>33</sup> P300 is unconscious and uncontrollable, unlike conventional galvanic or heart-rate-based polygraphs. Thus, EEG could theoretically be used to determine whether a situation or a piece of evidence was familiar to the subject, regardless of his or her claims.<sup>34</sup> It also has an advantage over fMRI in that it is not a control-question test, wherein detection can only be effective with certain formulations of questions. Still, once again, the results for the

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deception is preserved among people with schizophrenia. *Criminal Behaviour and Mental Health* 2011;21(1):8–20. Ito A, Abea N, Fujii T, Ueno A, Kosekia Y, Hashimotob R, et al. The role of the dorsolateral prefrontal cortex in deception when remembering neutral and emotional events. *Neuroscience Research* 2011 ;69(2):121–8. Sip KE, Lynge M, Wallentin M, McGregor WB, Frith CD, Roepstorff A. The production and detection of deception in an interactive game. *Neuropsychologia* 2010;48(12):3619–26. Monteleone GT, Phan KL, Nusbaum HC, et al. Detection of deception using fMRI: Better than chance, but well below perfection. *Social Neuroscience* 2009;4(6):528–38.

<sup>28</sup> Spence S, Hunter M, Farrow T et al. A cognitive neurobiological account of deception: evidence from functional neuroimaging. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 2004;359(1451):1755-1762 at 1755

<sup>29</sup> Ganis G, Kosslyn S, Stose S, Thompson W, Yurgelun-Todd D. Neural Correlates of Different Types of Deception: An fMRI Investigation. *Cerebral Cortex*. 2003;13(8):830-836.. at 830

<sup>30</sup> Langleben DD, Schroeder L, Maldjian JA, et al. Brain activity during simulated deception: An event-related functional magnetic resonance study. *Neuroimage* 2002;15(3):727–32. at 727

<sup>31</sup> Lee T, Liu HL, Tan LH, et al. Lie detection by functional magnetic resonance imaging. *Human Brain Mapping* 2002;15(3):157–64. at 161

<sup>32</sup> Ganis G, Rosenfeld JP, Meixner J, Kievit RA, Schendan HE. Lying in the scanner: Covert countermeasures disrupt deception detection by functional magnetic resonance imaging. *Neuroimage* 2011;55(1):312–19.

<sup>33</sup> Meixner JB. Liar, liar, jury’s the trier? The future of neuroscience-based credibility assessment in the court. *Northwestern University Law Review* 2012;106(3):1451.

<sup>34</sup> Farwell LA, Smith SS. Using brain MERMER testing to detect knowledge despite efforts to conceal. *Journal of Forensic Science* 2001 Jan;46(1):135–43

technique are somewhat mixed<sup>35</sup> and were obtained only in highly controlled situations unlikely to be replicable in the courtroom.

However fraught with current technological or neurobiological difficulties the techniques of thought identification or mind reading might be, they introduce a serious possibility that thought may, in the face of significant confirmatory neurological evidence, be at some point taken to be the equivalent of action or evidence for certain purposes. Indeed, the first attempts to do so have already taken place. In *United States v. Semrau*, the defendant sought to utilise fMRI evidence that he was being truthful in a fraud case, but the request was disallowed on a range of points, including the error rate of the technology, the control standards, the variance of his circumstances from any situation previously studied, and the fact that the technology was not widely accepted as reliable by experts, thus failing Federal Rule of Evidence 702.<sup>36</sup> Similarly, EEG has been presented in courtrooms, and although it was rejected outright as evidence in *Slaughter v. State*,<sup>37</sup> it has been used to convict in two separate murder cases in the Indian state of Maharashtra.<sup>38</sup>

## 7.6 Mind Reading via Thoughts and Deeds: Third Folio

Shakespeare, who was perennially preoccupied with mind reading, was somewhat enigmatic himself, perhaps because of the universality of his themes. In a famous sonnet, William Wordsworth<sup>39</sup> suggests that Shakespeare's sonnets are the key to understanding Shakespeare the man:

Scorn not the Sonnet; Critic, you have frowned,  
Mindless of its just honours; with this key  
Shakespeare unlocked his heart;

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<sup>35</sup> See note 33, Meixner 2012, for an overview of error rates in a range of EEG studies.

<sup>36</sup> The full litany of objections to the inclusion of the evidence makes for entertaining reading. *United States v. Semrau*, 2010 WL 6845092 (W.D. Tennessee, June 1, 2010).

<sup>37</sup> The rejection included the careful rejoinder that "beyond [the expert]'s affidavit we have no real evidence that Brain Fingerprinting has been extensively tested." *Slaughter v. State of Oklahoma*, 105 P.3d 832, 834–36 (Oklahoma Criminal App. 2005).

<sup>38</sup> Natu N. This brain test maps the truth. *The Times of India* 2008 July 1; available at <http://timesofindia.indiatimes.com/city/mumbai/This-brain-test-maps-the-truth/articleshow/3257032.cms?referral=PM> accessed 6 June 2014

<sup>39</sup> Wordsworth W. The Sonnet (ii). In: Quiller-Couch A, ed. *The Oxford Book of English Verse: 1250–1900*; 1919

Here we have reached the nub of our argument and, you will be relieved to hear, the end of poetry. It is in our writings and our interest in the writings or otherwise recorded thoughts and actions of others that our minds can be read and, sometimes, perhaps often, misread.

### 7.6.1 Thinking and Feeling in the Cloud<sup>40</sup>

Life in the cloud is immortal and omnipresent and, almost, as replete with feelings as our own dear lives. We must now accept that our words and, to an extent, our actions and thoughts are permanently in the cloud and accessible to anyone and everyone. Of course, thoughts and actions are as open to interpretation as words and always as ambiguous. As William Empson famously remarked, “In a sufficiently extended sense any prose statement could be called ambiguous.”.<sup>41</sup>

As John Harris previously suggested concerning the existence of the cloud,

This is a game-changing [innovation], and indeed constitutes a very dangerous turn of events. Not only is it a possible restriction, not just on free speech but on the possibility of sober, or even informed or nuanced discussion, it also constitutes perhaps the final erosion of the distinction between speaking and acting, and indeed between thought and action, and may have already expanded the scope of the “reckless” part of the coupling of “reckless” with “endangerment” to the point of no return.

This is because, not only do we have no knowledge or control over who will have access to our words and in what circumstances, we do not even have any control over how they will be edited, sensationalised, decontextualised, bowdlerised or otherwise distorted. We must be always aware of the potentially limitless scope, and indeed duration, of what we say.<sup>42</sup>

An example of the radical expansion of access to our words is provided by a comment made on a news story recently, which spread in an amazing way. “Companies like Novartis should not be in the position to block moves to more cost-effective treatments in order to maximize their profits,’ said John Harris of the Institute for Science Ethics and Innovation

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<sup>40</sup> Here again discussion follows lines elaborated in Harris 2012 (*op. cit.* 3).

<sup>41</sup> Empson W. *Seven Types Of Ambiguity*. Rev. ed. Chatto and Windus; 1970:1. At p.1

<sup>42</sup> *op. cit.* 3. 409

at the University of Manchester.” This comment was made in a press release; Reuters put it on “the wires,” and the report subsequently received 31,088,501 page views and 4,572,149 unique visitors.<sup>43</sup> More than 4.5 million different individuals accessed this comment online, and, in addition to the large number of web hits and visitors to the site, this remark was reported in 278 separate national and local news outlets, both broadcast and print.

As the chairman of Google, Eric Schmidt, has remarked, “The fact that there is no delete button on the internet forces public policy choices we had never imagined.”<sup>44</sup>

Recently, a landmark European Court ruling<sup>45</sup> on the right to be forgotten may indeed lead to the removal of items of personal data from particular sites or local search engines, but this will not mean that the relevant data has been entirely expunged from the cloud, nor from databases or computers, or rendered inaccessible.

In the cloud, words and indeed images and sounds exist, as far as we know, forever, in all places and all times. This is the immortality that some have dreamed of.<sup>46</sup> It also further erodes the traditional distinction between words and action and possibly also between thoughts and words, because speculations may be taken to be proposals and an exposure of the weakness of an argument *against* something may be taken to be an argument *for* it. This gives scope for radical misunderstanding and misrepresentation. But perhaps even more important than the fact that our words, actions, and thoughts are forever in the cloud is the fact that, insofar as they are digitised they can in principle be accessed by anyone with the requisite skills. As Bruce Schneier made clear in an oral presentation to the Royal Society,<sup>47</sup> anything submitted or recorded online would be permanently in the cloud,

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<sup>43</sup> Copley CHirschler B. Novartis challenges UK Avastin use in eye disease. *Reuters*. 2012. Available at: <http://www.reuters.com/article/us-novartis-britain-idUSBRE83N0GM20120424>. Accessed February 14, 2017. The page view data was obtained from Vocus ([www.vocuspr.com/uk](http://www.vocuspr.com/uk)), the University of Manchester’s media monitoring service (subscription required for access), 2012 May 1.

<sup>44</sup> Sample I. Governments pose greatest threat to internet, says Google’s Eric Schmidt. *The Guardian* 2012 May 23; available at <http://www.guardian.co.uk/technology/2012/may/23/google-fund-teachers-computer-science-uk> Accessed 3 June 2014.

<sup>45</sup> European Court of Justice Judgement, Case C-131/12 ECLI:EU:C:2014:616, 13 May 2014. Full text available at <http://curia.europa.eu/juris/document/document.jsf;jsessionid=9ea7d2dc30d5cfb78416675447019937a19787b77870.e34KaxiLc3qMb40Rch0SaxuNbxr0?text=&docid=152065&pageIndex=0&doctlang=EN&mode=req&dir=&occ=first&part=1&cid=124853> (last accessed 6 June 2014). See also: Google sets up “right to be forgotten” form after EU ruling. *BBC News* 2014 May 30; available at <http://www.bbc.co.uk/news/technology-27631001> (last accessed 3 June 2014).

<sup>46</sup> Harris J. Intimations of Immortality. *Science*. 2000;288(5463):59; Harris J. Intimations of immortality—The ethics and justice of life extending therapies. In: Freeman M, ed. *Current Legal Problems*. Oxford: Oxford University Press; 2002:65–97.

<sup>47</sup> Schneier B. *Cybersecurity, scientific data and public trust*. Lecture given at The Royal Society. H5N1 Research: Biosafety, Biosecurity and Bioethics; London. 2012.

accessible to anyone (like himself) knowledgeable enough to access them. Moreover, as Schneier noted, “all the research is being done on computers . . . and any computer can be hacked, not most, any!”<sup>48</sup>

In the cloud we have a permanent, accessible, and in principle freely available archive of everything we have ever recorded digitally.

*What has so far been generally overlooked is that this constitutes the most comprehensive gateway to the soul (or way of constructing an alternative soul ab initio) ever discovered, one that is, in principle, available to all and permanently accessible.*

In short, we already have a massive capacity for “mind reading” and hence mind misreading, against which there is no effective defence, and to which most of us are exposed. Here, we speak of those aspects of our minds and your mind that have been digitised, that is, put into computer memory or onto the Internet—into the cloud. There is no defence; anything that has ever been on a computer, let alone been e-mailed or stored in the cloud, can be read and downloaded, and that access cannot be prevented.

If we think about what “data” most of us have consigned to the cloud, the list can be alarming. Most of us now write on some kind of digitising equipment: a computer, tablet, or smartphone; most of us also write and receive emails, tweets, and so on; many have a web presence—a Facebook or Twitter account or a website; and many also keep their diaries and appointments in electronic media. Moreover, the cloud contains a record of the websites we have visited and of the things we have ordered online. Many of us fill in our tax returns online, pay fines online, and visit online medical services like NHS Direct; we look up medical conditions online, order drugs and services—many of which may be unavailable or even illegal in our own countries—and so on . . . the list is as large as our imagination and as inventive as Google’s algorithms.

It should be clear that much of this will contain the substance of what we believe on many matters; what we are minded to do or to consider doing; what we have done, including elements of our desires, fantasies, and interests; what we know and don’t know; our preoccupations, activities, patterns of behaviour, purchasing habits, and the amount of money we spend; and what the objects of our gaze are—and more or less reliable inferences can be drawn about what sort of gaze it is.

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<sup>48</sup> *ibid*, also available at <https://royalsociety.org/events/2012/viruses/> Accessed 3 June 2014.

Some aspects of this are starting to arouse interest. People using the Internet are becoming increasingly aware of the dangers of images they post and things they say on Facebook or other websites; this realisation is perhaps aided, ironically, by the proliferation of news feeds and novel forms of communication provided by the cloud. The rise of highly visible cyberstalking applications such as *Creepy*,<sup>49</sup> which aggregates the geolocation data attached to various tweets, updates, photos, and the like from any chosen poster and generates a map of the subject's whereabouts, and the extensive media coverage focused on cyberbullying,<sup>50</sup> with hundreds of tragic and often upsetting stories doing the rounds, have attracted attention. Charities and the victims and/or the families of the victims of these dangers have started campaigns to publicise them<sup>51</sup> and to offer advice and assistance.

Research suggests that, among users in what is generally regarded as the most vulnerable group, preteens and early teenagers, there is a “[belief] in the value of online privacy,” and that “educational opportunities regarding internet privacy and computer security as well as concerns from other reference groups (e.g., peer, teacher, and parents) play an important role in positively affecting the Internet users' protective behavior regarding online privacy.”<sup>52</sup>

The rising awareness of the public and the willingness to respond to the potential dangers of the cloud are perhaps well illustrated by a recent petition against a newly announced Facebook feature, which would “let it listen to our conversations and surroundings through our own phones’ microphone. Talk about a Big Brother move.”<sup>53</sup> At the time of writing, this petition has more than 587,960 signatories.

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<sup>49</sup> Although developed in 2011 ostensibly as a means of raising awareness of the ease of cyberstalking, *Creepy* is still available freely from <http://creepy.en.softonic.com/> Accessed 6 June 2014.

<sup>50</sup> A simple Internet search for “examples of cyberbullying on social networking sites” raises around 368,000 results from media outlet sites. They are perhaps best summed up in this article from the BBC: Harrison A. Cyber-bullying: Horror in the home. *BBC News* 2013 Aug 17; available at <http://www.bbc.co.uk/news/education-23727673> Accessed 6 June 2014

<sup>51</sup> For examples of such campaigns, see: Delete Cyberbullying. *deletecyberbullying.eu*. Available at: <http://deletecyberbullying.eu/>. Accessed June 6, 2014; NASUWT. Stop Cyberbullying. *nasuwt.org.uk*. Available at: [https://www.nasuwt.org.uk/Whatsnew/Campaigns/StopCyberbullying/NASUWT\\_002654/](https://www.nasuwt.org.uk/Whatsnew/Campaigns/StopCyberbullying/NASUWT_002654/). Accessed June 6, 2014; and A Thin Line. *Athinline.org*. Available at: <http://www.athinline.org/>. Accessed June 6, 2014.

<sup>52</sup> Chai S, Bagchi-Sen S, Morrell C, Rao H, Upadhyaya S. Internet and online information privacy: An exploratory study of preteens and early teens. *IEEE Transactions on Professional Communication* 2009;52(2):167–82. At 167

<sup>53</sup> Facebook: Do Not Release Your New App Feature that Listens to Users’ Conversations. *SumOfUs*. Available at: <https://actions.sumofus.org/a/Facebook-app-taps-phones>. Accessed June 6, 2014.

## 7.6.2 Mind Misreading: One Recent Example

A recent news story is particularly telling. On 21<sup>st</sup> March 2014, the BBC reported that “[a] woman who threw acid in the face of a friend while wearing a veil as a disguise has been jailed for 12 years.” The conviction of Mary Konye for this assault on Naomi Oni was widely reported.<sup>54</sup> The police had not believed the victim; they had examined her laptop hard drive and found that, before the attack, she had “looked at plastic surgery websites” and at news features concerning Katie Piper. Katie Piper was a young woman who, in 2008, as *The Guardian* reported, “was raped by a man she’d met online. He then arranged for someone to throw acid in her face.”<sup>55</sup> Armed with what they thought was evidence concerning Naomi Oni’s state of mind, the police thought, or through lack of thought assumed, that this was evidence that she had harmed herself, rather than, as proved to be true, or that she was the victim of a malicious and vicious attack.<sup>56</sup>

As the UK newspaper *The Daily Mirror* reported at the time of the assault on Ms. Oni (February 25, 2013), “Officers seized the 20-year-old’s laptop after discovering she had viewed websites about acid burn victims before she was hurt.”<sup>57</sup>

The police in this case were guilty of an error of inference, one of the most common errors to which humankind is subject. Moreover, the cloud simply contains data, often without context and almost always without other relevant information. For example, the cloud is irony blind; it usually contains no data on tone of voice. Often there is also no context. Remarks that may be nuanced in print, or, for example, in a public statement or speech, often appear on the Internet in truncated form, without nuance. One of the present authors has watched while members of the audience at a public lecture he was giving have tweeted extracts of the speech, which then appeared without the nuance or qualification that the lecture contained.

It is true that those of us who publish, broadcast, speak publicly, and so on, place our minds to an extent in the public domain, where they may freely be “read” by all and sundry. But most of us do so or do so potentially without realising that that is what we

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<sup>54</sup> Mary Konye jailed for acid attack on Naomi Oni - BBC News. *BBC News*. 2014. Available at: <http://www.bbc.co.uk/news/uk-england-london-26680664>. Accessed June 9, 2014.

<sup>55</sup> Cochrane K. Katie Piper: I asked Mum to kill me. *The Guardian*. 2012. Available at: <https://www.theguardian.com/lifeandstyle/2012/jun/02/katie-piper-acid-attack-book>. Accessed June 9, 2014.

<sup>56</sup> BBC Radio 4 Today. Police Are “Incompetent,” Says Acid Attack Victim. [Interview With Naomi Oni] March 24 2014. Available at: <http://www.bbc.co.uk/programmes/p01w49sq>. Accessed April 2, 2014.

<sup>57</sup> Collins D. Did acid burns victim attack herself? Police probe self-harm theory. *Mirror*. 2013. Available at: <http://www.mirror.co.uk/news/uk-news/naomi-oni-acid-burns-victim-1729522#ixzz347hivunu>. Accessed November 5, 2014.

have done or without realising that—set in a new context, without nuance, qualification, or other caveats—the meaning will inevitably be not only distorted but sometimes corrupted beyond recognition.

More significant by far, all people who use devices that record or transmit digitally are, almost certainly, placing themselves, if not on public record, at least in a universally and permanently accessible public domain. This is a domain in which inferences will increasingly be drawn (conservatively or recklessly or anything in between) about what we think, feel, believe, wish for or intend, desire, or dread. Some of the inferences drawn about us will be reasonable and accurate enough, and for the foreseeable future these will constitute the best available windows to the soul.

## **8.0 ARTIFICIAL INTELLIGENCE - THE SHYLOCK SYNDROME**

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*The collaborative and cooperative manner of writing this paper does not lend itself to identifying the specific contributions of each author by section or word count. Each contributor has agreed on an equal share of authorship of the paper, i.e. 33.3%*

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### **8.1 Abstract**

It seems natural to think that the same prudential and ethical reasons for mutual respect and tolerance that one has vis-à-vis other human persons would hold toward newly encountered paradigmatic but nonhuman biological persons. One also tends to think that they would have similar reasons for treating we humans as creatures that count morally in our own right. This line of thought transcends biological boundaries—namely, with regard to artificially (super)intelligent persons—but is this a safe assumption? The issue concerns *ultimate moral significance*: the significance possessed by human persons, persons from other planets, and hypothetical nonorganic persons in the form of artificial intelligence (AI). This article investigates why our possible relations to AI persons could be more complicated than they first might appear, given that they might possess a radically different nature to us, to the point that civilised or peaceful coexistence in a determinate geographical space could be impossible to achieve.

SALERIO Why I am sure if he forfeit, thou wilt not take his flesh,— what's that good for?

SHYLOCK To bait fish withal, if it will feed nothing else, it will feed my revenge.

He hath disgraced me, and hindered me half a million; laughed at my losses, mocked at my gains, scorned my nation, thwarted my bargains, cooled my friends, heated mine enemies, and what's his reason? I am a Jew. Hath not a Jew eyes? hath not a Jew hands, organs, dimensions, senses, affections, passions? fed with the same food, hurt with the same weapons, subject to the same diseases, healed by the same means, warmed and cooled by the same winter and summer, as a Christian is?—If you prick us, do we not bleed? if you tickle us, do we not laugh? if you poison us, do we not die? and if you wrong us, shall we not revenge?—If we are like you in the rest, we will resemble you in that. If a Jew wrong a Christian, what is his humility? Revenge. If a Christian wrong a Jew, what should his sufferance be by Christian example? why, revenge. The villany you teach me, I will execute, and it shall go hard but I will better the instruction.

William Shakespeare, *The Merchant of Venice*, Act III, Scene 1<sup>1</sup>

## 8.2 Introduction

When we imagine the human race encountering paradigmatic but nonhuman biological persons—meaning “a thinking intelligent being, that has reason and reflection, and can consider itself as itself, the same thinking thing in different times and places”<sup>2</sup> (e.g., Neanderthals, Spock, or ET)—we (almost) automatically think that the same prudential and ethical reasons for mutual respect and tolerance that we have vis-à-vis other human persons would hold toward them. We also tend to think that they *would have* (and certainly, if we know what’s good for us, that they *should have*) similar prudential and ethical reasons for treating us as creatures that count morally in our own right.

In fact, this line of thought transcends biological boundaries in that we also are tempted to assume that we would be morally bound to treat artificially intelligent persons (or artificially superintelligent persons) as we treat human persons, irrespective of whether or not these

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<sup>1</sup> Shakespeare W. *The Merchant of Venice*. In: Proudfoot R, Thomson A, Kastan DS, eds. *The Arden Shakespeare, Complete Works*. Walton-On-Thames: Thomas Nelson and Sons; 1998, at 842–3.

<sup>2</sup> Locke J. *An Essay Concerning Human Understanding*. Oxford: Clarendon Press; 1979, at bk. II, chap. 27, sec. 9.

creatures have been created by humans, were encountered in outer space, or turned up here in their spacecraft. In this respect most people reject, at least in principle, what might be called bioism: the prejudice or bias in favour of biological entities with *X* interests and capacities over those of nonbiological entities with comparable *X* interests and capacities.<sup>3</sup> This means that we hold that the same moral wrong would be committed if someone were to kill an innocent human person or an innocent artificially intelligent person. This issue of course is how we “flesh out” (and we use that term deliberately) what justifies thinking of an innocent artificial intelligence (AI) as also a person. The issue in short concerns what might be termed *ultimate moral significance*—that is, the significance possessed by human persons, persons from other planets, and nonorganic persons in the form of AI if and when they appear.<sup>4</sup>

One of the present authors, John Harris, wrote about AI in 1985 and started to think seriously about how we, humans, and they, AI creatures, might react to one another. At that time Harris explored the possibility of extraterrestrial AIs and suggested that:

the question of whether or not there are people on other planets is a real one. If there are, we need not expect them to be human people (it would be bizarre if they were!), nor need we expect them to look or sound or smell (or anything else) like us. They might not even be organic, but might perhaps reproduce by mechanical construction rather than by genetic reproduction.<sup>5</sup>

He then went on to speculate that if their technology proved to be superior to ours (perhaps the proof of superior technology would be them turning up on, or in near proximity to, the earth rather than us tracking them down in some other galaxy), it would be of paramount importance for us to convince them that we are also persons, if not just like them, at least enough like them to matter—in short, that we are persons with whom they would rather have lunch, than have for lunch.

Now, even when we maintain, in principle, that a symmetrical moral relation should hold (i.e., each party treats the other according to its moral status) between human persons and AI persons, two considerations come to mind that might lead us to think that our relations with them could be way more complicated than we usually make believe they could or should be. The first reason is that the creatures (created or encountered) might possess a radically different nature to us, to the point that civilised or even peaceful

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<sup>3</sup> Palacios-González C. *Robotic Persons and Asimov's Three Laws of Robotics* [unpublished manuscript].

<sup>4</sup> Harris J. *The Value of Life*. London: Routledge; 1985, at chap. 1. 7–27.

<sup>5</sup> *ibid.* 9–10.

coexistence in a determinate geographical space would be impossible to achieve. This might be due, for example, to the impossibility of setting reliable limits to the *aims and purposes* of a human-created AI person. This would apply particularly to an AI capable of thinking about its aims and purposes and adapting itself in ways not envisaged by its designers and over which they have no effective control, just as is true to an extent of us organic, ape-descended humans concerning one another. The second reason is an epistemological one. We might not realise that we have created (or encountered) an AI person. If this were to happen, we would risk not treating “her” (perhaps AIs, like ships, are conventionally female?) as morality requires that she/it be treated.

Here, we focus on the first reason. We investigate why our possible relations to AI persons could be more complicated than at first might appear due to issues surrounding the AI’s nature. Let’s start by saying that the control problem (i.e., how to regulate, or effectively influence, other beings in such way that we are not put in harm’s way by their actions or inactions) that we would have when dealing with AI persons, or when thinking about creating AI persons, is not the very same problem, or at least not precisely the same problem, we humans have with one another. It is not so, because the answers to the following questions vary depending on whether we are talking about a human person or an AI person: How can we minimise the risk posed by people whose actions or plans threaten other people or the planet? How can we eliminate or mitigate the risk posed deliberately or accidentally by other people through wickedness, negligence, insensitivity, stupidity, or *superintelligence*? How can we stop the proverbial village idiot<sup>6</sup> or the village genius from destroying the global village, or how can we stop the agent who fails in his or her or its duty to act for the best “all things considered” from doing likewise?<sup>7</sup>

One obvious answer when dealing with AI persons would be to try to motivate them just as we try to motivate humans, first by educating them, showing them that some sorts of beings are intrinsically valuable, offering the AI rewards, or threatening them with punishment. The problem with this solution is that it is too parochial and almost certainly doomed to fail.<sup>8</sup> In his book *Superintelligence: Paths, Dangers, Strategies*, Nick Bostrom rightly warns against anthropomorphising the capabilities or motivations of AI, or superintelligent AI. This worry is warranted by the fact that most usually we imagine (and in certain cases believe) that other creatures (e.g., aliens or AIs) possess human minds, and thus that they respond to stimuli as such. It is not that we think that they literally

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<sup>6</sup> Harris J. *How To Be Good*. Oxford: Oxford University Press; 2016.

<sup>7</sup> *ibid.*

<sup>8</sup> A possible exception to this is a situation in which the AI is created by means of whole human brain emulation. Cf. Bostrom N. *Superintelligence: Paths, Dangers, Strategies*. Oxford: Oxford University Press; 2014.

possess human minds (with the peculiarities of our evolutionary history) or human brains (the physical basis for human minds) inside robotic bodies or super computers. What happens is that we assume, perhaps unreflectively, that these creatures are motivated to act by the same types of considerations that motivate action in humans (i.e., that we have overlapping or congruent interests that motivate us) and also that they are demotivated by the same sorts of things that demotivate us.

When we make believe that we encounter aliens and AIs, often we imagine the proverbial wolf in sheep's clothing (i.e., nonhumans passing as humans for their advantage). But we encounter such wolves because we have made an epistemological mistake. While terrestrial or extraterrestrial biological organisms (if there are any) are likely to share certain motivations, if in fact they arose from similar evolutionary processes, human-designed AIs, by contrast, might not share any of these motivations. This can be the case because intelligence and goals are not linked in a specific and necessary way, much less in a way that allows biological beings like us to survive and thrive. It is from this nonrelation between intelligence and goals that Bostrom proposes the orthogonality thesis (OT): "Intelligence and final goals are orthogonal: more or less any level of intelligence could in principle be combined with more or less any final goal."<sup>9</sup>

A characteristic of the OT is that it does not require us to say anything about rationality or reason. The OT is specified in terms of intelligence, which Bostrom understands as "something like skill at prediction, planning, and means-ends reasoning in general."<sup>10</sup> For we humans, the existential danger that AI could most certainly impose derives from the fact that AIs could have goals that are incompatible with our survival but compatible with, and perhaps necessary for, the survival or the achievement of the goals of the AI (we do not address in this article issues that would arise with an AI who is reckless or careless of its own survival or the survival of its kind). What makes this even more worrying is that many of the goals an AI could have may be contradictory to the requirements for humans to survive and thrive, which are in any event highly difficult to meet. Why is this the case? Because of all the possible goals that there could be, only a minimal fraction of them are likely to be congruent with the survival of the earth as we know it, and an even a smaller number are compatible with the survival of humankind or even of posthumankind.

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<sup>9</sup> *ibid* 107

<sup>10</sup> *ibid*

### 8.3 Motivation

What might a machine life- (or existence-)form or a silicate being actually require to survive and thrive? What needs might drive an artificial intelligence to act toward self-fulfillment? For our present purpose, we can perhaps discount simple programmed commands, instead focusing on AIs with at least a measure of autonomy in their actions. As discussed elsewhere in this article, we cannot assume that these aims and goals would match our own or even be intelligible to us ape-descended creatures of flesh and blood.

One goal it might be reasonable to assume might be held by an AI would be the continued existence of the being and/or its kind. This, it could be argued, is the purpose of the seven commonly accepted human life processes,<sup>11</sup> or indeed that of the more nuanced academically accepted physiological functions of life—namely, homeostasis, cellular organisation, metabolism, growth, evolutionary adaptation, stimuli response, and reproduction.<sup>12</sup> In *Homo sapiens* and indeed most complex organisms, a lack of any of these characteristics would prohibit life, either by failing to support the organism or by leaving it completely vulnerable to outside hazard. Even single-celled organisms—prokaryota, eukaryota, and archaea—are each subject to the majority of these processes, and borderline cases—“organisms at the edge of life”<sup>13</sup> such as viruses, which do not conform to so many commonly recognised key markers of life<sup>14</sup> that they might be considered as simply being organic chemical structures—are subject to at least one.

This latter, ubiquitous function is, of course, reproduction—be it by sexual reproduction or even self-replication, as in a virus or other cellular structures. Many attempts have been made to define life, or to distil it to its essence, and one exhaustive review and analysis, by Trifonov, concludes simply that “life is self-reproduction with variations.”<sup>15</sup> It is a

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<sup>11</sup> Many readers will remember the seven life processes in the form of that friendly soul “MRS GREN”: movement, respiration, sensitivity, growth, reproduction, excretion, and nutrition. Chemical Reactions in Living Things. BBC Bitesize 2014. Available at: [http://www.bbc.co.uk/schools/gcsebitesize/science/add\\_ocr\\_21c/life\\_processes/reactionsrev1.shtml](http://www.bbc.co.uk/schools/gcsebitesize/science/add_ocr_21c/life_processes/reactionsrev1.shtml). Accessed April 16, 2015.

<sup>12</sup> McKay C. What is life—and how do we search for it in other worlds? *PLoS Biology* 2004;2(9): 302; Trifonov E. Definition of life: Navigation through uncertainties. *Journal of Biomolecular Structure & Dynamics* 2012;29(4):647–50.

<sup>13</sup> Rybicki E. The classification of organisms at the edge of life, or problems with virus systematics. *South African Journal of Science* 1990;86:182–6.

<sup>14</sup> This observation has been long established in the literature; for example: Penman S. Virus metabolism and cellular architecture. *Virology* 1985;169–82; Luria S. Bacteriophage: An essay on virus reproduction. *Science* 1950;111(2889):507–11; and Choppin P, Richard W. The structure of influenza virus. *The Influenza Viruses and Influenza* 1975;15–51.

<sup>15</sup> Trifonov E. Vocabulary of definitions of life suggests a definition. *Journal of Biomolecular Structure and Dynamics* 2011;29(2):259–66. It should be said, of course, that this is far from agreed on—there is a strong

reasonably rational assumption to make that any novel or at least newly discovered form of life would follow this pattern and possess, if nothing else we might understand, an aim or at least a propensity to propagate and thereby, pace Richard Dawkins, serve the interest of its genes or their equivalent.<sup>16</sup>

Empirical work, limited as it may be at this time, appears to bear this out. Hod Lipson and colleagues at Cornell demonstrated the “spontaneous emergence of self-replicating structures” in a simulated group of simple, undirected automata<sup>17</sup> without any selection or extraneous reward for using the trait; the “molecubes” exhibited a distinct tendency toward self-organisation and the replication of these structures, with populations among different groups fluctuating in relation to one another. As one populace waxes, another wanes. While this latter activity cannot properly be called hostile competition, given the lack of an organising central “mind,” it is nonetheless an intriguing microcosm of the very concerns we hope to address in this article and is a point to which we will return shortly.

Lipson’s work is interesting in that it implies that some form of Trifonov’s determination of life applies to a case in silico. Had Lipson’s group sufficient resources to build the requisite (prohibitively large, hence the simulation) number of physical, mechanical molecubes<sup>18</sup> and set them loose, it appears probable that the same behaviour would have been observed. Molecubes, physical or not, are comparatively uncomplicated, and the simulation only operates within certain parameters. Although they do spontaneously propagate their numbers, it is difficult to say whether this is in service of some inherent drive—let alone goal—to survive or merely the natural expression of the exercise of the molecubes’ limited abilities. It could be argued that this distinction is unimportant—a pathogenic virus does not proliferate with intent but rather carries out the functions and processes it is capable of performing. Either way, the virus acts in its own—unconscious—interests, primitively understood. We could draw the conclusion that Lipson’s machines exhibit the fundamentals of life in the same manner as a virus and, by extension, necessarily share their “goal” of maintaining it.

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contention that “attempts to define life are irrelevant” (Szostak J. Attempts to define life do not help to understand the origin of life. *Journal of Biomolecular Structure and Dynamics* 2012;29(4):599–600) or even futile, which may well be true from a purely scientific perspective, though it is a useful conceit when considering AI.

<sup>16</sup> Dawkins R. *The Selfish Gene*. Oxford: Oxford University Press; 2006.

<sup>17</sup> Studer G, Lipson H. Spontaneous emergence of self-replicating structures in molecube automata. *Proceedings of the 10th Int. Conference on Artificial Life (ALIFE X)* 2006;227–33.

<sup>18</sup> The team had previously built a smaller number of these machines, which demonstrate the physical capability to self-replicate. Zykov V, Mytilinaios E, Adams B, Lipson H. Self-reproducing machines. *Nature* 2005;435(7038):163–4.

## 8.4 Immortality

Given that we humans share this fundamental goal of survival (though we have the capacity to choose to ignore it in favour of other interests<sup>19</sup>) with “lower” orders of beings,<sup>20</sup> it stands to reason that an artificial human-commensurate- or super-intelligence would also be subject to it, with the same caveat. We must be wary when drawing this comparison, though: there is a significant difference, beyond substrate, between man and machine. *Homo sapiens* and almost all other known species are (at present) senescent and fleeting—despite any individual or collective survival goal, we wither and die.<sup>21</sup> To achieve the latter in lieu of the former we reproduce. Our AI (perhaps) compatriot, however, is not necessarily subject to the same weakness. It may be functionally immortal and therefore not subject to the same drive to proliferate as are we—that is, so long as it has not given itself the sensual satisfactions (or their nonorganic equivalent if there is one) of the Greek immortals, to have sex and procreate with humans and with each other. It is able to survive—fulfilling that most basic of aims—indefinitely, without any need for a line of descendants to keep its kind “alive.” This is problematic—why might the molecubes self-replicate as they do if it is unnecessary?

Perhaps a sole, individual AI would be content to exist alone, secure in the knowledge that it is surviving (assuming it wished to do so). This would, however, require that it disregard outside hazards and resource requirements. Once these are taken into account, the AI would be in a much less secure position as regards achieving its basic goal.<sup>22</sup> Presumably, then, it would act accordingly in pursuit of that goal. Any form of AI, be it ensconced in an individual, physical shell such as an android or one that exists more ephemerally within a wide digital network, would require energy to continue to “survive” and operate, just as we humans die without appropriate nutrition and sunlight. An AI would require complex component resources—or the means to manufacture these—for repair, much as do our bodies. The laws of physics decree that there is a finite quantity of each resource—however vast—available, and it is here that we meet the rub. These resources must be harvested, and the history of mankind is nothing if not evidence for the destructive competition engendered by groups attempting to harvest even plentiful or

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<sup>19</sup> For instance, the choice to opt for suicide or to not have children directly contravenes the survival instinct of the individual or the germline but is likely to fulfill other motivations that the chooser considers of a higher importance.

<sup>20</sup> “Lower” here refers to intelligence, rather than a misinterpretation of Linnaean taxonomy or Darwinistic descent.

<sup>21</sup> Harris J. Intimations of immortality. *Science* 2000 Apr;288(5463):59; Harris J. Intimations of immortality—the ethics and justice of life extending therapies. In: Michael F, ed. *Current Legal Problems*. Oxford: Oxford University Press; 2002:65–97.

<sup>22</sup> Hoyle F. *The Black Cloud*. New York: Buccaneer Books; 1957.

renewable resources in their own interests.

Here, we might think back to the interesting behaviour observed in Lipson's robots. Their subpopulations wax and wane as they compete for resources (in this case, loose molecubes combine into replicated structures). To maximise chances of survival over group B, group A might proliferate in order to maximise its opportunities. Similar behaviour is familiar to us from the animal kingdom, for instance, with small animals reproducing in large quantities to overcome the rate of attrition. It perhaps follows, then, that a finite availability of resources would engender reproductive behaviour in an AI. In the long term, its motivation to survive and ours would likely be incompatible.

If the intelligence relationship between an AI and the molecube is similar to that between us and a bacterium, it is fair to say that the AI is likely to have rather more discretion in its actions than the Cornell robots. If it is possessed of a moral faculty, it might judge us worthy of conservation, as we do for other species. It may choose to limit its population at some ideal number. Alternatively, it might simply be rational, at least in the short- to mid-term, for an AI machine being to develop the goal of ensuring *our* survival. But we perhaps should not count on this.

In the field of space exploration, there has been much thought devoted to solving the problem of how we might send probes across interstellar distances. Many of these are variations on the Von Neumann machine concept,<sup>23</sup> in which a machine gathers raw materials during its journey and gradually constructs the necessary industrial infrastructure to produce a replica of itself, which then travels on to do the same, and so on—thus covering vast areas of space. However, as Freitas calculates in an extremely detailed blueprint for such an enterprise, to create this infrastructure would take a large variety of task-focused robots (for instance, atmospheric miners, excavators, metallurgists, chemists, fabricators, quality assurance, power plants, etc.), and at least 500 years from planetfall.<sup>24</sup> Similarly, if we were to turn our AI loose into the world without access to our existing industrial complex, its generation time would be somewhat uncompetitive. Given access, the AI would, we must suppose, be able to acquire the resources it needs, the means to assemble them, and the means to acquire more.

As such, at least until it is capable of developing its own complex, a machine being's

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<sup>23</sup> This concept was developed throughout lectures collected in Von Neumann J. *The Theory of Self-Reproducing Automata*. Burks A, ed. Urbana: University of Illinois Press; 1966. But it was given the colloquial name apocryphally.

<sup>24</sup> Freitas Jr R. A self-reproducing interstellar probe. *Journal of the British Interplanetary Society* 1980;33:251–64.

survival is dependent on our own, in a form of symbiosis. The AI is motivated to assist our survival (even if this is an intermediate step toward later on destroying us), and we are motivated to assist the AI in return for the many advantages it can provide. Of course, it is important to mention again that we humans are subject to further motivations, which may take precedence over survival—we know that the use of fossil fuels is an existential threat, and yet that does not stop us from admiring and desiring powerful cars, motorcycles, or boats, on the one hand, or cheap electricity or fuel or food, on the other.<sup>25</sup> We cannot imagine what motivations beyond survival an AI might possess, what it might value sufficiently to become apathetic to future generations or antagonistic to us; and it may be here that our existence and theirs becomes incompatible.

## 8.5 Can We Make AI Safe Enough?

Many doubt the safety of relying on any initially programmed limits to an AI's capacity to develop in particular ways,<sup>26</sup> and if push came to shove we wouldn't like to bet our lives on<sup>27</sup> the benevolent interest of AIs we had created, particularly if they were really superintelligent! It is in this regard that, for example, Steven Hawking said, "The development of full artificial intelligence could spell the end of the human race,"<sup>28</sup> and Elon Musk<sup>29</sup> said, "We need to be super careful with AI. Potentially more dangerous than nukes."

Once we realise that an AI person's nature can be, and almost certainly would be, radically different from ours, it is easy to assume that *all* (or all that matters) of their goals would be different from ours and thus that we would be in the dark when trying to prevent an event that would be catastrophic for us. Even when our final goals might be radically different from those of an AI person, it is important to take into account what Bostrom calls the "instrumental convergence" thesis. According to this thesis:

Several instrumental values can be identified which are convergent in the sense

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<sup>25</sup> This is true at least in the case of these authors, though the motorcyclist among us maintains innocence by way of fuel efficiency.

<sup>26</sup> *op. cit.* 8, Bostrom 2014; and Barrat J. *Our Final Invention: Artificial Intelligence and the End of the Human Era*. New York: Macmillan; 2013.

<sup>27</sup> As John Harris suggested in *How to Be Good*; *op. cit.* 6

<sup>28</sup> Cellan-Jones R. Stephen Hawking warns artificial intelligence could end mankind. *BBC News* 2014 Dec 2; available at <http://www.bbc.co.uk/news/technology-30290540>. Accessed 16 Apr 2015

<sup>29</sup> Rodgers P. Elon Musk warns of terminator tech. *Forbes*. 2014. Available at: <http://www.forbes.com/sites/paulrodgers/2014/08/05/elon-musk-warns-ais-could-extirminate-humanity/>. Accessed April 16, 2015.

that their attainment would increase the chances of the agent's goal being realized for a wider range of final goals and a wide range of situations, implying that these instrumental values are likely to be pursued by a broad spectrum of situated intelligent agents.<sup>30</sup>

Bostrom identifies the next convergent instrumental values: self-preservation, goal-content integrity, cognitive enhancement, technological perfection, and resource acquisition. Although it is clear that any AI person would try to achieve these given awareness of self, it is open to investigation whether intelligent, or superintelligent, AI nonpersons would in fact be able to identify and try to achieve such goals.

Now, if the instrumental convergence thesis is correct and if all, or some, of these goals are going to be sought by an AI person, then we had better anticipate whether or not the acquisition of such values would be realised in a zero-sum game fashion. Given that failing to come to the right conclusion could end in the destruction of humanity, Bostrom suggests—when designing intelligent, or superintelligent, AIs—that we should start by figuring out how we could effectively control them before freeing them into the world. He proposes two different paths to accomplish this: capability control methods, including boxing methods (either physical or informational), incentive methods, stunting (limiting the system's capacities or access to information), and tripwires, and motivation selection methods, including direct specification, domesticity, indirect normativity, or augmentation. As stated before, the problem with these methods is that they only need to fail once for humanity to be at significant risk of extinction. As Bostrom states at the end of his book:

Before the prospect of an intelligent explosion, we humans are like small children playing with a bomb. Such is the mismatch between the power of our play-thing and the immaturity of our conduct. Superintelligence is a challenge for which we are not ready now and will not be ready for a long time. We have little idea when the detonation will occur, though if we hold the device to our ear we can hear a faint ticking sound.

For a child with an undetonated bomb in its hands, a sensible thing to do would be to put it down gently, quickly back out of the room, and contact the nearest adult. Yet what we have here is not one child but many, each with access to an independent trigger mechanism. The chances that we will all find the sense to put down the dangerous stuff seem almost negligible. Some little idiot is bound to

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<sup>30</sup> op. cit. 8. at 109.

press the ignite button just to see what happens.

Nor can we attain safety by running away, for the blast of an intelligence explosion would bring down the firmament. Nor is there a grown-up in sight. In this situation, any feeling of gee-wiz exhilaration would be out of place. Consternation and fear would be closer to the mark; but the most appropriate attitude may be a bitter determination to be as competent as we can, much as if we were preparing for a difficult exam that will either realize our dreams or obliterate them.<sup>31</sup>

Be all this, in a sense, as it may, there is another problem that may radically inhibit cordial relations between a superintelligent AI and human persons.

## 8.6 The Shylock Syndrome

When Shylock makes his famous and controversial speech in *The Merchant of Venice*, he is setting out one compelling answer to the question, what is it to be human? But he is also reminding us that the foundations of our morality, as well as those of our humanity, are grounded, to an extent of which we may be unaware, in our nature. This nature includes our passions, our vulnerabilities, our ability to reason, and our sense of justice, among many other things. We can of course surpass our nature (or elements of it) and sometimes suppress it or disregard it, but we would find it impossible to reject it all at once. In this, “we are like sailors who must rebuild their ships on the open sea, never able to dismantle it in dry-dock and to reconstruct it there out of the best materials.”<sup>32</sup>

Ludwig Wittgenstein<sup>33</sup> also made a point similar to this wonderful metaphor of Otto Neurath, when he said: “At the foundation of well-founded knowledge is knowledge that is not well-founded”; not surprising perhaps, since both he and Neurath were part of the Vienna Circle.<sup>34</sup>

To gloss Neurath’s metaphor: our moral system is like Noah’s Ark, a wooden ship housing not only ourselves but all we need to survive and flourish. No single plank (or possibly no

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<sup>31</sup> *op. cit.* 8. at 259.

<sup>32</sup> Neurath O. Protokollsätze. *Erkenntnis* 1932;3(1):204–14. Quoted in Rabassi E. Some notes on Neurath’s ship and Quine’s sailors. *Principia* 2003;7(1–2):171–84. Quine also used Neurath’s metaphor in his *A Logical Point of View*. 2nd ed. revised. New York: Harper; 1963, at 78.

<sup>33</sup> Wittgenstein L. *On Certainty*. Paudl D, Anscombe GEM, trans. Oxford: Basil Blackwell; 1969, at para. 253 and 247.

<sup>34</sup> Janik A, Toulmin S. *Wittgenstein’s Vienna*. New York: Simon and Schuster; 1973.

section of the ship) is flawless; any might fail or become rotten with age and need to be replaced. What is certain is that we cannot, while at sea, junk the whole vessel and start again. And if one or more planks need to be replaced, we have to be sure that we have somewhere secure and reasonably dry to stand while we are replacing them. The planks on which we stand while examining and perhaps replacing those found to have failed are not necessarily flawless themselves; they are not necessarily more ultimately reliable—we simply make do and mend with them while we are repairing, and hopefully perfecting, the whole ship. Recalling Shylock's lines, the possession of any one of the following is not a necessary condition either of personhood or of a moral status comparable to that of most human beings: "hands, organs, dimensions, senses, affections, passions."...

Nor is the capacity to be like other persons, other morally significant beings in the following respects, essential, for we are "fed with the same food, hurt with the same weapons, subject to the same diseases, healed by the same means, warmed and cooled by the same winter and summer." True also of perhaps most humans is the fact that "if you prick us, do we not bleed? if you tickle us, do we not laugh? if you poison us, do we not die? and if you wrong us, shall we not revenge?"<sup>35</sup> But what follows?

While reminding us of what we standardly have in common with other persons, other currently comparable intelligences, neither Shylock nor, through him, Shakespeare is saying that the capacity to be wounded, the capacity for laughter, vulnerability to toxins, or the readiness to take revenge are essential components of human nature or even of moral agency. What they are both<sup>36</sup> saying, though, is something taken up by many moral theorists, notably R. M. Hare:<sup>37</sup> that one very handy tool in moral argument, an appeal found to work, that is to be persuasive across cultures and epochs is the appeal to reciprocity. This appeal is sometimes expressed in a version of the principle of reciprocity called the Golden Rule: "Do unto others as you would have them do unto you." Although it is associated with the Christian Prophet, this idea did not come to Jesus directly from God but can be found in many pre-Christian sources and sources independent of Christian thought. It is not our business to chart these here. Suffice it (we trust) to say that the question to others that begins "How would you like it if X and Y were to happen to, or be done to, you" makes a powerful—and if not universally decisive at least almost universally recognisable—appeal.

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<sup>35</sup> *op. cit.* 1.

<sup>36</sup> We treat fictional beings as real enough for the purposes of this locution.

<sup>37</sup> However, Hare misapplies this tool in the case of abortion. Hare RM. Abortion and the Golden Rule. *Philosophy & Public Affairs* 1975 Spring; 4(3):201–22.

For example, as one of the present authors has recently argued at some length, in the context of understanding what is good for people and what we all want and seek,

we understand very well what good and bad circumstances are and indeed generally how to avoid them for ourselves, and others. If we didn't we couldn't be prudent, we couldn't take care of ourselves, nor look out for others.

This is what the claim that the good is generic means and it is also how we argue for it. And there is a huge (although not of course total) consensus about what is good and bad for us; and again the existence of this consensus means that we know how to interpret the precautionary principle (with all its limitations) because we know what it is to be cautious and we know what it is to care for ourselves and others. . . . A morally vital question is always “why on earth did you hurt him?” or “How could you have let that terrible thing happen to her”? These questions are not simply a form of scolding, but a request for an appropriate moral justification in the knowledge that others will understand immediately why our conduct is in question here—because they understand how important it is that we preserve ourselves and others from harm. And that would be impossible to know or to teach without general agreement about what constitutes harm and benefit.<sup>38</sup>

For these considerations to bite we need to know what constitutes benefit and harm, hurting or healing, for these significant others, and they for us, if there is to be reciprocity. It is possible of course to overemphasize the difficulty of understanding these sorts of things intellectually—cognitively, rather than more directly from personal experience. But it is also possible to underemphasize them.

The problem is this: if for an AI we just do not know what it would be for that creature to be prudent in all the senses in which we are prudent for ourselves and for others, if we did not understand what for them the equivalent of the Shylock syndrome would be/is, we would not know what was bad for them or what was good. Equally, they might know these things of us cognitively, but would they, could they, know them empathetically?

Perhaps the famous scene in Kubrick and Clarke's *2001: A Space Odyssey*,<sup>39</sup> in which the supercomputer HAL is gradually destroyed while it pleads with the humans it has tried to kill for them to let it live/survive, comes close to making apparent what we might need to

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<sup>38</sup> *op. cit.* 6, at chap. II. The extracted section here is adapted rather than a verbatim quotation from this source.

<sup>39</sup> Kubrick S, Clarke AC. *2001: A Space Odyssey* [film]. Metro Goldwyn-Mayer; 1968.

begin to understand. By this we are not saying that empathy is the true source of moral understanding, quite the contrary. We are suggesting that to know the good, to know cognitively the good, involves more than propositional or algorithmic knowledge (if there is such a thing). Moral knowing, in other words, involves, for we human persons at least, more than a combination of knowing *how* and knowing *that*; it involves also knowing *why* and knowing . . . not necessarily what it *is* like to feel, think, or have “*that thing*” happen to us, but knowing, being able to imagine, *what it might be like*.<sup>40</sup> This is what Shylock is appealing to and what is if not doubtful then at least radically uncertain: namely, what we would know of an AI or it would know of us—for all that might appear to be the case from the next room during a Turing test. This is, we believe, the question as to whether creatures like us could have moral understanding and moral relations with an AI and vice versa.

Ludwig Wittgenstein is famous for a very sophic remark: “If a lion could speak, we could not understand him.” As with Wittgenstein’s lion,<sup>41</sup> we would need to know of an AI much more about its way of life—and he, she, or it of ours—before we could talk of understanding at all, let alone mutual understanding—and hence possibly of mutual (or maybe even unidirectional) concern and respect. Perhaps it was to acquire this sort of understanding that the Greek (and other) gods so often interfered in person in human affairs, to the extent of having sex (and indeed breeding) with humans.

The reciprocity presupposed by social and political institutions, as well as by moral relations and ethical understanding, takes place in the context of a shared nature and a shared evolutionary as well as social and political history among all people and peoples of which we are currently aware. Some elements of these may be common to all evolved organic creatures, whether originating on the earth or elsewhere. How much commonality may be required is difficult to say without consideration of actual examples. Immortality, either of gods, humans, or machines, may be one genuine imponderable in the mix, and we have suggested that the capacity for genuinely reciprocal understanding may be another. What further imponderables and indeed what other persons—not simply morally significant others<sup>42</sup> but others of moral significance and moral capacity comparable to persons—there may be, we may be on the threshold of discovering.

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<sup>40</sup> *op. cit.* 6

<sup>41</sup> Wittgenstein L. *Philosophical Investigations*. Anscombe GEM, trans. Oxford: Basil Blackwell; 1958, at part II, xi, 223. “If a lion could speak, we would not understand him.”

<sup>42</sup> Here we continue to talk of course of what might be termed “ultimate moral significance”—that is, the significance possessed by human persons, persons from other planets, and nonorganic persons in the form of AI if and when they appear.

## **9.0 THE EDGE OF HUMAN? THE PROBLEM WITH THE POSTHUMAN AS THE ‘BEYOND’**

**David R. Lawrence**

Lawrence D. The Edge of Human? The Problem with the Posthuman as the ‘Beyond’.

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### **9.1 Abstract**

This article asks whether enhancement can truly lead to something beyond humanity, or whether it is, itself, an inherently human act. The ‘posthuman’ is an uncertain proposition. What, exactly, would one be? Many commentators suggest it to be an endpoint for the use of enhancement technologies, yet few choose to codify the term outright; which frequently leads to unnecessary confusion. Characterizing and contextualizing the term, particularly its more novel uses, is therefore a valuable enterprise. The abuse of the term ‘Human’, especially in the context of the enhancement debate and the myriad meanings ascribed to it, could give ‘posthuman’ very different slants depending on one's assumptions. There are perhaps three main senses in which the term ‘human’ is employed: the biological, the moral, and the self-idealizing. In the first of these, ‘human’ is often conflated with *Homo sapiens*, and used interchangeably to denote species; in the second, ‘human’ (or ‘humanity’) generally refers to a community of beings which qualify as having a certain moral value; and the third, the self-idealizing sense, is more descriptive; a label denoting the qualities that make us who we are as beings, or ‘what matters about those who matter’. So, what might enhancement make us? A novel species or genus of hominid? Or, perhaps, a morally more valuable being than a regular human? Of course, there's a third option: that a posthuman is a being which embodies our self-ideal more successfully than we do ourselves – one ‘more human than human’. Which to choose?

## 9.2 Introduction

As the debate around human enhancement technologies continues and enters a new phase, more and more attention is being paid to whether there is a stage at which the enhanced human becomes something else, no longer human as we are. A common critical refrain serenades the fear that we will leave our humanity behind and become something else, something other- usually termed ‘posthuman’. Yet, how we should define the ‘posthuman’ remains unclear.

To talk about the ‘posthuman’ as if we have left humanity behind, either in the sense of having gone ‘beyond’ human or as a certain set of creatures apart from humanity, is both misleading and dangerous. It is misleading because it is a hyper-inflated claim, as I will show, and it is dangerous because it encourages the belief that the world is- or will soon become- peopled with different classes of being. This may engender if not false, then at least dangerous beliefs about rights, duties, and moral status.

It is undeniable that enhancement technologies exist, are used, and will continue to develop; and it is idle to claim that we ought avoid them wholesale. Depending upon one’s definition,<sup>1</sup> from integrated technoscientific interventions like nootropics and bionic prostheses; through external technologies, anything from eyeglasses to the smartphone; even down to anthropological phenomena such as education and agriculture; it is possible to argue that our lives and lifestyles already rely on these enhancements today, and perhaps even that they form the basis of what makes us who we are. This being so, it is important that we find a way to reconcile ourselves with the beings we may become, since ‘they’ and we are products of the same process. In what follows, I will set the basis for an argument that what might make us ‘posthuman’ is in fact that which makes us (merely!) ‘human’, amplified perhaps; but the same collection of traits, characteristics, and measures of moral value as we have ever aspired to possess as markers of our humanity. I will argue that to be ‘posthuman’ is in truth to be more human than human - more successful at embodying these traits than we, who consider ourselves the model of humanity, do. It is not, as critics may claim, to be beyond, to be something to fear, something fundamentally different.

Unfortunately the ‘posthuman’ is, at best, an uncertain proposition. What, exactly, would one be, or be like?

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<sup>1</sup> An issue I have covered elsewhere in some depth. Lawrence DR. To what extent is the use of human enhancements defended in international human rights legislation?. *Medical Law International*. 2013;13(4):254-278.

### 9.3 Posthuman as Beyond

The term is frequently bandied about in the literature. It appears to be used, in general, as shorthand for any being beyond those we can currently create or imagine evolving in the foreseeable future without our help. I use the term ‘appears to be’ for a reason, however- no author seems to mean quite the same thing by it. Very few commentators choose to elaborate on the term to elucidate their intended meaning, instead dropping the term straight into their argument, and this frequently seems to lead to an understandable- yet misguided and unnecessary- confusion. One of the exceptions to this rule is explored below, but let us briefly examine the term itself.

The semantics and etymology of the word are fairly plain- ‘post-’ being transparently derived as a prefix from the Latin ‘post’, meaning ‘after’ or ‘behind’, and being defined in English as “after in time or order”<sup>2</sup>. Logic dictates, therefore, that a posthuman would be something which supersedes (whether that be replacing or co-existing with) humanity. This notion tends to be present in critical literature and commentary on the subject, and as we will see may in fact be the only commonality between the many examples of such.

In the absence of explicitly stated philosophically principled reasons for assuming a particular account of ‘human’- if the etymology holds true- it is difficult to parse what is meant by that which comes after. When it is discussed in academia (and in truth this rule generally applies to fiction too), ‘posthuman’ is almost always deployed in a philosophical bioethics context, and this is one in which the distinctions between the possible interpretations are highly sensitive. It is consequently vital to make clearer what one means by posthuman- a clarification which, as mentioned above, is only rarely approached explicitly.

Many commentators hold that that a being with capacities beyond those of a ‘normal’ human is de facto not human, an idea championed by the American bioconservative Leon Kass:

the scientific project to master nature could, if we are not careful, lead to our dehumanization, via eugenics, drug-induced contentment, and other transformations of human nature... Will man remain a creature made in

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<sup>2</sup> *post-* in Soanes C, Stephenson A. *Concise Oxford English Dictionary*. 11th ed. Oxford: Oxford University Press; 2006. at 1121

the image of God, aspiring to align himself with the divine, or will he become an artifact created by man in the image of God-knows-what[?]³

As I have discussed elsewhere⁴ Kass somewhat undermines his own claim here by invoking divine design as the essence of humanity, rather than cognitive development, given that such an appeal carries little weight if one does not believe in any god as he does. However, the essence of his point is clear. Similarly, and more explicitly, he states that artificial “transformations of human nature” will *de facto* prevent the subject from being human.<sup>5</sup>

Nicholas Agar (who agrees with Kass perhaps more in spirit than in letter) adds some detail, making a distinction on the grounds that moderate enhancements “do not exceed the maximum attainable [capacity] by any current or past human being”<sup>6</sup>, giving as examples to “make [children] as smart as the genius physicist Albert Einstein, or as good at tennis as the Swiss maestro Roger Federer”. This implies therefore that an enhancement which increases ability beyond the bounds of extant human achievement would warrant being termed ‘radical’, and Agar qualifies his ‘radical’ enhancement by having it “greatly exceed” the extant.

I have queried this particular viewpoint elsewhere<sup>7</sup> by offering something of a *reductio*: we see (and celebrate) beings who exceed that which was previously the pinnacle of human achievement on a regular basis- every four years or so, for instance, at the Olympic Games. Does the reigning 100m champion cease to be human upon taking the world record? Does s/he then return to human status once surpassed? The same question applies to children born with genius-level intelligences (though these are more difficult to measure). The conservative position rests on comparative evaluation with a static norm, which does not really exist if it can be constantly surpassed to greater and greater degrees. This Boorsian<sup>8</sup> biological normality, or ‘species-typical’ function is a convenient one, though it is only applicable in biological contexts, and possibly not especially useful in discussion of the nature of the posthuman, as we shall see a little later.

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<sup>3</sup> Quoted in Flaumenhaft. H. The Career of Leon Kass. *Journal of Contemporary Health Law Policy*. 2003;20:1-24.

<sup>4</sup> *op. cit.* 1. 265

<sup>5</sup> *op. cit.* 3.

<sup>6</sup> Agar N. *Humanity's End: Why We Should Reject Radical Enhancement*. Cambridge, Mass.: MIT Press; 2010. 17.

<sup>7</sup> *op. cit.* 1

<sup>8</sup> The idea was, if not created by, certainly codified by Boorse in his naturalistic account of disease, the Biostatistical Theory, in Boorse C. A Rebuttal on Health. In: Humber J, Almeda R, ed. *What Is Disease*. Totowa, N.J.: Humana Press; 1997:3–134.

Agar goes on to say that because “[r]adically enhanced beings are... significantly “better” than us in various ways, they are different from us- so different, in fact, that they do not deserve to be called human.”<sup>9</sup> This particular idea of ‘deserving’ is one to which I shall return, but it is useful to note here that ‘qualify’ may be a more useful term. The gist of Agar’s thought is present elsewhere throughout the literature, which generally follows the idea of the ‘posthuman’ as something beyond what is presently called human, a separate group.<sup>10</sup> This is evident on both ‘sides’ of the enhancement debate. Consider, for example, the brief explanation of ‘posthuman’ offered to us by noted enhancement advocate and self-described transhumanist Nick Bostrom. He tells us that

[i]t is sometimes useful to talk about possible future beings whose basic capacities so radically exceed those of present humans as to be no longer unambiguously human by our current standards. The standard word for such beings is “posthuman”.<sup>11</sup>

This description is notable for being one of the only points at which an author has deliberately stated their assumptions on the term,<sup>12</sup> though it is difficult to call it a clear explanation as it suffers from a fundamental problem. ‘Human’ is itself a greatly abused term, especially in the context of the enhancement/ posthuman debate, and the myriad of meanings ascribed to it could give ‘posthuman’ a very different slant depending on one’s understanding. For that matter, it has been an abused term from what may be the founding debates of modern bioethics, regarding moral status and the beginning of life. For instance, many may accept that a blastocyst or early-stage embryo would qualify as living genetically *Homo sapiens sapiens* tissue, but hold that it does not yet qualify as

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<sup>9</sup> Nick does go on to somewhat qualify his statement and add some subtleties in his later works *Truly Human Enhancement* (Agar N. *Truly Human Enhancement: A Philosophical Defense Of Limits*. Cambridge, MA.: The MIT Press; 2013.) and his new book *The Skeptical Optimist* (Agar N. *The Sceptical Optimist: Why Technology Isn't The Answer To Everything*. Oxford: Oxford University Press; 2015.), as well as in personal discussion, though I understand his essential position to remain the same.

<sup>10</sup> Amongst many: Bostrom N. Why I want to be post human when I grow up. In: Gordijn B, Chadwick R, ed. *Medical Enhancement And Posthumanity*. New York: Springer; 2008:107-137.; Bostrom N. *Transhumanist FAQ*. Available at: <http://www.nickbostrom.com/views/transhumanist.pdf>. Accessed January 21, 2016.); Marsen S. Becoming More Than Human: Technology and the Post-Human Condition. *Journal of Evolution and Technology*. 2008;19:1.; Buchanan A. Moral Status and Human Enhancement. *Philosophy & Public Affairs*. 2009;37(4):346-381; DeGrazia D. Genetic enhancement, post-persons and moral status: a reply to Buchanan. *Journal of Medical Ethics*. 2011;38(3):135-139.; Buchanan A. Still unconvinced, but still tentative: a reply to DeGrazia. *Journal of Medical Ethics*. 2011;38(3):140-141.; Agar N. Why we can't really say what post-persons are. *Journal of Medical Ethics*. 2011;38(3):144-145; Wilson J. Persons, post-persons and thresholds. *Journal of Medical Ethics*. 2011;38(3):143-144.; DeGrazia D. Genetic Enhancement, Post-persons, and Moral Status: Author reply to commentaries. *Journal of Medical Ethics*. 2011;38(3):145-147.

<sup>11</sup> Bostrom. *Transhumanist FAQ*. *ibid*.

<sup>12</sup> Another notable example can be found throughout Chapter 3 of DeGrazia D. *Creation Ethics: Reproduction, Genetics, And Quality Of Life*. New York: Oxford University Press; 2012:60-69.

human (and thus qualify for protection). Thus it is essential to determine conclusively perhaps not a single standard as such, but that it is clear which of the possible meanings we are discussing in any given context. What is it that we are talking about going ‘beyond’?

#### 9.4 What We Really Mean By ‘Posthuman’

There are, perhaps, three main senses in which the term ‘human’ is frequently employed- the biological, the moral, and the self- (or other-) idealising.<sup>13</sup> In the first of these, human is often conflated with *Homo sapiens sapiens*, and used interchangeably with this term to refer to our taxonomic species<sup>14</sup> (such as the common term ‘human anatomy’<sup>15</sup>); in the second sense, ‘human’ (or, to be accurate, ‘humanity’) generally refers to a community of beings which qualify as having a certain moral value or status; and the third, the self-idealising sense, is more descriptive- a label denoting the collection of qualities that make us who we are- or who we would like to be- as beings, or, to be pithy, ‘what matters about those who matter’.<sup>16</sup> Critics of this breakdown might query the extent to which the third and second senses overlap, and the answer is only to the extent that the self-ideal is, itself, morally idealizing. Asking myself a question as to what I would like to see myself as, and then answering it, does not necessarily give an answer of any moral value- if I were to tell myself that my self-ideal is to be a good sportsman, this is likely to be morally neutral. On the other hand, Idealizing being ‘a good person’ is likely to be much more morally directed. Similarly, to be in favour of enhancement is to be morally motivated- to quote Harris, “If it wasn’t good for you, it wouldn’t be enhancement.”<sup>17</sup>

Considering the prevailing wisdom as espoused by Bostrom- that the posthuman is in some way ‘beyond’- we could thus conclude that one might be a novel species or genus of hominid, naturally possessed of capabilities similar in nature to but surpassing in performance those widely considered species-typical for *Homo sapiens*. Or, perhaps we

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<sup>13</sup> I would note here that in using ‘idealising’ I do not commit myself to a particular philosophical account of intent, but rather more simply I use the term within the bounds of its normal English deployment. It may be also be understood as “self-defining” or “self-developmental”.

<sup>14</sup> Though there is a strong argument to be made that it is frequently used more broadly in academic discussion to refer to our *genus*. This is a topic which deserves exploration, but for which sadly there is insufficient space here. See, for instance, the widespread discussion regarding great ape personhood and the validity of making such beings subject to human rights law.

<sup>15</sup> This term even makes it onto the cover of one edition of the revered Gray’s: Gray H. *Anatomy Of The Human Body*. 20th ed. Philadelphia: Lea & Febiger; 1918.

<sup>16</sup> I am indebted to Sarah Chan for putting into words that which I could not, and for commentary on an early draft.

<sup>17</sup> Harris J. *Enhancing Evolution: The Ethical Case for Making Better People*. Princeton NJ: Princeton University Press; 2010: 9

infer that the term indicates a morally more valuable being than a regular human, a post-person to our person? There's a third option: that a posthuman is a being which embodies our self-ideal more successfully than we do ourselves- one "more human than human". Which to choose? Or, is it even necessary to do so?

#### 9.4.1 First Sense- Biological

Hayles suggested that "the humanities have always been concerned with shifting definitions of the human"<sup>18</sup>, and so too is the biological form of *Homo sapiens*- our first sense of 'human'- far from a constant. Hayles was concerned with a slightly different usage of 'posthuman'- in her case, the idea of a mode of critical discourse rather than an actual potential being- but the notion of shifting definitions rings true for biology also. For instance, an oft-discussed and highly visible change is in average heights of populations over time. To refer back to an earlier point, the so-called Irish Giant, Charles Byrne, whose skeleton is housed in the Hunterian museum<sup>19</sup> may have been unusually tall at (at least) seven foot seven- perhaps taller than any other *sapiens* of the time, but this does not and did not make him something other than human.

A simple literature search reveals hundreds of studies in anthropometric history, with many epidemiological and socio-economic correlates having been established, to the point where mean height is now utilised as an indicator for nutrition quality and general wellbeing.<sup>20</sup> Underlying all of these studies is measurable and definite change in height in whichever population is being examined. Similar fluctuations can be found in studies of weight (or more pertinently, mass)<sup>21</sup>, and any other varietal one might choose to scrutinise. It would appear, then, that our collective 'human' physical anatomy is in constant flux, and we know that our biological form does not lend us inherent value. *Homo sapiens*' biomechanical format- with cranium uppermost, opposable thumbs, bipedal, plantigrade ambulation, and particular musculoskeletal layout- is far from unique. All of these factors can be found in other animals, either separately or even all together in our simian genetic relatives. If our posthumans are taxonomically distinct from humans, then it follows that they would feature some degree of taxonomic *difference*, whatever the means

<sup>18</sup> Quoted in Solomon D. *Interview with N. Katherine Hayles: Preparing the Humanities for the Post Human*. 2007. Available at: [http://asc.nhc.trp.nc.us/news/?page\\_id=81](http://asc.nhc.trp.nc.us/news/?page_id=81). Accessed February 21, 2016.

<sup>19</sup> *Hunterian Collections*. 2015. Available at: <https://www.rcseng.ac.uk/museums/hunterian/about-us/collections.html>. Accessed February 21, 2016.

<sup>20</sup> e.g.: Dasgupta P. *An Enquiry Into Well-Being And Destitution*. Oxford: Oxford University Press; 1995.; Steckel R. Stature and the Standard of Living. *Journal of Economic Literature*. 1995;33(4):1903-40.

<sup>21</sup> Flegal K, Carroll M, Kuczmarski R, Johnson C. Overweight and obesity in the United States: prevalence and trends, 1960–1994. *International Journal of Obesity*. 1997;22(1):39-47.

of speciation that may result in their existence. Whilst this is eminently possible- despite the general blueprint being the same, we are a distinct species from *Pan troglodytes*- it is unlikely to be the case here.

To suggest that we today are not beyond in ‘species-typical capacity’ the 195,000 year old *Homo sapiens sapiens* fossils known as *Omo I* and *Omo II*<sup>22</sup> is ludicrous. Yet we afford them human status in (both academic and casual) discussion<sup>23</sup>, and in a strict Biological Species Concept<sup>24</sup> (BSC) understanding of biological species- this being the most commonly accepted- *Omo* and modern man are one and the same since we are not reproductively isolated. Indeed we afford the term ‘archaic humans’ to distinct species such as *Homo neanderthalensis* (with whom *H. Sapiens* is known to have interbred, muddying the waters of reproductive speciation within the *hominina* subtribe<sup>25</sup> and perhaps inclining us more towards a pragmatic view of species), *Homo rhodesiensis*, and *Homo heidelbergensis*.<sup>26</sup> We do not generally consider ourselves to be ‘posthuman’, and yet compared to our human ancestors, we are significantly different. It may be worth considering, too, that modern science and technological methods such as *in vitro* fertilisation and other assisted reproductive technologies may vastly increase the ambit of what ‘reproductive isolation’ and thus ‘biological species’ might mean.<sup>27</sup> The biological sense of ‘posthuman’, then, is unhelpful.

#### 9.4.2 Second Sense- Moral Value

It is possible to reflect on the transitions from hominid to human and what this may say about the perceived possibility to transition further than this point, but it is important to note that our ‘humanity’ is a self-assigned classification, with boundaries that have changed and moved along with our development.

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<sup>22</sup> Fleagle J, Assefa Z, Brown F, Shea J. Paleoanthropology of the Kibish Formation, southern Ethiopia: Introduction. *Journal of Human Evolution*. 2008;55(3):360-365.; McDougall I, Brown F, Fleagle J. Stratigraphic placement and age of modern humans from Kibish, Ethiopia. *Nature*. 2005;433(7027):733-736.

<sup>23</sup> For instance, McDougall, *ibid*.

<sup>24</sup> Mayr E. *Systematics and the origin of species from the viewpoint of a zoologist*. New York: Columbia University Press; 1942.

<sup>25</sup> Subtribe being the lesser taxonomic division between subfamily and genus, and which in this case includes *Homo* and related australopithecines after the cladogenic split from *Pan*.

<sup>26</sup> Dawkins R. Archaic homo sapiens. In *The Ancestor's Tale*. Boston: Mariner; 2005

<sup>27</sup> As Harris has pointed out at some length. Harris J. *Wonderwoman and Superman*. Oxford: Oxford University Press; 2010:143 ff.

Historically, Frankfurt<sup>28</sup> and Piaget<sup>29</sup> both hold that the human sets himself apart through his cognitive (and self-determinative) ability, and this idea may link to those of ‘moral community’<sup>30</sup> and non-finite personhood<sup>31</sup>. Echoing Harris’ earlier work<sup>32</sup> in conceptualising personhood, Steve Fuller posits that “perhaps membership in *Homo sapiens* is neither sufficient nor even necessary to qualify a being as human”<sup>33</sup>, and uses the analogy of the republic. Being born into the republic confers no benefit over earning citizenship in some other fashion. The heritable quality is irrelevant- and this applies to ‘human citizenship’, or the human community, also. One either is, or is not, a citizen; it is a threshold concept. One cannot feasibly be a citizen to a greater degree than anyone else.<sup>34</sup> Equally, once a being passes the moral status threshold for the human community, it must count as human. Following this logic, humanity is a “matter of sufficiency”<sup>35</sup>- an end-state for moral status, not a stepping-stone which one can be ‘post’.

Fuller does fall into the trap here of failing to explain his terms. He appears to mean ‘human, where human is being used as a political moral category’ but this may have made for an ungainly *bon mot*. His analogy, too, lacks an important subtlety. In the later Roman Empire, I as a Briton may well have qualified to hold Roman citizenship<sup>36</sup>- but this is not to say I would be *treated* as would a Roman by other Romans, which may be equally or even more important than the citizen label. As he states earlier in the same piece:

[F]or most of what is properly called 'human history' (i.e., the history that starts with the invention of writing), most of *Homo sapiens* have not qualified as 'human'—and not simply because they were too young or too disabled. In sociology, we routinely invoke a trinity of shame—'race, class, and gender'—to characterise the gap that remains between the normal existence of *Homo sapiens* and the normative ideal of full humanity.<sup>37</sup>

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<sup>28</sup> Frankfurt H. Freedom of the Will and the Concept of a Person. *The Journal of Philosophy*. 1971;68(1):5.

<sup>29</sup> See, for example: Piaget J. *La construction du réel chez l'enfant / The construction of reality in the child*. New York, Basic Books 1937/1954; and Piaget J. La causalité chez l'enfant. *British Journal of Psychology*. 1928;18:276-301.

<sup>30</sup> Lomasky L.E. *Persons, rights, and the moral community*. Oxford: Oxford University Press; 1987.

<sup>31</sup> Overboe J. Ableist Limits on Self-Narration: The Concept of Post-personhood. In: Raoul V, ed. *Unfitting Stories: Narrative Approaches To Disease, Disability, And Trauma*. Waterloo, ON.: Wilfrid Laurier Univ. Press; 2007:175-182.

<sup>32</sup> Harris J. *The Value of Life*. London, Routledge; 1985

<sup>33</sup> Fuller S. What scientific idea is ready for retirement? Steve Fuller: Human Being= *Homo Sapiens*. *edge.org*. 2014. Available at: <http://edge.org/response-detail/25396>. Accessed February 25, 2016.

<sup>34</sup> Though I acknowledge that in certain historical republics the theoretical benefit of this was less than obvious in practice.

<sup>35</sup> Buchanan A. *Beyond Humanity?: The Ethics Of Biomedical Enhancement*. Oxford: Oxford University Press; 2011: 224

<sup>36</sup> I thank Margot Brazier for this criticism in particular.

<sup>37</sup> *op. cit.* 33.

It may be, here, that it is more helpful to understand ‘have not qualified’ as ‘have not been regarded as qualifying’.

With this in mind, we might return to Agar’s contention that “[r]adically enhanced beings are... significantly better than us in various ways, they are different from us- so different, in fact, that they do not deserve to be called human.” In the sense of the concept of the human- the *moral*- community, it seems difficult to accept that Agar can be correct. The only means by which a being might “not deserve to be called human” would be for them to fail to reach the moral value threshold of the human community. If Agar is correct, then there is a danger of finding oneself stuck with an unpalatable conclusion born from the corollary of his point: that a being who somehow becomes significantly ‘worse’<sup>38</sup> (or rather, less capable) than other humans would also “not deserve to be called human”.<sup>39</sup> One way to conceptualise this is to consider the antonym of what we are calling ‘second-sense “human”’, which might roughly be ‘dehumanised’- something historically done to ostracize peoples before enacting genocide against them, so to speak, guilt free- for instance Jewish peoples labelled ‘rats’ or Untermenschen during the Holocaust.<sup>40</sup>

Perhaps, then, the idea of a being no longer *deserving* membership of the human community is too problematic. It might be better stated as *failing to qualify*. We have an instinctive reaction against the idea applying this judgment to a member of *Homo sapiens*, even one of very limited cognitive capacity. Philosophically, however, we would have to admit that such a being may not deserve to be called ‘person’. It may be that the “human community” and the community of persons are not necessarily one and the same, and there is a political factor in play.

We have to recognize that someone who might fail the moral value threshold of personhood would still be included within our biological species, especially given the incoherence of ‘species-typical capacity’ in this context. Per Mayr<sup>41</sup>, because someone suffering a hypothetical disability that prevents sexual reproduction would be able, at least *but for* that disability, to reproduce with another human, they satisfy the Biological Species Concept. Throughout his work on enhancement, Agar generally uses the BSC to define the limits of prudential interest<sup>42</sup>- as in, we have an interest in those we would be able to

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<sup>38</sup> I use the term here as an antonym of Agar’s “better”, rather than as any reflection of my own opinions.

<sup>39</sup> Thanks to John Harris for pointing this out in discussion.

<sup>40</sup> Of course I am certain that Nick would never wish to imply such a thing; but it cannot be ignored as potentially being the other side of his argument here.

<sup>41</sup> *op. cit.* 24.

<sup>42</sup> *op. cit.* 6: throughout. Also Agar N. Thoughts about our species’ future: themes from Humanity’s End: Why We Should Reject Radical Enhancement. *Journal of Evolution and Technology*. 2010;1(21):23-31.

reproduce with. Possessing this interest in one group over another does not equate to speciesm- although it is a form of relativism, it is not perjorative, implying that those we cannot reproduce with have a lesser or different moral status. If so, it follows that it is nonsensical to force-apply a moral significance to species at all in terms of our second, communitarian sense of ‘posthuman’. Indeed, there is no reason to assume that we would *not* have a prudential interest in beings we bring to fruition, by whatever means.

This leaves us, then, with the third potential sense of ‘posthuman’, which as mentioned stems from the use of ‘human’ to denote a desirable set of characteristics, qualities, and ideals that we hold about ourselves (or our moral community) as a whole.

#### 9.4.3 Third Sense- Self-ideal

The entire history of humanity (in any sense) has been geared towards realizing these traits and ideals, generally practiced by means of enhancement. *Homo sapiens* could never have evolved successfully without the prior work of ancestor species to enhance their own capacities. Paleoanthropological literature suggests in particular that the development of tool use for hunting was critical in being able to provide sufficient energy to fuel larger and larger brains.<sup>43</sup> It follows that an increased drain on the body’s energy budget by a larger brain (with a greater capacity for work) requires a proportionately increased calorific intake, and gaining the ability to hunt animals for energy-rich meat would provide for this. The discovery of means to control fire by at least *Homo erectus*<sup>44</sup> (if not even earlier ancestors<sup>45</sup>) also acted to improve nutrition through increasing the digestibility of foods through cooking<sup>46</sup>. It also contributed<sup>47</sup> to such physiological factors which we use to define *Homo sapiens* such as smaller jaws and teeth than ancestor species<sup>48</sup>. Less directly, fire’s provision of warmth and light was vital for the survival of hairless ancestor species, driving off predators and making up for a lack of inherent ability to retain heat.<sup>49</sup>

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<sup>43</sup> Gibbons A. Solving the Brain's Energy Crisis. *Science*. 1998;280(5368):1345-1347.

<sup>44</sup> James S, Dennell R, Gilbert A et al. Hominid Use of Fire in the Lower and Middle Pleistocene: A Review of the Evidence. *Current Anthropology*. 1989;30(1):1-26.

<sup>45</sup> *ibid*.

<sup>46</sup> Wrangham R, Conklin-Brittain N. Cooking as a biological trait. Comparative *Biochemistry and Physiology Part A: Molecular & Integrative Physiology*. 2003;136(1):35-46.

<sup>47</sup> Pickrell J. Human 'dental chaos' linked to evolution of cooking. *New Scientist Online*. 2005. Available at: <http://www.newscientist.com/article/dn7035-human-dental-chaos-linked-to-evolution-of-cooking.html#.U8WJSY1dUah>. Accessed February 25, 2016.

<sup>48</sup> Boyd R, Silk J. *How Humans Evolved*. New York: Norton & Company; 2003.

<sup>49</sup> Price D. Energy and human evolution. *Population and Environment*. 1995;16(4):301-319.

There is a rich tradition in both academic and fictional literature of creating alternative Latinate names for our species. Many of these reflect facets of third- sense ‘humanity’; including *Homo socius*- man as a social being<sup>50</sup>, *Homo faber*- fabricating man<sup>51</sup> or in an alternate sense “man as the artifex of his destiny”<sup>52</sup>, and *Homo ludens*- playful man.<sup>53</sup> In this manner, *Homo sapiens* similarly only encapsulates one aspect of our being, *wise man* (or alternately *knowing man*, which could be argued to describe another aspect of our nature). It isn’t entirely clear why Linnaeus<sup>54</sup> chose to highlight this element of humanity with the chosen specific epithet,<sup>55</sup> though it is interesting to note that he himself termed it (and other descriptive elements of the binomial system) a ‘trivial name’.

Yves Gingras would have us named *Homo technologicus*, or technological man. Given that we are also *Homo faber*, we necessarily create our own world through our own perceptions and means- techniques- of reason and interpretation. Gingras holds that therefore everything around us is, and we ourselves are, artificial, a product of technology, that man is necessarily counter-nature.<sup>56</sup> This may or may not be true, but the idea of our being a product of technology is vitally important. Returning to an earlier point, I would suggest that given *Homo sapiens* only having arisen through being enhanced by technologies such as fire and tool use, we might be better termed *Homo augmentus*- ‘elevated man’ or ‘augmented man’. Gingras is correct in one regard, at least- we are able to possess the faculties we do as a species as a result of primitive technologies. However, it is important to be clear that we are elevated by the technology, not that we are ourselves technological creations.

If striving to uphold the elements of third-sense humanity is what makes us who we are, then a being “...significantly better than us...”<sup>57</sup> presumably must be able to uphold or realize these ideals to a greater degree than to which we are presently able. If it is these ideals that make us human, then upholding them more successfully- whether through technology or otherwise- must perforce make one more successful at *being* human. Note that this is not the same thing as being *other* than human, or *beyond* human.

<sup>50</sup> Berger P, Luckmann T. *The Social Construction Of Reality. A Treatise In The Sociology Of Knowledge*. London: Random House; 1966.

<sup>51</sup> Arendt H. *The Human Condition*. Chicago: University of Chicago Press; 1958.

<sup>52</sup> Stoessl F. Die Sententiae des Appius Claudius Caecus. *Rheinisches Museum für Philologie*. 1979;122:18-23.

<sup>53</sup> Huizinga J. *Homo Ludens : A Study Of The Play-Element In Culture*. Boston: Beacon Press; 1955.

<sup>54</sup> von Linné C. *Systema Naturae. Regnum Animale*. 10th ed.; 1758: 18,20 Available from: <http://www.biodiversitylibrary.org/item/80764#page/28/mode/1up> Accessed 25 Feb 16.

<sup>55</sup> Plato’s taxonomical designation for our species- “featherless biped”- is possibly more literal. However, upon his proclaiming this, Diogenes swiftly presented him with a plucked chicken, so perhaps we can understand Linnaeus’ whimsy on this point. Diogenes Laertius. *The Lives And Opinions Of Eminent Philosophers*. London: HG Bohn; 1853: 6.40.

<sup>56</sup> Gingras Y. *Éloge De L’homme Techno-Logicus*. Saint-Laurent, Québec: Fides; 2005.12.

<sup>57</sup> *op. cit.* 6.

How, then, can radical enhancement lead to something beyond humanity- would more enhancement not perhaps mean that we become fundamentally more human?

## 9.5 Taxonomy, Persons, and Continuity

As noted, taxonomic classification does not itself lend any value to a given being. Linnaeus giving us the binomial of *H. sapiens* is simply a product of the system he developed for categorising animals. It is co- incidental that a literal translation of the Latin can be interpreted as describing something we consider to be inherent about us- had the system existed before our evolution, we could just as easily have been named after our discoverer or a beloved media personality,<sup>58</sup> as are many creatures today.

Consequently, to be beyond *H. sapiens sapiens*- *H. sapiens superior*, if you will<sup>59</sup> - is also meaningless in these terms. While we are far from the only species in a state of change- indeed every species is constantly subject to genetic drift and natural selection, however slow- it is still convenient to be able to label beings into categories. This is perhaps not the place to attempt to solve the so-called ‘species problem’, but the above does strongly lend itself to the pragmatist viewpoint<sup>60</sup> that species is conceptually convenient and practical, and therefore conceptually real; despite probably failing to qualify as a natural kind. If so, the biological sense of human is significantly weakened when comparing ‘human’ and ‘posthuman’.

Obsession with forcing a distinction between human and posthuman is not particularly interesting, in and of itself, as it is clear that there is none meaningful to be drawn; but the idea of post-persons is a slightly different prospect, and is more at the heart of the true debate than the existing academic dialogue probably makes clear. Whilst it is likely true<sup>61</sup>

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<sup>58</sup> For instance, *Materpiscis attenboroughi*, *Agra schwarzeneggeri*, or the somewhat forced ‘Spider from Mars’ *Heteropoda davidbowie*.

<sup>59</sup> I admit that thanks are probably due here to Stan Lee and the many other writers of Marvel’s *X-Men*, as well as innumerable other science-fiction sources, but *X-Men* is where I first became familiar with the term. See, for instance, Lobdell S. The Story Of The Year!. *Uncanny X-Men* #346 Marvel Comics. 1997;1(346); Morrison G. Superdestroyer. *New X-Men* #124 Marvel Comics. 2002;1(124); Tieri F. Man and Monster: Conclusion. *Weapon X* #28 Marvel Comics. 2004;2(28).

Other potential names proffered by Marvel include *H. mutantis*- ‘Changed Man’ (Ellis W. Agent X-13’s report on the emergency annexation of Earth-616. *Astonishing X-Men: Ghost Boxes* #1 Marvel Comics. 2008;1(1).; and *H. mutantur*- ‘Changed Ones’ (Gaiman N. 1602 Part One; In Which We are Introduced to Some of Our Featured Players. *Marvel 1602* #1 Marvel Comics. 2003;1(1).)

<sup>60</sup> Dupré J. In defence of classification. *Studies in History and Philosophy of Biological and Biomedical Sciences*. 2001;32:203-219.

<sup>61</sup> Depending on their natures. This is a question which merits much deeper discussion, and though there is regrettably not space in this paper it will be a fruitful avenue for future research.

that some of our *Homina* ancestors were human pre-persons, assuming personhood is a threshold concept, the very fact of this would preclude there from being Homo post-persons since the threshold would already be surpassed. Rather than fear the conceptually troublesome, perhaps what we ought worry about is being depersonalized and not being de- or trans- or post-humanized. To have enhanced moral awareness, enhanced consciousness, *etcetera* is not an inherently bad thing- in fact, to possess these is simply to more fully realize characteristics that are part of the wider, for want of a better term, zeitgeist of the self-ideal. This is presumably not an outcome we should be worrying about, but rather one to be embraced.

What this shows is that it is a mistake to envisage the posthuman as a different species. It is a mistake to imagine traits such as immortality or godlike powers as being changes that indicate a significant discontinuity. This is not to say that they could not change us at all. It seems likely that an immortal (though importantly not invulnerable) person would have an enduring and open-ended investment in the future. This may not necessarily be embodied simply in benevolent interest in their successors but rather a more personal, and not simply intellectual and transient, interest in the future that a more markedly mortal being could not possess.<sup>62</sup> However it is entirely possible to possess continuity for some purposes and not for others. Therefore, the argument really is whether or not the acquisition of such traits represents a genuine transition in status, and whether what frightens conservative commentators is really the notion of this transition being premature or presumptuous for our species.

To such commentators, it seems to be comfortable to consider ‘humans’ as a finished product, that transformation is inimical to our essence as such. Darwinian, naturally occurring evolution appears to have slowed due to our technological elevation from a world of kill-or-be-killed. It may be comforting to imagine that this means it has stopped outright, though of course this is merely a function of our own limited perceptions and it continues at the same glacially slow pace as it ever has. Psychologically, we generally find clear division useful and pleasing, discrete categorization almost soothing. Perhaps this goes some distance to explain the above mindset.

There is certainly far more that might be said on this matter, though for the moment it is enough to acknowledge that people are perhaps afraid of the idea of further evolution because we (understandably!) dislike the idea of having further self-development to

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<sup>62</sup> Thanks to John Harris for reminding me of this important point. Harris has considered this issue in several places, notably *Enhancing Evolution* Ch. 3 (*op. cit.* 17)

undertake. Once we finally reach adulthood, that is supposed to be the end of the road, the final stage. We see this reflected in literature- Tolstoy's trilogy of *Childhood, Boyhood, and Youth*<sup>63</sup> separates out the milestones on the way to this point; Shakespeare's famous 'Seven Ages of Man' monologue from *As You Like It*<sup>64</sup> divides a lifetime into the Acts of a play.

## 9.6 An Inclusive Terminology

Yet, if we must picture the posthuman as anything separate from 'us' in some way, if it is absolutely necessary to differentiate, perhaps it is this vision that is the most useful: an 'Eighth Age of Man', not quite the same and yet not different enough to be called 'other'. As I have discussed, the touted 'posthuman' probably fails to satisfy any of the conditions to be categorized as either biologically or morally separate from 'humans'. However, it would be somewhat parochial to try and argue that it isn't useful to have a term we can use when discussing these potential beings. Whilst I do not accept that the theoretical period in which some people possess new abilities or traits and others don't will necessarily create a societal divide<sup>65</sup> (or, at least, I see no good reason why this is unavoidable); I concede that just as it is sometimes necessary to terminologically distinguish between races using anthropometric taxons such as Negroid, Mongoloid, or Caucasoid, there may well be some practical application in having one for the beings we may become. 'Posthuman', as I hope to have demonstrated, is perhaps not this term. Instead, I might tentatively suggest an alternative which approaches what I consider to be the core of the matter.

The point I have laboured herein is that there is no clean divide between today's *Homo sapiens* and tomorrow's potentially more capable *Homo sapiens*. The fact that we cannot distinguish this division is telling. It is difficult to accurately describe something as –post, as coming after, when it does nothing of the sort. Earlier in this paper I noted that the etymology of our English '–post' comes from the Latin, and so it seems fitting to return to the classical languages for a more useful label. The Greek prefix 'meta-',<sup>66</sup> originally, could be translated similarly to '–post' in suggesting 'after', but it also could mean 'beside',

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<sup>63</sup> Tolstoy L, Trans. Dole N. *The Complete Works: Childhood, Boyhood And Youth..* New York: T.Y. Crowell; 1899..

<sup>64</sup> W. Shakespeare. *As You Like It*. In Proudfoot R, Thomson A, Kastan DS, eds. *The Arden Shakespeare, Complete Works*. Walton-On-Thames: Thomas Nelson and Sons; 1998, Act 2 Scene VII

<sup>65</sup> Warwick K. I, Cyborg. Chicago: University of Illinois Press; 2004.

<sup>66</sup> As opposed to the epistemological usage in which it means 'about (something's own category)'.

'with', or 'among', depending on context and grammar.<sup>67</sup> A 'metahuman', then, might be a being beyond (or 'post-') us in terms of some capacity or another, but alongside us, amongst us, in as much as it is in all senses that matter no different to the 'humans' we consider ourselves to be. There will never come a point where we look at ourselves and exclaim, "We are now posthuman!"- rather, consider the disabled person. We do not hold that they should be treated differently- or, at least, we know that they ought not to be. This is no different from the IVF child. We do not consider them to be different in any way that matters, although it is occasionally useful to group people who are subject to some quirk of biology or fate together. So it is with the metahuman.

However, I acknowledge that this proposal may too run afoul of the so-called 'expressibility problem'. In this instance, the mere act of assigning terminology is inherently one of division. Even in the case of the previously mentioned useful anthropometric taxons, the use of these terms is designed to classify and separate. As I hope to have shown, this is precisely the problem with the notional posthuman. My own thoughts and terminologies, as well as those of various learned colleagues, seem to suffer this issue- it is difficult to conceive of a term which does not separate or 'other' in this fashion.

Alternate terms<sup>68</sup> we might consider using include the 'Promethean Man', or the 'Enhanced Human'- both terms which when considered in the context of this paper may suffice well (being as they are more accurate descriptions than 'posthuman'), but which in practical usage would likely serve to partition by the very act of specifying. The simplicity of 'Enhanced Human' may make it the superior term in as much as it specifies the being in question as being *human*, but it carries the unwanted implication that being enhanced is a quality necessarily worth flagging- that it is a quality which in some way alters one's value.

Perhaps, ultimately, it is not vital to the debate to develop a terminology which solves this; though I would be interested to see one. Instead it would be more valuable, throughout the wider academic dialogue on the topic, to acknowledge and seek to avoid invoking the misapprehensions discussed here about humanity and value.

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<sup>67</sup> μετό, in Liddell H. Scott R. *A Greek-English Lexicon, Abridged*. London: Oxford; 1972.

<sup>68</sup> These names courtesy of John Harris, who, despite his erudition, accepts that he "potentially failed" my challenge to avoid the trap at hand.

## 9.7 Conclusions

The commentators on both sides of the debate, concerning the meaning of ‘posthuman’ do so as if it had currency. It is deployed as though this term had either determinate meaning or as if it marked some indeterminate point (which could then be debated) at which humans transition to something else, something new. To use the term to imply species or value change, or a radical transition (the meaning of which is unclear in any case), there needs to be justification in a way which does not seem to have been delivered within the existing dialogue. Here, I have argued that this is not a plausible understanding, and furthermore that it is based in error- the analogous changes we have undergone throughout our history have not been thought to signal a qualitative change, or at least, not to any significant degree. We are, today, post-internet age humans; we are post-neolithic, post-bronze age, post-iron age. These transitions have not changed our value or the nature of our being- machine-age man, *Homo augmentus*, is still man. The touted ‘posthuman’ is, in general, overhyped and unwarranted by the evidence- either factual, or conceptual- and does not seem to have been subject to a close analysis until now. Perhaps commentators are aware of this failing and yet choose to avoid remedying it in order to preserve the utility of a concept so vague and all-encompassing, or for fear of undermining their arguments in some cases as explored herein. The ‘posthuman’ as the beyond is incoherent and obfuscatory at best, and it is important that we do not lose sight of the fact that species does not dictate moral value. The key is to ask not what we may become, but rather: why does it matter?

**David R. Lawrence**

Lawrence D. More Human Than Human. *Cambridge Quarterly of Healthcare Ethics.* 26(3): Forthcoming 2017.

### 10.1 Abstract

Within the literature surrounding nonhuman animals on the one hand and cognitively disabled humans on the other, there is much discussion of where beings that do not satisfy the criteria for personhood fit in our moral deliberations. In the future, we may face a different but related problem: that we might create (or cause the creation of) beings that not only satisfy but exceed these criteria. The question becomes whether these are minimal criteria, or hierarchical, such that those who fulfill them to greater degree should be afforded greater consideration. This article questions the validity and necessity of drawing divisions among beings that satisfy the minimum requirements for personhood; considering how future beings—intelligent androids, synthoids, even alternate-substrate sentiences—might fit alongside the “baseline” human. I ask whether these alternate beings ought to be considered different to us, and why this may or may not matter in terms of a notion of “human community.” The film *Blade Runner*, concerned in large part with humanity and its key synthoid antagonist Roy Batty, forms a framing touchstone for my discussion. Batty is stronger, faster, more resilient, and more intelligent than *Homo sapiens*. His exploits, far beyond the capability of normal men, are contrasted with his frailty and transient lifespan, his aesthetic appreciation of the sights he has seen, and his burgeoning empathy. Not for nothing does his creator within the mythos term him “more human than human.”

I've seen things you people wouldn't believe... Attack ships on fire off the shoulder of Orion, I've watched c-beams glitter in the dark near the Tannhäuser Gate. All those moments... will be lost in time, like tears in rain. Time... to die.<sup>1</sup>

So goes the soliloquy that closes *Blade Runner*, a film concerned in large part with humanity. The speaker, Roy Batty, is an android (or bioroid, as will be discussed later). Built as a combat model, he is stronger, faster, more resilient, and more intelligent than *Homo sapiens*. However, the above quote—Batty's last words—are intended to illustrate his fundamental humanity. His exploits, far beyond the capability of normal men and women, are contrasted with his frailty and transient life span, his aesthetic appreciation of the sights he has seen, and his fear of death. Not for nothing does his creator within the mythos term him “more human than human.”<sup>2</sup>

A common refrain in bioconservative circles is a fear of the creation of races of so-called “posthumans” through genetic engineering, technological innovation, or the advent of artificial intelligences, giving a range of justifications of varying value. Some critics cry hubris,<sup>3</sup> some decry the trivialisation of what they see as “human identity” and fear a new “genetic divide,”<sup>4</sup> and others still simply fear the unknown.<sup>5</sup> These theorised beings—organic or synthetic—may well be as or even more intelligent and conscious than *Homo sapiens*. The question we must face is how we should treat these beings: as “other” or as we would ourselves?

There is much debate within forward-looking bioethics as to the nature of the human. I have discussed this at some length in my “The Edge of Human”<sup>6</sup>, in which I argue that there is no hard and fast mark delineating when a future being (once itself, or descended from, *H. sapiens*) may cease to be human and instead becomes something new, something “post-.” Despite my confidence in this assertion, I may ruefully acknowledge

<sup>1</sup> *Blade Runner*. Hauer R, Scott R, Fancher H, People D; 1981. The actual lines spoken in the film, as quoted here, were improvised by Rutger Hauer in place of a longer passage.

<sup>2</sup> *ibid.*

<sup>3</sup> Such as: Communion and Stewardship: Human Persons Created in the Image of God. *Vatican.va*. 2002. Available at: [http://www.vatican.va/roman\\_curia/congregations/cfaith/cti\\_documents/rc\\_con\\_cfaith\\_doc\\_20040723\\_commu\\_nion-stewardship\\_en.html](http://www.vatican.va/roman_curia/congregations/cfaith/cti_documents/rc_con_cfaith_doc_20040723_commu_nion-stewardship_en.html). Accessed July 17, 2016.

<sup>4</sup> McKibben B. *Enough: Staying Human in an Engineered Age*. New York: Times Books; 2003.

<sup>5</sup> Eliezer Y. Artificial intelligence as a positive and negative factor in global risk In: Bostrom N, Ćirković M, eds. *Global Catastrophic Risks*. Oxford: Oxford University Press; 2008, at 303.

<sup>6</sup> Lawrence DR. The Edge of Human? The Problem with the Posthuman as the ‘Beyond’. *Bioethics* (onlinefirst). 2016 DOI: 10.1111/bioe.12318

that theory does not always translate easily into practice, and there is every possibility that legal and social barriers may interfere with the open acceptance that such beings warrant.

However, an enhanced *Homo sapiens*—or a so-called “posthuman,” or whatever term one may choose to use<sup>7</sup>—has, at least, biological relatedness to point to in order that such a being might quiet any xenophobic opposition to its integration in human society, and its enjoyment of human rights. Even the most ardent advocates and detractors of enhancement and what it may mean for *H. sapiens* must acknowledge that the human community as a whole will not be able to enhance themselves or transition to whatever may lie beyond the human instantly. Some may take radical routes, leading to new forms or substrates, whereas others change only a little; what is certain is that all of these changes will take place only incrementally, as new technologies and new practices are developed. As such, it will be difficult to point at an individual and proclaim that being to be different, to say that such a being does not qualify as *H. sapiens*, or to ostracize such a being from society, simply for being slightly enhanced or more competent relative to the general populace. Trite as it may seem, I have made the point elsewhere<sup>8</sup> that we do not tend to cast out our star athletes, or our respected geniuses,<sup>9</sup> even though they fit the descriptions of various conservative commentators as being “significantly different”<sup>10</sup> from us.

However, there is the question of the android: the synthetic human.<sup>11</sup>

Roy Batty is not *Homo sapiens*. Perhaps in Linnaean taxonomic terms an “uploaded” consciousness in-silica<sup>12</sup> is not either, and an artificial superintelligence (AI) certainly fails to qualify. It might be easy—or easier—for a critic to exclude such a being from “human” society on the basis of their being patently “other.” It is possibly unnecessary to point out, but similar attitudes have led to great travesties of justice throughout human history. In matters such as this, so-called “wisdom of repugnance”<sup>13</sup> is unlikely to be a reliable guide, nor is it particularly wise. It is within our animal nature to fear the unknown or the different,

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<sup>7</sup> *ibid.*

<sup>8</sup> Lawrence DR. To what extent is the use of human enhancements defended in international human rights legislation? *Medical Law International* 2013;13(4):254–278.

<sup>9</sup> At least, not in the modern age, or so one would hope.

<sup>10</sup> Agar N. *Humanity’s End: Why We Should Reject Radical Enhancement*. Cambridge, MA: MIT Press; 2010, at 17.

<sup>11</sup> Prucher J. *Brave New Words: The Oxford Dictionary of Science Fiction*. New York, Oxford University Press; 2007, at 6–7.

<sup>12</sup> I am not aware of this term having been used previously; however, I feel it is a phrase that requires coining should one wish to conduct serious discussion of the potential impact of such a being.

<sup>13</sup> Kass L. The wisdom of repugnance. *New Republic* 1997;216(22):17–26.

but what marks us as human (and what is a hallmark of that which we consider to be civilization) is our ability to act against base instinct, to evaluate and reason, and to determine the best course of action to arrive at the greatest good, however and by whichever normative theory one may choose to define it.

It would be foolhardy to reject or to subjugate such beings as Roy out of hand. To do so would betray our own human values, and thus I contend that we must give due consideration to the nature of such a being before we can contemplate making judgments.

It is entirely possible—almost certain—that we will, in the near future, create (or cause the creation of) other sentiences. Present research into artificial intelligence continues apace, and makes startling advances. Its entry into the mainstream media as an active issue for debate,<sup>14</sup> for example by such figures as Stephen Hawking and Elon Musk (men respected for their views on science and technology), in contrast to its prior perception as mere science fiction, speaks volumes.

Human enhancement technologies are already available to us, pharmaceuticals used increasingly by militaries, sportspersons, and students alike. Various interventions from pharmaceuticals and genetic technologies such as clustered regularly interspaced short palindromic repeats (CRISPR) or transcription activator-like effector nucleases (TALENs), to cybertechnologies and other implanted or external devices are at various stages of development and deployment into the world.

Here is not the place for a thorough review of either the state of enhancement technology or of robotics and AI. However, a few examples paint a picture that may either fill one with excitement about the possibilities, or fear for the future.

A survey of the 100 most cited academics writing on AI suggests an expectation that machines will be developed "that can carry out most human professions at least as well as a typical human,"<sup>15</sup> with 90 percent confidence, by 2070, and with 50 percent confidence by 2050. This earlier estimate is well within the feasible life span of many

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<sup>14</sup> Cellan-Jones R. Stephen Hawking warns artificial intelligence could end mankind. BBC News December 2, 2014; available at <http://www.bbc.co.uk/news/technology-30290540> (last accessed 14 July 2016).; Rodgers P. Elon Musk warns of terminator tech. Forbes August 5, 2014; available at <http://www.forbes.com/sites/paulrodgers/2014/08/05/elon-musk-warns-ais-could-extirminate-humanity/> (last accessed 14 July 2016).

<sup>15</sup> Müller VC, Bostrom N. Future progress in artificial intelligence: A survey of expert opinion. In: Müller VC, ed. *Fundamental Issues of Artificial Intelligence*. Cham, Springer; 2016:553–71.

reading this article, and whereas it must be stressed that this is merely educated speculation, the prototypes and experimental robots extant today are more than impressive. The componentry and systems exist (though for now they are yet to be united in one machine) to emulate proprioception, tactility,<sup>16</sup> visual processing and object recognition, walking and running<sup>17</sup>—even on rough terrain and at high speeds<sup>18</sup>—and many more elements of human biology, even the high-speed recognition, analysis, and reaction needed to play table tennis.<sup>19</sup> Robots have long been a feature of the workforce; for example, in the automotive manufacturing industry, but are now in a position to start taking more subtle, customer-facing jobs. ASIMO, Honda's famous walking robot, has acted as a receptionist,<sup>20</sup> and has acted intelligently in concert with other ASIMOs as a team of office assistants.<sup>21</sup> Many industries live in fear of the encroachment of automation,<sup>22</sup> and robots are even expected to move into the “educated professions” such as law and medicine.<sup>23</sup>

As robotics have advanced, so too has the development of AI, in concert with the abovementioned and as a field in its own right. There are a number of subfields, each immensely complex, working toward elements of human-level intelligence. For example, a true, conscious AI would need to be able to perceive and understand information,<sup>24</sup> to learn;<sup>25</sup> to process language;<sup>26</sup> to plan ahead and anticipate (and thus visualize itself in time, an important point to which I will return);<sup>27</sup> to possess “knowledge representation”<sup>28</sup>

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<sup>16</sup> Syntouch- Biotac. *syntouchllc.com*. 2016. Available at: <http://www.syntouchllc.com/Products/BioTac/>. Accessed July 14, 2016.

<sup>17</sup> ASIMO – The Honda Worldwide ASIMO Site. *World.honda.com*. 2016. Available at: <http://world.honda.com/ASIMO/>. Accessed July 14, 2016.

<sup>18</sup> Raibert M, Blankespoor K, Nelson G, Playter R. BigDog, the Rough-Terrain Quaduped Robot. *Boston Dynamics*. 2008. Available at: [http://www.bostondynamics.com/img/BigDog\\_IFAC\\_Apr-8-2008.pdf](http://www.bostondynamics.com/img/BigDog_IFAC_Apr-8-2008.pdf). Accessed July 14, 2016.

<sup>19</sup> A Ping-Pong-Playing Terminator. *Popular Science*. 2010. Available at: <http://www.popsci.com/technology/article/2010-02/ping-pong-playing-terminator>. Accessed July 14, 2016.

<sup>20</sup> Humanoid robot gets job as receptionist,. *New Scientist*. 2005. Available at: <https://www.newscientist.com/article/dn8456-humanoid-robot-gets-job-as-receptionist/>. Accessed July 14, 2016.

<sup>21</sup> The World's Most Advanced Humanoid Robot. *Asimo by Honda*. 2016. Available at: [http://asimo.honda.com/news/honda-develops-intelligence-technologies-enabling-multiple-asimo-robots-to-work-together-in-coordination/newsarticle\\_0073/](http://asimo.honda.com/news/honda-develops-intelligence-technologies-enabling-multiple-asimo-robots-to-work-together-in-coordination/newsarticle_0073/). Accessed February 16, 2017.

<sup>22</sup> Why robots are coming for US service jobs. *Financial Times*. 2016. Available at: <http://www.ft.com/cms/s/0/cb4c93c4-0566-11e6-a70d-4e39ac32c284.html#axzz4DNsK7QYF>. Accessed July 14, 2016.

<sup>23</sup> Meltzer T. Robot doctors, online lawyers and automated architects: the future of the professions?. *The Guardian*. 2014. Available at: <https://www.theguardian.com/technology/2014/jun/15/robot-doctors-online-lawyers-automated-architects-future-professions-jobs-technology>. Accessed July 14, 2016.

<sup>24</sup> Russell S, Norvig P. *Artificial Intelligence A Modern Approach*. 2nd ed. New Jersey: Prentice Hall; 2003. at 537–81, 863–98.

<sup>25</sup> Langley P. The changing science of machine learning. *Machine Learning* 2011;82(3):275–9.

<sup>26</sup> Cambria E, White B. Jumping NLP curves: A review of natural language processing research. *IEEE Computational Intelligence Magazine* 2014;9(2):48–57.

<sup>27</sup> *op. cit.* 24 at 375–459.

<sup>28</sup> *op. cit.* 24 at 320–63.

or the ability to retain, parse, and apply the astronomically high number of discrete facts that we take for granted, and be able to use this information to reason; to possess subjectivity; and many, many more elements. A number of projects exist attempting to develop and integrate one or more of these elements into “artificial brains,” using modeled or biological neural networks and other technologies; including Cyc,<sup>29</sup> an ongoing 32 year attempt to collect and incorporate a vast database of “common-sense” knowledge in a practical ontology, to enable reasoning. There is also the Google Brain,<sup>30</sup> a “deep learning” project focused on giving the AI access to Google’s vast troves of data and allowing it to begin to parse things for itself; for example, the Brain, when given access to *Youtube.com*, learned unprompted to recognize human faces, and showed a partiality to videos of cats.<sup>31</sup> A third project, the well-known Blue Brain, has successfully modelled 37,000,000 synapses of a rat’s sensory cortex<sup>32</sup> in an attempt to understand the “circuitry.”

An ambitious recent announcement, building on synthetic biology research into the creation of novel lifeforms such as Venter’s JCVI-syn3.0,<sup>33</sup> brings science fiction closer to reality. Synthetic biology involves “assembl[ing] components that are not natural (therefore synthetic) to generate chemical systems that support Darwinian evolution (therefore biological)”<sup>34</sup> in order to perform “rational design of biological systems and living organisms using engineering principles.”<sup>35</sup> The *Human Genome Project—Write*,<sup>36</sup> a “sequel” to the original 1990–2003 project, aims to synthesise an entire human genetic sequence, with the stated intent of provoking discourse, stimulating the development of genetic technologies, and discovering the functions of the 98 percent of genes that remain a mystery. The signatories are careful to state in interviews<sup>37</sup> that the purpose is explicitly not the creation of a physical synthetic human.

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<sup>29</sup> Knowledge modeling and machine reasoning environment capable of addressing the most challenging problems in industry, government, and academia. *Cycorp: Home of Smarter Solutions*. 2016. Available at: <http://www.cyc.com/>. Accessed July 14, 2016;  
The word: Common sense. *New Scientist*. 2006. Available at: <https://www.newscientist.com/article/mg19025471.700-the-word-common-sense/>. Accessed July 14, 2016. I thank John Harris for informing me of this fascinating endeavor.

<sup>30</sup> Hernandez D. The Man Behind the Google Brain: Andrew Ng and the Quest for the New AI. *WIRED*. 2013. Available at: <http://www.wired.com/2013/05/neuro-artificial-intelligence/>. Accessed July 14, 2016.

<sup>31</sup> Google’s Artificial Brain Learns to Find Cat Videos. *WIRED*. 2012. Available at: <http://www.wired.com/2012/06/google-x-neural-network>. Accessed July 14, 2016.

<sup>32</sup> Markram H, Muller E, Ramaswamy S, Reimann MW, Abdellah M, Sanchez CA, et al. Reconstruction and simulation of neocortical microcircuitry. *Cell* 2015;163(2):456–92.

<sup>33</sup> Hutchison C, Chuang R, Noskov V et al. Design and synthesis of a minimal bacterial genome. *Science*. 2016;351(6280).

<sup>34</sup> Benner SA, Sismour AM. Synthetic biology. *Nature Reviews Genetics*, 2005;6(7):533–43.

<sup>35</sup> Osbourn AE, O’Maille PE, Rosser SJ, Lindsey K. Synthetic biology. *New Phytologist* 2012;96:671–7.

<sup>36</sup> Boeke J, Church G, Hessel A et al. The Genome Project—Write. *Science*. 2016;353:126-7.

<sup>37</sup> Radford T, Davis N. Scientists launch proposal to create synthetic human genome. *The Guardian*. 2016. Available at: <https://www.theguardian.com/science/2016/jun/02/scientists-launch-proposal-to-create-synthetic-human-genome-dna>. Accessed July 17, 2016.

However, the possibility could exist once the project is complete, and where there is scientific possibility, it is entirely likely that someone could attempt to attain it. One has merely to look at the experiments on human embryonic germline modification in China to prevent β-thalassemia,<sup>38</sup> which both preceded and precipitated the now-granted application by the Francis Crick Institute<sup>39</sup> to begin similar experimentation, to acknowledge that with the advent of these technologies comes implementation. Someone will always try to “get there first.”

This possibility is particularly interesting, with regard to the novel beings that might be engendered. Despite the nomenclature, there is clearly some difference between a novel being constructed from machinery, electronics, and supremely sophisticated programming, and a being “grown” organically, made from flesh, genetically designed, and constructed much like the synthetic biology understood today. Substrate is probably not significant philosophically, but a “bioroid” such as this latter concept is quite possibly more achievable in a shorter time frame than a true “synthezoid” or android built in the manner of today’s robotics. Genetic design such as that used to create Roy and the other replicants is very much upon us. Man might very well make his own match.<sup>40</sup>

One might surmise, then, that arrival of truly intelligent novel beings is merely a waiting game, and it is not infeasible that they might walk amongst us in the (reasonably) near future. As such, we are faced with what is (possibly) a wholly new situation; that *Homo sapiens* will no longer be the only “wise” or “knowing” being around.

I add the qualifier “possibly” for a reason. *H. sapiens* is very used to sharing its world and environment with other creatures—this much is uncontroversial—and some of these creatures are known to be far more intelligent than others. Theoretically, how we may interact with any given being will be predicated on their moral status, a classification that is rarely if ever straightforward.

Charles Taylor states:

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<sup>38</sup> Liang P, Xu Y, Zhang X et al. CRISPR/Cas9-mediated gene editing in human tripronuclear zygotes. *Protein & Cell.* 2015;6(5):363-372. doi:10.1007/s13238-015-0153-5.

<sup>39</sup> Cressey D, Abbott A, Ledford H. UK scientists apply for licence to edit genes in human embryos. *Nature.* 2015. Available at: <http://www.nature.com/news/uk-scientists-apply-for-licence-to-edit-genes-in-human-embryos-1.18394>. Accessed July 17, 2016.

<sup>40</sup> Credit is due here to a sadly anonymous marketing writer. One poster tagline for the film *Blade Runner* read: “Man has made his match... now it’s his problem,” which sums up conservative fears rather pithily.

A person is a being with a certain moral status, or a bearer of rights. But underlying the moral status, as its condition, are certain capacities. A person is a being who has a sense of self, has a notion of the future and the past, can hold values, make choices; in short, can adopt life-plans. At least, a person must be the kind of being who is in principle capable of all this, however damaged these capacities may be in practice.<sup>41</sup>

One might assume that the type of sapient AI, cognitively enhanced *H. sapiens*, or conscious synthetic beings that are the object of such concern from some commentators are likely to possess self-awareness, moral agency, and continuous narrative. Otherwise, one might wonder, what is there to be feared?

An android that is not self-aware is simply a drone, operating solely to parameters preset (and presumably extensively tested and approved by layer upon layer of robotics firm management) by its makers and operators. The line here is blurred between “being” and “object.” We do not have these existential concerns about camera drones<sup>42</sup> or about the sophisticated robots that build our cars. A debate is emerging around the “morality” of self-driving vehicles, and although recent surveys in *Science*<sup>43</sup> suggest a very murky public feeling (76 percent of respondents approved of the *idea* of a utilitarian morality sacrificing passengers to save others; but gave only a 19 percent likelihood of actually being willing to subject themselves to a utilitarian algorithm), the truth of the matter is that they, too, are not making any of the decisions themselves, but rather operating within the bounds of parameters set by the manufacturer. One might hope that as these autonomous vehicles become widespread, some supranational body would emerge to ensure that these parameters are globally compatible; although this raises some interesting social and ethical issues of its own that warrant further investigation elsewhere.

Whilst it is still possible for a being to have agency without being a moral agent, this only extends to a strict ability to act within an environment. If putative androids lack a sense of self, they could still undertake “goal-directed action,”<sup>44</sup> which is more or less what we might expect from any “smart” device that we have today. The very existence of these

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<sup>41</sup> Taylor C. *The Concept of a Person. Philosophical Papers, Volume 1*. Cambridge: Cambridge University Press; 1985, at 97.

<sup>42</sup> Although I acknowledge that many fears are indeed articulated related to, for example, privacy; these are born of a different set of issues entirely.

<sup>43</sup> Bonnefon JF, Shariff A, Rahwan I. The social dilemma of autonomous vehicles. *Science* 2016;352(6293):1573–6.

<sup>44</sup> Wilson G, Shpall S. Action. Plato.stanford.edu, 2002; available at <http://plato.stanford.edu/entries/action/> (last accessed 17 July 2016).

androids—and our having created them—would seem rather pointless if they could not. However, it does not make sense to fear reactivity; for bioconservative worries to make sense, one must be imagining something more calculated, actions perpetrated with consideration and with the potential to be undertaken in contravention of “normal” moral parameters. Such an action could only be executed (or conceived of) by a moral agent.

Similarly, without narrative (which, to avoid misunderstanding, let us take to mean an “internalized and evolving life story, integrating the reconstructed past and imagined future to provide life with some degree of unity and purpose”<sup>45</sup>) a novel being would also singularly fail to have the potential to live up to the monstrous visions of some commentators. It is entirely possible for a being to possess narrative identity and still be no great threat (the vast majority of *Homo sapiens* embody this niche); however, without it, what possible motivation could there be? Such a being could not react to wrongs, perceived or real, and it could not “seek revenge” or seek to prevent future threats to its well-being. It would be no Skynet, no Magneto, no HAL 9000. In short, it would be, again, nothing to fear beyond whatever parameters or directives it operated within, and if it were unable to formulate these itself on the reasoned basis of past experiences or desires for the future, then it probably would not warrant the hyperbole or fear at its potential existence.

With these thoughts in mind, I will briefly consider the aforementioned nature of personhood. If personhood is to be broadly understood in the naturalist epistemological sense—that is, the possession of the abovementioned faculties and the ability to act self-deterministically (despite the various philosophical wrangles as to what exactly that entails or how it is realized)—then a being that lacked these, a being that was not really worth the critical rhetoric, would probably not qualify as a person. Conversely, if a being *were* worth considering in the ways conservative commentators would have us question, then it must possess these faculties, and as such, it would be hard to deny that being personhood, or some analogue. If so, then there is a true dilemma. The possession of personhood has a number of implications, chief among them that a person is afforded a range of protections enshrined in both domestic and international law.

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<sup>45</sup> McAdams DP, McLean KC. Narrative identity. *Current Directions in Psychological Science* 2013;22(3):233–8.

It would be the work of a book—even several—to detail these in full,<sup>46</sup> that itself speaks volumes to the weight of protections one must consider. However, for the present purpose, a few general examples will suffice. Consider the Universal Declaration of Human Rights (UDHR),<sup>47</sup> which, although not a binding document in itself, is nonetheless a guiding light for bills of rights (and is the first recognisably global recognition of generally accepted entitlements<sup>48</sup>), and has been absorbed into many of the newer national constitutions that have arisen since its adoption in 1948. It holds itself “as a common standard of achievement for *all peoples* and all nations”<sup>49</sup> and this spirit of equality is key. It provides that all should be subject to liberty, security, freedom from discrimination, and more. The UDHR’s companion in the International Bill of Human Rights is the International Covenant on Civil and Political Rights (ICCPR),<sup>50</sup> which provides rights of self-determination, the right to life and physical integrity, freedom from slavery, recognition as a person before the law, and equality before the law, again, among many more protections.

Moving to slightly narrower and more specific documents, consider the European Convention on Human Rights (ECHR).<sup>51</sup> This further reiterates the above-described sentiments in a very enforceable manner. As examples, Article 2 states that: “[e]veryone’s right to life shall be protected by law”; Article 5 that: “[e]veryone has the right to liberty and security of person”; and Article 14 states that:

[t]he enjoyment of the rights and freedoms set forth in this Convention shall be secured without discrimination on any ground such as sex, race, colour, language, religion, political or other opinion, national or social origin, association with a national minority, property, birth or other status.

There is no reason to imagine that “status,” here, does not cover factors such as “origin,” as in biological or synthetic.

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<sup>46</sup> For a thorough overview of a number of these aspects as they relate to medicine, see Brazier M, Cave E. *Medicine, Patients, and the Law*. 6th ed. London: Penguin Books; 2016. I thank Margot Brazier particularly for her kind advice on the following segments.

<sup>47</sup> United Nations General Assembly. *Universal Declaration Of Human Rights*; 1948:217 A (III).

<sup>48</sup> Without ignoring the Cairo Declaration on Human Rights in Islam, which although brought into existence through disagreements with the UDHR, was made in the same spirit.

<sup>49</sup> *op. cit.* 47 Preamble. Emphasis added.

<sup>50</sup> United Nations General Assembly, *International Covenant on Civil and Political Rights (ICCPR)*, December 16, 1966, United Nations, Treaty Series, vol. 999.

<sup>51</sup> Council of Europe, *European Convention for the Protection of Human Rights and Fundamental Freedoms*, as amended by Protocols Nos. 11 and 14, November 4, 1950.

Furthermore, one might like to think of the common law of England,<sup>52</sup> pertinent here as it can be considered the model for that adopted in the colonies of the British Empire, and that persists today in many of the Commonwealth nations and the United States. The common law has long conferred rights of bodily integrity and liberty, via the law of tort. Witting notes that “Tort law has always protected certain human rights”<sup>53</sup> notably by way of the action for trespass to the person.<sup>54</sup> The criminal law endorses the right to life; deriving from the writings of Coke CJ in the early seventeenth century,<sup>55</sup> murder in English law has been defined as follows: “The offence is committed when ‘a person of sound mind and discretion unlawful kills any reasonable creature in being under the Queen’s peace with intent to kill or cause grievous bodily harm.’”

All these instruments, it could be argued, were not written with novel beings such as are the focus here in mind. Most, if not all, were conceived long before the very idea of an android or a posthuman was anything more than purest fiction. However, this seems to be precisely a point in favor of inclusivity.

The above-cited legal instruments are united in a term: “everyone.” This article is not the place for a full legal analysis of the term;<sup>56</sup> however, there are several clues as to the spirit of its usage. The first, quite simply, is context. As is made abundantly clear in the ECHR Article 14, there ought be no grounds on which discrimination is acceptable. The Convention is meant to protect all those whom it possibly could encompass, and leave room for those the drafters could not think of: “*or other status*.” It seems likely that the origin of consciousness is not the exception to this rule. Consider the animal personhood cases to be discussed subsequently. Those that failed did not do so expressly because they concerned beings that were not *Homo sapiens*, but rather because these beings failed—in themselves—to meet the personhood standards considered necessary by the court. Relatedly, “person” is used frequently throughout these and any other similar document, in reference to those subject to the article being stated. From the ICCPR (in which “person” appears no less than 38 times, 35 as the subject): “All persons shall be equal before the courts and tribunals.”<sup>57</sup> From the UDHR: “no distinction shall be made on the basis of the political, jurisdictional or international status of the country or territory to

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<sup>52</sup> I give special thanks to Margot Brazier for providing and explaining this valuable thought in conversation.

<sup>53</sup> Witting C, ed. *Street on Torts*. 14th ed. Oxford: Oxford University Press; 2015, at 7.

<sup>54</sup> *ibid.* at 5–10. For a modern example of the right to bodily integrity as protected by trespass to the person, see *Re T (adult: refusal of treatment)* [1992] 4 All ER 649 CA

<sup>55</sup> Coke E. *The First Part Of The Institutvtes Of The Lawes Of England*. London: Printed for the Societie of Stationers; 1628. Pt III, Ch 7: 47.

<sup>56</sup> Although an excellent and fascinating one is to be found in a draft (at the time of writing) paper: Brazier M. *What or Who is Human: A Conundrum for the Law*. Unpublished manuscript.

<sup>57</sup> *op. cit.* 50, Article 14.

which a person belongs.”<sup>58</sup> It may be possible to suggest that the use of “person” in these documents is meant to indicate “human person,” another term that appears (although less frequently), although the distinction here is unclear. I have argued extensively elsewhere<sup>59</sup> that there is no good reason to assume that this biological understanding of humanity is either relevant or helpful in these types of debate, and, therefore, this objection can probably be safely discounted given that I am discussing matters of a community of moral value and not those of taxonomy. The entire reason for wishing to provide these laws is that we consider the group subject to them to be of a certain moral value worthy of protection; as such, one cannot suggest that the philosophical interpretation of personhood is irrelevant.

Persons, then, must be understood as the subject of broad legal protection. This concept is the cornerstone of a number of longstanding conflicts in bioethics; foremost among which is the issue of fetal personhood and whether or not an embryo qualifies as “human” (again, here read “person”), when faced with destruction (either by abortion or in research). A vicious argument with huge investment and emotion on both sides, this example serves well to illustrate the primacy of the regard in which we hold personhood in Western society. Equally, there exist the range of legal cases in recent years aimed at securing personhood for non-*sapiens* animals. This phenomenon warrants a brief diversion.

The majority of animal personhood cases have been aimed at primates, with rulings covering “great apes” in general. These started with national recognitions, such as in Germany’s constitution, that animals should be subject to guaranteed rights.<sup>60</sup> Subsequently, New Zealand introduced specific protections to certain species of ape, particularly against their being used in research or testing.<sup>61</sup> Following this, a number of nations, including the United Kingdom, have banned research on great apes outright, although they fall short of granting legal rights as in New Zealand. More recently, groups such as the Great Ape Project<sup>62</sup> have advocated for a wider adoption of these basic legal rights in a “United Nations Declaration of the Rights of Great Apes,” for the release of great apes in captivity, and for a cessation to research and testing on them.

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<sup>58</sup> *op. cit.* 47, Article 2.

<sup>59</sup> *op. cit.* 6

<sup>60</sup> Deutscher Bundestag. *Grundgesetz für die Bundesrepublik Deutschland* 1949 Art. 20a; available at <http://www.gesetze-im-internet.de/gg/BJNR000010949.html> Accessed 14 July 2016

<sup>61</sup> Taylor R. A step at a time: New Zealand’s progress toward hominid rights. *Animal Law* 2001;7:35–41.

<sup>62</sup> Singer P, Cavalieri P, eds. *The Great Ape Project: Equality Beyond Humanity*. London: Fourth Estate; 1993.

More specifically, in 2015, an Argentine court appeared to grant an orangutan, Sandra, “non-human person rights” to life, to freedom, and to protection from harm, in order that she could be released from captivity and moved to a sanctuary;<sup>63</sup> however, it is unclear as to whether this was merely semantics or a declaration of status. In New York, a 2014 case<sup>64</sup> expressly denied that a chimpanzee, Tommy, was a legal person for whom a writ of *habeas corpus* could be filed; however, a year later in 2015 (briefly) just such a writ was granted with regard to two more chimpanzees, Hercules and Leo, in order to compel Stony Brook University to defend its keeping them in captivity.<sup>65</sup> Mention of the writ was later struck from the record,<sup>66</sup> however, precedent has nonetheless been set after a number of other failed previous attempts. It is not only hominids that are the subject of such rulings; in 2013, India banned the captivity of cetaceans, including dolphins, on moral grounds, mentioning that they could be considered persons, but stopped short of declaring that they should be *treated* as such.<sup>67</sup>

It is not expressly because of their nature in dealing with non-*H. sapiens* creatures that these cases have mostly failed. The fact that they have been considered at all—and in some instances been successful to greater or lesser extent—speaks volumes. There is no good reason to assume that a novel being or consciousness should not be subject to reasoning related to that used in these cases.

As has been discussed, there are cases in which it is judged that some animals have become, and others are capable of becoming, persons in the sense that they have acquired or attained levels of cognition relevantly comparable to that of at least some properly so-called human persons. We are also comfortable with the idea of *H. sapiens* that do not qualify as persons. Those with severe cognitive disabilities—either congenital or imposed on them through illness or misadventure—or in persistent vegetative states,

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<sup>63</sup> Emiliano Giménez S. Orangutan granted controlled freedom by Argentine court. *CNN*. 2016. Available at: <http://edition.cnn.com/2014/12/23/world/americas/feat-orangutan-rights-ruling/>. Accessed July 17, 2016.

<sup>64</sup> *The Nonhuman Rights Project, Inc., On Behalf Of Tommy, V Patrick C. Lavery*. 518336, (State of New York Supreme Court 2014). available at <http://decisions.courts.state.ny.us/ad3/Decisions/2014/518336.pdf> Accessed 14 July 2016

<sup>65</sup> *Matter Of Nonhuman Rights Project, Inc. V. Stanley*. N.Y. Slip Op 31419, State of New York Supreme Court 2015 (<http://law.justia.com/cases/new-york/other-courts/2015/2015-ny-slip-op-25257.html> Accessed 17 July 2016).

<sup>66</sup> McKinley J. Judge Orders Stony Brook University to Defend Its Custody of 2 Chimps. *Nytimes.com*. 2015. Available at: <http://www.nytimes.com/2015/04/22/nyregion/judge-orders-hearing-for-2-chimps-said-to-be-unlawfully-detained.html>. Accessed July 17, 2016.

<sup>67</sup> India Bans Captive Dolphin Shows as ‘Morally Unacceptable’. *Ens-newswire.com*. 2016. Available at: <http://ens-newswire.com/2013/05/20/india-bans-captive-dolphin-shows-as-morally-unacceptable/>. Accessed July 17, 2016.; Dvorsky G. No, India did not just grant dolphins the status of humans. *Io9.gizmodo.com*. 2013. Available at: <http://io9.gizmodo.com/no-india-did-not-just-grant-dolphins-the-status-of-hum-1149482273>. Accessed July 17, 2016.

are seen, philosophically,<sup>68</sup> as nonpersons.<sup>69</sup> Admittedly, in normal discussion, we generally grant such beings both the term “person” and the relevant protections, if modified, for reasons of consent and practicality; but for their disability/illness, these beings would almost certainly qualify as persons in all of the ways I have discussed.

The fact that we acknowledge this distinction is indicative of the general, if unconscious, acceptance of a “threshold” concept of personhood.<sup>70</sup> If we are willing to entertain the notion of a human who fails to meet the threshold as being a nonperson, and the idea that animals that have traditionally been considered to fall below the threshold, but perhaps display the necessary qualities to surpass it, as possibly being persons, then it does not seem any more of a stretch to apply the term to other beings that meet or surpass the requirements. In short, to deny personhood to an intelligent being provably in possession of the necessary qualities—including sentience, self-awareness, moral agency, and narrative identity—would render the basis of our understandings of personhood meaningless.

Let’s return to our android example, Roy. The mythos of the film refers to him and his fellows as “replicants,” a term the writers preferred to “android” so as to avoid preconceptions. They define it, in the fiction, thus:

REPLICANT \rep’-li-cant\ *n.* See also ROBOT (*antique*): ANDROID (*obsolete*): NEXUS (*generic*): Synthetic human with paraphysical capabilities having skin/flesh culture. Also: Rep, skin job (*slang*): Off-world uses: Combat, high risk industrial, deep space probe. On-world use prohibited. Specifications and quantities—information classified.<sup>71</sup>

It would appear that the replicants are intended as a labour force, particularly in dangerous, unpleasant, or undesirable roles.<sup>72</sup> This does not seem to be too different from the roles in which we use—or intend to develop the use of—robotics today, as tools. Note, too, the slang words, and consider further that the (very broad) plot synopsis of the story is that of an enforcer hunting down and “retiring”—for which read “killing”—replicants

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<sup>68</sup> So as to differentiate from the historic treatment of women, slaves, and other races as nonpersons, which may have had some philosophical argument but which is patently false.

<sup>69</sup> Goodman MF. *What is a Person?* Clifton NJ, Springer Science & Business Media; 1988

<sup>70</sup> Agar N. *Truly Human Enhancement: A Philosophical Defence of Limits*. Cambridge, MA: MIT Press; 2013, at 162.

<sup>71</sup> *op. cit.* 1. From the title sequence’s in-mythos “New American Dictionary,’ Copyright 2016,” a forecast that makes me somewhat wistful given the time of writing.

<sup>72</sup> One of Roy’s companions, Pris, is described as “a basic pleasure model,” a designation that tells its own story.

that have escaped to Earth. Patently, these beings are not seen as equals to the *H. sapiens* populace. They are not given the protections discussed earlier that are warranted by persons, neither are there advocates for their rights fighting in courts. The replicants are seen as little more than animate and useful objects. Perhaps “slaves” would be an appropriate term. There are many parallels, particularly inasmuch as they are shown to be capable of desiring better for themselves.

Throughout the film, Roy Batty shows himself to possess all the qualities of personhood that I have discussed, all the qualities that some commentators would have us fear in a novel being; his entire motivation as the putative antagonist stems from them. Roy is self-aware, and his actions are self-determined. He chooses to go on the run, to land on Earth, to seek out his creator. Unlike the drones or self-driving cars described earlier, Roy operates outside any master’s parameters. He chooses freedom, knowing the suffering and hardship he and his group will endure in the attempt. He is, very definitely, a moral agent. He performs calculated acts. In one example, he manipulates one of his designers, Sebastian, behaving with kindness toward him until he is led to kill him, apologetically. He knows he is morally wrong to do this and that Sebastian is a good man and never intended the suffering Roy has undergone. He kills his creator in a rage born of fear and frustration when that creator cannot provide that which he so desperately desires. And he chooses to show mercy to Deckard, who has hunted him throughout the film and “retired” his companions, because he knows that Deckard knew no better. Only a being of rationality could feel and express guilt about war and murder:

*Batty looks down in a sudden, uncharacteristically humble posture and speaks with guilt in his voice.*

### BATTY

I've done questionable things.<sup>73</sup>

Roy's possession of biographical identity is perhaps his defining feature, and is the key to his character. As he says in the quotation that opens this article, when he expires “all [his experiences] will be lost in time, like tears in rain.”<sup>74</sup> His motivation in returning to Earth is to seek out Eldon Tyrell, his creator, in order to find a way to extend his 4 year lifespan. He knows that his end is nigh, and seeks to avert it, because he wishes to continue to

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<sup>73</sup> *op. cit.* 1.

<sup>74</sup> *op. cit.* 1.

experience life (or existence). In other words, he can envisage his future, and is motivated by the memories of his past.

Roy, then, seems to embody the novel beings in question. He is, or would be, undoubtedly, a person. If, as discussed, personhood conveys a certain threshold of moral value, then it might be reasonable to suggest that Roy would also possess this, and ought be subject to the relevant protections associated with it. Roy, then, is an effective cipher for the type of being I have established as being worth discussion.

Granting Roy personhood, however, is not the end of the story. The necessary criteria for personhood may be fulfilled, but as mentioned, these novel beings could be found to fulfill them to levels beyond that which we are able, purely as a result of enhanced—or artificial—cognition. Would they therefore warrant being labeled as being beyond us in some meaningful way?

I will consider, for a moment, the types of beings that we as a society are likely to be dealing with. Enhanced *H. sapiens* is likely to be rather similar to “baseline” *H. sapiens*, *but for* his or her enhancements. Whether these render these beings biologically distinct is, again, a moot point; what matters is that they would not be so divorced from us that we would not recognise them instinctively as being “one of us,” increased capacities or no. Androids, however, do not have this luxury, nor do artificial intelligences more broadly conceived. The term “android” is derived from the same root as the modern term androgyny: the late Greek *androeidēs*, meaning “manlike,”<sup>75</sup> possibly better translated in context as “humanoid.” This refers to more than these beings’ musculoskeletal format. Androids are designed specifically to resemble *H. sapiens*,<sup>76</sup> and should the technology continue to advance, we might assume that they could become indistinguishable from us, like those in the film. This idea is further complicated if one considers the realities of the technology, as mentioned earlier. Although it is entirely possible for a true “synthezoid”—a wholly artificial (in the sense of being inorganic) humanoid—to emerge, we are more likely to encounter “bioroids”: wholly designed, organic beings. Appearance is far from a significant factor in moral status, but it would very much come into play in social attitudes, and it is the combination of these that are likely to dictate how we ought or will treat novel beings.

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<sup>75</sup> Android. *Collins English Dictionary*. 2016. Available at: <http://www.collinsdictionary.com/dictionary/english/android>. Accessed July 17, 2016.

<sup>76</sup> *op. cit.* 11, at 6–7.

It is to this latter class of humanoid that Roy belongs, and it is no accident that the motto of the Tyrell corporation in *Blade Runner*, the creators of the replicants, is “More Human Than Human.”<sup>77</sup> As mentioned previously, I have examined the nature of the human more extensively elsewhere, but some small points bear repeating now. One of the most common and most interesting ways in which we generally label something “human” is in reference to a moral community of beings who we consider to possess a certain value or status; who possess humanity. Humanity, in turn, could be considered to be a state of aspiration and of motivation; broadly describable as a collection of desirable characteristics, qualities, and ideals that we hold about ourselves, with a conscious or unconscious drive to live up to these being the primary driving force in our lives. It scarce needs to be said that in order to possess this aspiration and motivation, one has to be a person; without narrative identity, aspiration has no meaning; without self-determination or moral agency, we cannot act to try to fulfill them.

Consequently, one must ask an important question of Roy. I have already mentioned that his primary motivation is to continue living, a motivation that is, itself, very human. It might be assumed that any novel being possessed of personhood might have similar motivations. But do his capacities beyond those we ourselves possess make him more than just our physical or cognitive better?

This question is at the heart of the matter. If a novel being is not the same as we are, then one might assume that surely it must be “other.” However, whether or not personhood is a threshold concept or hierarchical<sup>78</sup> is, likely, not important for the way in which we treat a being. If Roy fulfills the same minimum criteria for a given moral status as we do, or if he surpasses us and is somehow of a greater moral value, there is probably no real difference made in terms of what ought determine our treatment of him. If a being has the same moral status that we do, then it makes sense to treat that being as such; affording them the relevant protections and respect that we do ourselves. Because we give ourselves primacy over other beings of lower moral status, and because it would be difficult to conceive of what more protections we could afford ourselves (in theory, if not practice) than those of life, liberty, and self-determination, it is unclear as to what better treatment we could offer a being of higher moral status. In practical terms, the potential for increased capacities merely grants the possessor the ability to enact the motivations and realize the aspirations that make up “humanity” to a greater degree than we can. If this

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<sup>77</sup> *op. cit.* 1.

<sup>78</sup> For a thorough and thoughtful analysis, see Agar 2013. *op. cit.* 70, at 161.

changes anything, then perhaps it is to give such beings a greater claim to being human than our own.

Because, we might suspect, we would not wish to give up our status as humans—downgrading ourselves to allow these novel, more capable beings to occupy our previous status niche—it appears there are only two methods of recourse. One is distasteful and, as mentioned, would belie the high ideals we hold about ourselves, truly rendering us as something less than human. We would be on the verge of, if not actually emulating, the acts of history's most vilified figures if we were to create intelligent novel persons with the intent of enforcing the exploitation of their potential utility, as were the replicants of the film; or if we brought them to existence and consciousness but also wished to deny them the exercise of their personhood, as one may expect fear and conservatism might demand, labeling them “subhuman.” It should be stated at this point that nobody (or at least no academic) is actively calling for potential future beings to be denied the exercise of their (probable) rights: however, this seems to me to be inevitable, and is a scenario that cannot be dealt with effectively if allowed to take hold.

A second option is less reactionary, and far more in keeping with the human ideal. Because it has been established that these novel beings are as qualified as we are to be members of the same community of value—the “human community”—and almost certainly warrant the same protections (and therefore would be subject to our same legal and social responsibilities), then it makes sense to simply accept that, and abandon “human” as a term of biology used interchangeably with *H. sapiens*, relying instead on the other, more meaningful understandings of it. Roy Batty, life span notwithstanding, could finally be seen as human. Enhanced *H. sapiens*, or whatever binomial name such persons might warrant, would not be subjected to prejudice or “othering” on account of either life choices they made themselves, or choices that were made by their parents before ever they were born. Even a disembodied AI could be seen as human under this reasoning. Where John Searle’s “Chinese Room”<sup>79</sup> is intended as a means of refuting the idea of “strong AI,”<sup>80</sup> as he puts it, having a genuine mind; the argument hinges on the idea that the entity within the Room could be either human or machine, responding to instructions. If, in conversing with the entity, one is able to hold this “conversation,” then the experiment simply falls foul of practicality, as exemplified by “Alder’s Razor,”<sup>81</sup> which states that: “we should not dispute propositions unless they can be shown by precise logic

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<sup>79</sup> Searle J. *The Rediscovery of the Mind*. Cambridge, MA: MIT Press; 1992, at 44.

<sup>80</sup> Searle uses this term to refer to the type of conscious mind I am discussing here.

<sup>81</sup> Or to give it its true, spectacular title: Alder M. Newton’s flaming laser sword. *Philosophy Now* 2004;46:29–32.

... to have observable consequences" or, more simply, if we cannot distinguish between the two, then the division is frivolous.

This, then, is the answer to the key question on novel beings. Bearing in mind the twin factors of moral value and of societal attitude, I will undertake a quick thought experiment. Most examples of such concerned with consciousness or AI enjoy the motif of a room or box, so far be it for me to buck the trend. Within our room sits Roy, our novel being. Outside is an *H. sapiens* observer, possessed of fully realized personhood and with all faculties intact. Neither being is forced into the situation; there is no particular malice. The two beings are able to communicate by any means, but are not able to see each other. As has been established, Roy is, effectively, human. In discussion with the observer, Roy is likely to come across as erudite, passionate, and equally curious as the man or woman outside the room. It is reasonable to assume, therefore, that the two persons would be capable of establishing a relationship, of identifying with one another much as we do with other members of our species whom we do not know. If we remove the walls of the room, the two beings are face to face. The realization (if there is one, in the case of Roy, or *H. superior*<sup>82</sup> in which it would not necessarily be immediately obvious) that she or he was not in fact talking to another being of the same type as him or herself does not affect the foundations of the relationship that was built. There is potential for a very practical example of this experiment to emerge. Various scientific and amateur groups continue to search for extraterrestrial signals, for contact from distant alien species. The distances and times involved, should such a signal be found, are such that we are unlikely to ever meet such beings in the flesh; therefore, any relationship, and our judgments on whether they might qualify as persons or indeed any other type of being, and any action that might require, would be based solely on contact much like that with the occupant of the room detailed previously.

Different observers may react differently to this; some may be victims of the "yuck" factor, and some may fear what they see. On the other hand, some may be unfazed by the revelation. The wisdom of repugnance—the "yuck" factor—is very rarely a sound basis for judgment, despite the arguments of Leon Kass<sup>83</sup> and his adherents. Xenophobia, too, is hardly significant; it is a product of some animal instinct, the same that leads to racism and extreme nationalism today. Reasonable humans do not allow such opinions to color their views on other races, cultures, or creeds with whom we may share everything save

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<sup>82</sup> As a term of art.

<sup>83</sup> *op. cit.* 13.

one insignificant factor. The same ought hold true for novel persons, particularly those who warrant this kind of discussion.

Some readers will question the point of these considerations. After all, there are many issues in bioethics of more immediate concern: organ shortages, patient's rights, and biorisk, to name but a few. However, although all are important, they may not have quite the potential that the introduction of novel beings of equal or greater intelligence, capacity, and (perhaps) moral value would to disrupt our society. It is highly likely that such life forms will emerge in the reasonably foreseeable future, and if we are to avoid disruption, then it is imperative that we act with foresight, preparing the way and not scrambling to try to keep up or prevent something that has already happened. If we do not consider the possibility now, and develop policy to approach and handle the matter, then we truly will end up creating an "underclass." The evidence of the way we see ourselves as persons and humans; the ways in which we consider ourselves of value; and the increasing weight of opinion toward extending rights to other beings—only on the day of writing, legal scholars have suggested the need for robot rights<sup>84</sup>—implies that there is no good reason not to apply similar considerations and protections to novel persons. To do otherwise would fly in the face of the human ideal. A being worth this type of discussion would, necessarily, be more human than human, particularly if we were to cast that being out.

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<sup>84</sup> Bremner C. Even robots have human rights, say legal experts. *The Times*. 2016. Available at: <http://www.thetimes.co.uk/article/5fe3d4d6-29be-11e6-832e-ae3a7e82d7c7>. Accessed July 17, 2016.

## **11.0 AMPLIO, ERGO SUM**

**David R. Lawrence**

Recently completed paper, awaiting submission.

### **11.1 Abstract**

This paper aims to develop a palaeoanthropological bioethics, in order to explore the idea that enhancement technologies have been and will continue to be an essential element of what we might call the ‘human continuum’, and are indeed key to our existence and evolution. Whereas conservative commentators argue that enhancement is likely to cause us to lose our humanity and become something other, I here argue that the very opposite is true. Using evidence from paleoanthropology to examine the nature of our predecessor species, and their proclivities for and tool use, we can see that there is good reason to assume the development of *Homo sapiens* is a direct result of the use of enhancement technologies. A case is also made for broad understandings of the scope of enhancement, based on the significant evolutionary results of acts that are usually dismissed as unremarkable’. Furthermore, I argue that the use of enhancement by modern man is no different to these prehistorical applications, and is likely to ultimately have similar results. There is no good reason to assume that whatever we may become will not also consider itself human.

### **11.2 Introduction**

Since the earliest times, what we today refer to as human enhancement technologies and methodologies have had a greater and more fundamental influence on mankind than many would wish to accept. I present here an argument that enhancement, in its various forms, has been essential to the evolution of our species and its use today will only maintain the human continuum. If we can affirm this there are great implications for our understanding of and the attitudes we should adopt towards the beings we may become, the so-called ‘posthuman’.<sup>1</sup> It is my contention that by looking to the past we will hold the

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<sup>1</sup> I have explored (and opposed) this concept of ‘post’ elsewhere: Lawrence D. The Edge of Human? The Problem with the Posthuman as the ‘Beyond’. *Bioethics* (onlinefirst). 2016; doi:10.1111/bioe.12318. It seems reasonable that any being we may become will also count itself, and should be counted by us today, as being simply ‘human’.

key to understanding the likely ways in which we will develop, and react to that development, in the future.

From *Sahelanthropus* to *Australopithecus afarensis*, into the genus *Homo*, the descent of man is a constant thread. *Homo habilis* and *H. gautengensis* gave rise to the intermediaries *H. georgicus* and *H. ergaster*; before the well-known tool and fire user *Homo erectus* came to the fore as the premier member of the genus. *H. antecessor* followed, broadening the group to include *H. heidelbergensis*, *H. rhodesiensis*, and the cousins *H. neanderthalensis* and Denisovian man. During the existence of the latter species, we see the emergence of *Homo sapiens idaltu*, and ourselves, the wise men-*Homo sapiens sapiens*. It is likely we would feel a kinship with these ancestors, stretching back into our first emergence from the trees, and we must acknowledge that one day we shall be seen by our descendants further along this thread just as we look back upon *H. erectus*. Here, I shall explore what it is that gives shape to this common thread, what made us who we are, and what shall undoubtedly shape our futures.

### 11.3 Ancient apes and modern man

Imagine an ancient *Homo sapiens* walked amongst us. How would we treat them? Imagine that they were no Methuselah figure, but a true ancestor to us all, one of the first *sapiens* to walk the Earth. Imagine that they were new to our modern society, that they were, so to speak, a ‘primitive’. They use fire, they use stone and wooden tools. They clothe themselves and live as nomads in basic shelters. They are used to being prey for wild beasts, and to hunting and gathering for themselves. Agriculture is still far off for them, let alone our modern visions of biotechnology and enhancement.

They are 195,000 years old. They are known to us, today, as ‘Omo man’.<sup>2</sup> Omo I and Omo II are the oldest known fossil examples of *Homo sapiens*. Their exact subspecies is not entirely clear- they could be thought of as the point from which *Homo sapiens sapiens* and *Homo sapiens idaltu* diverged- but they are generally regarded as being, or being on the very cusp of, what anthropology refers to as ‘anatomically modern humans’<sup>3</sup> (AMH).

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<sup>2</sup> McDougall I, Brown F, Fleagle J. Stratigraphic placement and age of modern humans from Kibish, Ethiopia. *Nature*. 2005;433(7027):733-736.

<sup>3</sup> Nitecki M, Nitecki D. Nitecki. *Origins Of Anatomically Modern Humans*. 1st ed. New York: Plenum Press; 1994.

When we think of ‘humans’ and ‘humanity’, we do not tend to picture the beginnings of our species, beings from a different epoch. We perhaps tend to think of one of three major meanings<sup>4</sup> of the term: the biological sense, effectively equalling species and usually limited to *H. sapiens sapiens*; the moral sense, in which we refer to a community of beings of a particular moral status we hold ourselves to possess; or the self-idealising sense, wherein we see a set of physical and behavioural traits and characteristics that we recognise both within ourselves and as something to which we ought aspire.

All three are valid in different ways and are appropriate in different contexts, but if we consider them together our instincts as to what counts as human might be challenged. The second and third senses are relatively straightforward- anything that shares the requisite traits, characteristics, or desires as do we would probably count as human, as would anything which falls within our bracket of moral value; i.e. persons. The issue here is introduced when the being that fulfils these requirements is *not* the same species, as in the first common use of ‘human’. If the term is used as shorthand for *Homo sapiens sapiens*, as it frequently is, then necessarily it precludes any other species (including other members of the same genus). As we shall see slightly later, this is likely to be a mistake.

It seems likely that the presence of such a visitor as *Omo* would cause a number of dilemmas, or perceived dilemmas. A primary concern would probably be the protection of such a being, and to what degree *Omo* would qualify for this. I have discussed elsewhere<sup>5</sup> that it is the possession of personhood that we generally hold as a threshold for warranting the protections enshrined in law; protection of life, of body, of autonomy, from discrimination to name but a few. However language, culture, and xenophobia (from both us and, potentially, from *Omo*) may make it difficult to recognise moral agency, self-consciousness, or narrative identity<sup>6</sup> in our direct ancestor; which are the usual measures by which we tend to evaluate personhood.<sup>7</sup> The matter would be further complicated by the academic value of having a living early *H sapiens* to study, doing which may contravene some of these protections (assuming *Omo* lacks a grasp of evolutionary biology and modern research methods, or a particularly easygoing nature). We could undoubtedly learn much more about ourselves and about our ancestors than from fossils and inference of behaviour, and it may be that some argue in favour of

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<sup>4</sup> *op. cit.* 1.

<sup>5</sup> Lawrence D. More Human Than Human. *Cambridge Quarterly of Healthcare Ethics*. 26(3):Forthcoming 2017.

<sup>6</sup> Taylor C. *The Concept Of A Person. Philosophical Papers, Volume 1*. Cambridge: Cambridge University Press; 1985. 97.

<sup>7</sup> For a more thorough exploration of this concept see *op. cit.* 5.

pursuing such a unique opportunity. Furthermore there is the need to protect *Omo* from the hazards of the modern environment that they may not comprehend.

Still though we would probably be reticent to treat such a being as an inferior- as a non-human animal, as an object- even if their personhood is in question. Some parallels might be drawn with beings we more commonly encounter- those who are either congenitally or through injury incapable of possessing or exercising the capacities necessary to qualify, philosophically, as persons. We generally abhor the notion of ostracising the cognitively impaired, and instead treat them as we would persons. As I have discussed at length elsewhere, ‘human’ is often used as a taxonomic descriptor and a collection of self-ideals to which we aspire, but is also a term describing a community of value.<sup>8</sup> We would, it is almost sure, describe a severely cognitively impaired *sapiens* as a human, as being a member of this community; and it seems reasonable that we would feel the same about any being we know to be of our own specific species, ancient or not.

Would we react in the same way if our visitor was not our species? What if they were an immediate ancestor in our genus, such as *Homo erectus*? There would be no hard and fast dividing line<sup>9</sup> between species where we might cleanly apply our divisions of personhood and humanity. If *H. erectus* was to appear among us rather than his descendant, it seems unlikely that our reactions would be any different to suddenly meeting *Omo*. Once again, we would be faced with someone highly similar to ourselves, though this time not ‘anatomically modern’ nor even an ‘archaic human’<sup>10</sup>, an anthropological term for our immediate ancient peer species including *H. neanderthalensis*, *H. rhodesiensis*, and *H. heidelbergensis* which is interesting to note in and of itself. We would see its heavy brow and different gait when compared to ourselves, even to *Omo*, and yet we would also see a range of behaviours we recognise as being meaningfully similar to our own. Our gut instinct would probably be to welcome a family member, not to cage an animal.<sup>11</sup> The further back we go to draw our visitor the harder it is to predict our reaction, as we know less and less for certain. Our ancestors become steadily less ‘anatomically modern’- *H. habilis* had a smaller skull, shorter stance and

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<sup>8</sup> *op. cit.* 1.

<sup>9</sup> There is some debate in palaeoanthropological circles as to whether an intermediate species existed- potential examples include *Homo cepranensis* and *Homo antecessor*.

Bermudez de Castro J. A Hominid from the Lower Pleistocene of Atapuerca, Spain: Possible Ancestor to Neandertals and Modern Humans. *Science*. 1997;276(5317):1392-1395; Manzi G, Mallegni F, Ascenzi A. A cranium for the earliest Europeans: Phylogenetic position of the hominid from Ceprano, Italy. *Proceedings of the National Academy of Sciences*. 2001;98(17):10011-10016.

<sup>10</sup> Dawkins R. Archaic Homo Sapiens. In: *The Ancestor’s Tale*. Bostrom: Mariner; 2005.

<sup>11</sup> In a figurative sense. It may well be that the visitor is hostile, much as certain largely uncontacted tribes are known to aggressively reject outsiders. However, we still recognise these tribes as human, and would no doubt treat them as such if possible.

more apelike features than us, but was still morphologically and behaviourally similar- and had a cranial capacity at least twice that of its predecessor.<sup>12</sup> More and more would rely on our determination of their moral status.

Our personhood is effectively unique, and it is probable that we are the only species to consider ourselves as such. Or, more properly, the only extant species- *Homo sapiens idaltu*, *Homo neanderthalensis*, *Homo erectus*, and possibly older members of the genus are likely to have had the necessary intelligence and cranial capacity to qualify as persons- particularly if we consider the modern movements and legal proceedings<sup>13</sup> to provide personhood to great apes and certain other non- *Homo* creatures. These animals are likely to be less intelligent or cognitively capable than our direct ancestors- obviously, this cannot be proven, but we can extrapolate from the cranial capacities and paleontologically evidenced behaviours of the latter that they were probably close to modern humans in this regard. These behaviours include cooking in *Homo erectus*, as well as complex social groupings with hunter-gatherer behaviour and care provision for the infirm,<sup>14</sup> even seafaring.<sup>15</sup> *H. erectus* is also thought to have been capable of true vocalised language, possibly even articulate language in the same range as *H. sapiens*.<sup>16</sup> We cannot know that this level of intelligence allowed for the generally accepted traits of personhood, which as discussed earlier in this paper include moral agency, self-awareness, and narrative- but the nature of the behaviours would suggest that it did. It is unlikely a non moral agent would provide care for the infirm; and there are few reasons to build rafts to cross lakes and seas from Asia to Europe<sup>17</sup> without some capability to recognise a poor past and the potential for a better future beyond the waves. Self awareness is harder to fathom given its internal nature, but evidence from nonhuman

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<sup>12</sup> Spoor F, Gunz P, Neubauer S et al. Reconstructed Homo habilis type OH 7 suggests deep-rooted species diversity in early Homo. *Nature*. 2015;519(7541):83-86.

<sup>13</sup> for example: Singer P, Cavalieri P, eds. *The Great Ape Project: Equality beyond humanity*. Fourth Estate: London, England; 1993; Emiliano Giménez S. Orangutan granted controlled freedom by Argentine court. CNN. 2016. Available at: <http://edition.cnn.com/2014/12/23/world/americas/feat-orangutan-rights-ruling/>. Accessed July 17, 2016; *The Nonhuman Rights Project, Inc., On Behalf Of Tommy, V Patrick C. Lavery*. 518336, State of New York Supreme Court 2014 (available at <http://decisions.courts.state.ny.us/ad3/Decisions/2014/518336.pdf> Accessed 14 July 2016); *Matter Of Nonhuman Rights Project, Inc. V. Stanley*. N.Y. Slip Op 31419, State of New York Supreme Court 2015 (<http://law.justia.com/cases/new-york/other-courts/2015/2015-ny-slip-op-25257.html> Accessed 17 July 2016); McKinley J. Judge Orders Stony Brook University to Defend Its Custody of 2 Chimps. *Nytimes.com*. 2015. Available at: <http://www.nytimes.com/2015/04/22/nyregion/judge-orders-hearing-for-2-chimps-said-to-be-unlawfully-detained.html>. Accessed July 17, 2016.

<sup>14</sup> Boehm C. *Hierarchy In The Forest: The Evolution Of Egalitarian Behavior*. Cambridge MA: Harvard University Press; 1999. 198.

<sup>15</sup> Gibbons A. Ancient Island Tools Suggest Homo erectus Was a Seafarer. *Science*. 1998;279(5357):1635-1637.

<sup>16</sup> Leakey R. *Origins Reconsidered*. Anchor; 1992. 257-58

<sup>17</sup> Oldest stone tool ever found in Turkey discovered. *ScienceDaily*. 2014. Available at: <https://www.sciencedaily.com/releases/2014/12/141223084139.htm>. Accessed February 17, 2017.

animals would suggest that it is entirely likely.<sup>18</sup> If we take a Lockean perspective- that self-awareness is a repeated self-recognition allowing for moral responsibility;<sup>19</sup> and the Nietzschean corollary of this that a self-aware being could be guilty and also cruel-“...the psychology of conscience is not 'the voice of God in man'; it is the instinct of cruelty ... ”<sup>20</sup>- then observations of chimpanzees would tend to bear this out. Chimpanzees have been found to have a sense of fairness- choosing in a test to ensure both parties received equal shares of food rather than trying to win more for themselves.<sup>21</sup> They have also been found to punish wrongdoing (stealing food) against themselves,<sup>22</sup> and have been seen to act in a cruel and brutal fashion in the famous ‘Gombe Chimpanzee War’ as observed by Jane Goodall:

For several years I struggled to come to terms with this new knowledge. Often when I woke in the night, horrific pictures sprang unbidden to my mind—Satan [one of the apes], cupping his hand below Sniff's chin to drink the blood that welled from a great wound on his face; old Rodolf, usually so benign, standing upright to hurl a four-pound rock at Godi's prostrate body; Jomeo tearing a strip of skin from Dé's thigh; Figan, charging and hitting, again and again, the stricken, quivering body of Goliath, one of his childhood heroes. ...<sup>23</sup>

It bears noting however that it is not clear that the chimpanzees here were acting classically cruelly- i.e., planning to cause pain, and imagining the suffering of the victim.<sup>24</sup>

The evidence, then, would suggest that it is entirely possible for our predecessor species to have qualified as persons, at least those within our own genus. If personhood is the main constituent of our community of value, then it is difficult to argue that any hominids that *were* persons might not also count as human. However, we are left with the question of what it is that makes this possible. To understand this chain of humanity, we must first examine what has forged it.

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<sup>18</sup> Bekoff M. Awareness: Animal reflections. *Nature*. 2002;419(6904):255-255.

<sup>19</sup> Locke J. *An Essay Concerning Human Understanding*. Oxford: Clarendon Press; 1979 Ch. XXVII

<sup>20</sup> Nietzsche F. trans. Wayne T. *Ecce Homo*. New York: Algora Pub.; 2007.117

<sup>21</sup> Proctor D, Williamson R, de Waal F, Brosnan S. Chimpanzees play the ultimatum game. *Proceedings of the National Academy of Sciences*. 2013;110(6):2070-2075.

<sup>22</sup> Riedl K, Jensen K, Call J, Tomasello M. No third-party punishment in chimpanzees. *Proceedings of the National Academy of Sciences*. 2012;109(37):14824-14829.

<sup>23</sup> Goodall J. *Through A Window: My Thirty Years With The Chimpanzees Of Gombe*. Boston: Houghton Mifflin Harcourt; 2010: 128-129

<sup>24</sup> Nell V. Cruelty's rewards: The gratifications of perpetrators and spectators. *Behavioral and Brain Sciences*. 2006;29(03).

## 11.4 Essential technology

The use of tools and the use of fire are possibly the primary drivers in the evolution of *Homo sapiens*; and more pertinently of the traits and characteristics that we like to consider qualify us as ‘human’. Tools are defined as “[a]n object that has been modified to fit a purpose” or “[a]n inanimate object that one uses or modifies in some way to cause a change in the environment, thereby facilitating one’s achievement of a target goal”.<sup>25</sup> This is not, as we shall discuss, too far from the general gist of enhancement technologies.

Bending physics to our will did not begin around 5,500 years ago with the wheeled vehicle<sup>26</sup>, nor did it start at the use of Archimedean machines such as the lever and the inclined plane in prehistory. The oldest known deliberately-designed tools are flint hand axes, applications of the machine principle of the wedge, dating from around 2.6 million years ago<sup>27</sup> - tools which heralded the dawn of the Palaeolithic period.<sup>28</sup> There is evidence to suggest the use of sharp stone implements for food acquisition occurred even earlier, around 3.4 million years ago, with “unambiguous stone-tool cut marks in ... [animal] bone”.<sup>29</sup>

These, though, are not the first instances of tool use itself. Leaving aside so called ‘social tools’, such as ants using their own bodies to form bridges,<sup>30</sup> there are many examples of tool use in nonhuman animals. Whilst deliberately manufactured tools are rare there is widespread use of found objects, for want of a better term, across all *phylae* of the animal kingdom; from primates<sup>31</sup> to cetaceans,<sup>32</sup> birds,<sup>33</sup> cephalopods,<sup>34</sup> fish,<sup>35</sup> reptiles,<sup>36</sup> and

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<sup>25</sup> Beauchamp T, Frey R. *The Oxford Handbook Of Animal Ethics*. New York: Oxford University Press; 2014: 232.

<sup>26</sup> Anthony D. The Horse, The Wheel, And Language: How Bronze-Age Riders From The Eurasian Steppes Shaped The Modern World.. 1st ed. Princeton, N.J.: Princeton University Press; 2010: 67.

<sup>27</sup> Semaw S, Rogers M, Quade J et al. 2.6-Million-year-old stone tools and associated bones from OGS-6 and OGS-7, Gona, Afar, Ethiopia. *Journal of Human Evolution*. 2003;45(2):169-177.

<sup>28</sup> Toth N, Schick K. Overview of Paleolithic Archeology. In: Henke H, Hardt T, Tattersall I, ed. *Handbook Of Paleoanthropology. Volume 3*. 1st ed. New York: Springer- Verlag; 2007:1944.

<sup>29</sup> McPherron S, Alemseged Z, Marean C et al. Evidence for stone-tool-assisted consumption of animal tissues before 3.39 million years ago at Dikika, Ethiopia. *Nature*. 2010;466(7308):857-860.

<sup>30</sup> Pierce J. A Review of Tool Use in Insects. *The Florida Entomologist*. 1986;69(1):95.

<sup>31</sup> Boesch C, Boesch-Achermann H. *The Chimpanzees Of The Tai Forest: Behavioural Ecology And Evolution*. Oxford: Oxford University Press; 2000. 192

<sup>32</sup> Smolker R, Richards A, Connor R, Mann J, Berggren P. Sponge Carrying by Dolphins (Delphinidae, Tursiops sp.): A Foraging Specialization Involving Tool Use?. *Ethology*. 2010;103(6):454-465

<sup>33</sup> Emery N. Cognitive ornithology: the evolution of avian intelligence. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 2006;361(1465):23-43.

<sup>34</sup> Finn J, Tregenza T, Norman M. Defensive tool use in a coconut-carrying octopus. *Current Biology*. 2009;19(23):1069-1070.

<sup>35</sup> Bernardi G. The use of tools by wrasses (Labridae). *Coral Reefs*. 2011;31(1):39-39.

<sup>36</sup> Dinets V, Brueggen J, Brueggen J. Crocodilians use tools for hunting. *Ethology Ecology & Evolution*. 2013;27(1):74-78.

insects.<sup>37</sup> Tool use is far from a unique trait to *Homo* species. When we can directly observe the phenomenon in animals in the wild today, particularly in those animals we know ourselves to be closely related to, it is safe to think that whatever common hominid ancestor we share with *Pan*, *Pongo*, or *Gorilla* is likely to have made use of them too.<sup>38</sup>

Consequently, we may feel justified in concluding that tool use is nothing special. It does not set us apart from any other beings, past or present- it cannot be this faculty that makes us human- or at least, not this alone. As mentioned, tool use is undoubtedly the driving force behind our evolution into the morally valuable beings we consider ourselves to be- and, indeed, for our ancestors to have done the same, even if they did not consider it in as many words.

Through our ancestors' use of tools to augment their capabilities, they provided themselves with the means to evolve in the manner in which they did; resulting, as it happens, in the primacy of highly developed cognitive function. We could consider this cognitive function something of a self-fulfilling prophecy, providing the means for our ancestors to enhance their own cognition further and so on. As *Australopithecus* developed the duplicate SRGAP2 gene,<sup>39</sup> engendering longer and more functional neurons, it sowed the seed for *Homo* to emerge.<sup>40</sup> *Australopithecus afarensis*, the species of the famed 'Lucy' fossil,<sup>41</sup> existed at the right time to have been behind the oldest stone tool cut marks already mentioned. Lucy's probable descendant *H. habilis*- the 'handy man'- began the widespread use of stone tools, moving beyond the 'found object' tools previously discussed. The use of the upper limbs to manipulate tools regularly is thought to have contributed significantly to the move to true specialised bipedalism- less shoulder stability is needed, which frees the arms for greater ranges of motion to develop.<sup>42</sup> Furthermore, the use of increasingly complex hand tools required increasingly

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<sup>37</sup> Möglich M, Alpert G. Stone dropping by *Conomyrma bicolor* (Hymenoptera: Formicidae): A new technique of interference competition. *Behavioral Ecology and Sociobiology*. 1979;6(2):105-113.

<sup>38</sup> Whiten A, Goodall J, McGrew W et al. Cultures in Chimpanzees. *Nature*. 1999;399(6737):682-685; Panger M, Brooks A, Richmond B, Wood B. Older than the Oldowan? Rethinking the emergence of hominin tool use. *Evolutionary Anthropology: Issues, News, and Reviews*. 2003;11(6):235-245.

<sup>39</sup> Reardon S. The Humanity Switch. *New Scientist (AU/NZ)*. 2012;(2864):10-11.

<sup>40</sup> I have here rather simplified the 'descent of man', which is rife with disagreement and multiple theories. For instance, it is not entirely clear that *H. habilis* and *H. erectus* were not in fact simultaneously descended from a common ancestor, rather than being sequential species.

Spoor F, Gunz P, Neubauer S et al. Reconstructed *Homo habilis* type OH 7 suggests deep-rooted species diversity in early *Homo*. *Nature*. 2015;519(7541):83-86.

<sup>41</sup> Johanson D. Lucy (*Australopithecus afarensis*). In: Ruse M, Travis J, ed. *Evolution: The First Four Billion Years*. Cambridge MA: The Belknap Press of Harvard University Press; 2009:693-697.

<sup>42</sup> Sigmon B. Bipedal behavior and the emergence of erect posture in man. *American Journal of Physical Anthropology*. 1971;34(1):55-60.

sophisticated cognitive capacities to co-ordinate the requisite fine motions.<sup>43</sup> Sharp tools allowed butchery and the skinning of animals,<sup>44</sup> primarily scavenged, which would usher in a critical evolutionary factor. *Homo erectus* was the first ancestor in which we see incontrovertible evidence of the manipulation of fire and of cooking foods.<sup>45</sup>

The controlled use of fire has one immediately obvious advantage; and it is the same reason that campers and outdoorsmen carry fire-making equipment and we still build homes with hearths today (even if the advent of the radiator has mitigated this somewhat). The provision of warmth is one of the most critical survival necessities for any animal, and fire- the most direct means of doing so- significantly reduces the amount of time and effort it takes to attain.<sup>46</sup> The ability to produce and control fire would also have contributed to the spread of ancient humans to cooler climates, and provided protection from night predators.<sup>47</sup>

The cooking of food, though, is likely the most significant factor in the acceleration of cognitive capacity and brain size. Cooking acts as a form of pre-digestion in as much as less energy is required to break down tough fibres and proteins. Consequently, there is more to spare, and this is exacerbated by the increased release of nutrients. For instance, cooking would improve the digestive availability of complex carbohydrates, so for the same amount of food consumed, significantly more energy can be absorbed.<sup>48</sup> This contributed to the growth in brain size and capacity of *H. erectus*<sup>49</sup> in several ways. The first, much as with the provision of heat, allowed much less time- and therefore less energy- to be spent on feeding. An analysis of modern humans suggests that we spend only 4.7% of our time feeding, whereas our body mass and comparison to our close primate relatives would call for nearer 48%.<sup>50</sup> The second is this very provision of energy.

As I have discussed elsewhere,<sup>51</sup> increased cognitive capacities and larger brains cause a proportionally increased drain on the body's energy budget. Being able to provide for this

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<sup>43</sup> Ko K. Origins of human intelligence: The chain of tool-making and brain evolution. *Anthropological Notebooks*. 2016;22(1):5-22.

<sup>44</sup> Pollard E, Rosenberg C. *Worlds Together, Worlds Apart*. New York: W. W. Norton; 2004: 11

<sup>45</sup> *ibid.* 13.

<sup>46</sup> Stone L, Lurquin P, Cavalli-Sforza L. *Genes, Culture, And Human Evolution: A Synthesis*. Malden, MA: Blackwell; 2007: 33.

<sup>47</sup> Wrangham R. *Catching Fire: How Cooking Made Us Human*. New York: Basic Books; 2010.

<sup>48</sup> Leonard W. Food for Thought: Into the Fire. *Scientific American*. Available at: <http://www.sciam.com/article.cfm?id=food-for-thought-into-the>. Accessed September 14, 2016.

<sup>49</sup> Gibbons A. Food for Thought. *Science*. 2007;316(5831):1558-1560.

<sup>50</sup> Organ C, Nunn C, Machanda Z, Wrangham R. Phylogenetic rate shifts in feeding time during the evolution of Homo. *Proceedings of the National Academy of Sciences*. 2011;108(35):14555-14559.

<sup>51</sup> *op. cit.* 1.

higher calorific need- through tool use and cooking<sup>52</sup>- is the basis of an upward spiral or self- fulfilling prophecy. As cognitive function increases it both requires and provides means for improved efficiency of energy intake. The increasing intake provides excess energy, which can be used to improve cognitive capacities. These then require a greater input, and so on. There was, in a sense, an evolutionary pressure to improve technology, which, as I shall show, in turn improved ‘us’.<sup>53</sup>

### 11.5 Technological enhancement vs natural behaviour

It is all very well to say that the actions described above were important in the development of greater capacities in our predecessors; but it may be possible to write these off as animal behaviours with no deeper significance or meaning. One might suggest that their evolutionary ramifications are a mere byproduct no different to that of any random beneficial genetic mutation taking hold, as seen in ‘traditional’ sympatric speciation. If one imagines that an ancient primate group split into subgroups, one of which used stick tools and one of which did not, and the stick-users had some advantage which led to isolation and speciation, this notion makes a certain degree of sense.

A similar concept is prevalent in a certain sector of the enhancement literature. Some thinkers would argue that some actions which bring us benefits and improve our capacities do not count as enhancement- the use of hand tools, as described in the previous section, being a major example. Patrick Lin and Fritz Allhoff give perhaps the neatest example of this argument, saying: “we understand that steroid use by baseball players is a case of human enhancement; we also understand that using a rock to crack open a clam is not”.<sup>54</sup> This line serves to illustrate the key distinction for those who might agree- that there is a significance to artificial interventions over those which could be considered natural. Unfortunately (or fortunately depending upon your views) the reality of this distinction is not as clear-cut as some would like. In order to determine which interventions might be significant, we are forced to ask the following question: what, exactly, is the difference between the natural and the artificial in this context?

Let’s take Lin and Allhoff’s steroids and rocks as they are intended- the product of our highest modern chemical and biological artifice and the most basic, unaltered object

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<sup>52</sup> *op. cit.* 47.

<sup>53</sup> Gibbons A. Solving the Brain’s Energy Crisis. *Science*. 1998;280(5368):1345-1347.

<sup>54</sup> Lin P, Allhoff F. Against Unrestricted Human Enhancement. *Journal of Evolution and Technology*. 2008;18(1):35-41.

imaginable. The differences between the two items are myriad- one takes the application of all our learning to develop, and our sophisticated technologies to produce. Anabolic steroids- performance enhancing drugs- are made possible only by our advanced capabilities and could not feasibly have been manufactured or applied to augment sportspersons before the modern day. A rock, on the other hand, is a common object, which one can pick up almost anywhere on the planet, and is unchanged from those accessible to the Victorians, to the Romans, or to our most ancient primate ancestors. It requires no artifice and only a modicum of finesse or knowledge to utilise a rock to smash a clam.

The implication made is that the rock is natural, and the steroid is not. This may be true, in a strict sense. One is found as-is, and one requires artifice to produce. Consider, though, their effect. Injecting our baseball player with a course of the steroid may improve his strength, his speed, or his endurance. He is now capable of greater athletic feats than before the steroid- he can swing harder, round the bases faster, and work harder for longer (always useful in interminably long games of baseball). Palming a rock and swinging it has its own effect- our clam-fancier can impact the bivalve with a much greater force than with no rock in hand. She can open something that was previously inaccessible- she can perform a feat that previously she was incapable of doing. The rock and the steroid both impart a greater capacity to the user- they have, ultimately, the same effect.

There is no agreement across the spectrum of enhancement literature as to what might actually constitute an enhancement. Leaving aside the perennial enhancement-therapy debate, it remains (and is likely never to cease being) a matter of contention as to whether enhancement technologies must be so-called “technoscientific”<sup>55</sup> interventions- like our anabolic steroid- or whether the definition can be much broader.

Lin and Allhoff, who claim that “tools, diet, exercise and so on... [are] what we would intuitively call ‘natural enhancement...’”<sup>56</sup> are of course in the former camp. This explains their feelings as to the the rock. The European Parliament’s Internal Policies department holds that an enhancement is “a modification aimed at improving individual human performance and brought about by [specifically] science-based or technology-based

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<sup>55</sup> Bostrom N, Sandberg A. Cognitive Enhancement: Methods, Ethics, Regulatory Challenges. *Science and Engineering Ethics*. 2009;15(3):311-341.

<sup>56</sup> *op. cit.* 54.

interventions in the human body”,<sup>57</sup> and further elaborate that: “...Excluded... are improvements of human performance which are realised by the use of devices which are not implanted or not robustly fixed to the body”. Thus, binoculars would not count, but implanted magnifying lenses would.

There is no explanation of this argument offered. Lin and Allhoff for their part rely on ‘intuition’. It seems, then, that the grounds for this viewpoint may be a little thin. The European Parliament document does try to rationalise by telling us that “one could argue [that non technoscientific interventions have] nothing to do with human enhancement at all, but only [amount] to a rather ordinary application of technology”;<sup>58</sup> but again fail to actually deliver this argument. Nor do they explain why the application of science and/or technology to develop external aids is somehow different to similar applications within the body.

They do, however, use an interesting turn of phrase- ‘a rather ordinary application of technology’. This appears to be the key to the viewpoint being espoused- namely, the idea that some technology use is unremarkable. As explored at some length above, we see basic technology (as in the Greek, *techne*- art, skill, or cunning of hand, and *logia*- knowledge<sup>59</sup>) in a variety of animals. Technology, the use of artifice and the knowledge to apply it, exemplified as tool use in particular, is clearly a natural occurrence. Does this render it unremarkable? Perhaps it does, in and of itself, or perhaps it is more to the *effects* of this natural process that we should look to determine significance.

As discussed, in hominid evolution the use of natural tools no different from those which critics would dub ‘ordinary’ proved a key factor- possibly even the most important. The (extremely long-term) effects of this ‘natural’ technology were to elevate us to the intellect and capacities we pride ourselves on possessing, uniquely among species. One might be justified in considering this significant.

Where a tool is “a device or implement...used to carry out a particular function... a thing used to help perform a job”,<sup>60</sup> we may struggle to think of any technology- advanced

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<sup>57</sup> Coenen C, Shuijff M, Smits M et al. *European Parliament Science And Technology Options Assessment: Human Enhancement Study (EP STOA)*. European Parliament Directorate General For Internal Policies Department A: Economic And Scientific Policy. Brussels; 2009.

<sup>58</sup> *ibid*

<sup>59</sup> The ancient Greek as understood by this author.

<sup>60</sup> *tool* in Soanes C, Stephenson A. *Concise Oxford English Dictionary*. 11th ed. Oxford: Oxford University Press; 2006. 1518, emphasis added.

technoscience or an ape's stick for collecting ants<sup>61</sup>- that does not fulfil this description. Performing a task requires capacity. Tools are, by definition, a means of providing this capacity- capacity we do not possess without them. Where it is possible for us to break a stick with our bare hands, or to climb a wall, it is not possible for us to fell a tree, or to cut meat. These latter tasks require our capacities to be increased, through the use of a tool.

Though the particulars of what constitutes enhancement are up for debate, all comers agree that an enhancement would improve our capabilities or experience in some manner.<sup>62</sup> This most basic requirement is telling. It seems difficult- even futile- to argue that the effect of a prosthesis, or a computer implant, even an injection altering one's biochemistry would have a greater, or more lasting impact than those we have discussed above.

It is strange to consider technoscience as enhancement if these natural tool uses are not, and indeed Lin and Allhoff admit in a later paper that "the natural-versus-artificial distinction... may prove most difficult to defend given the vagueness of the term 'natural.'"<sup>63</sup> Arguably, we have gained far more from them than from the promised benefits of cognitive drugs, or cyborg implants. As I have endeavoured to make clear, without these 'natural' processes we would very likely still be much closer to our cousin the chimpanzee. It is probable that we would not possess many, even any, of the faculties and traits which we pride ourselves on, which we hold as what make us human. If we, as we exist today, are the only beings worthy of personhood then it is almost certain that without the enhancement provided by these basic tools, these 'ordinary' behaviours, we would not be persons.

The technoscientific, radical intervention type of enhancement technologies that are (rightly) the focus of most debate promise us great things. All our capacities are potentially available to be augmented, from physical to cognitive; and it may well be with the advent of genetic science that we are able to give ourselves wholly novel abilities. It is increasingly likely that these changes could be made to the germline,<sup>64</sup> altering our offspring and potentially the future of our evolution into the bargain. Some argue that it will go so far as to create new species, rivals for *Homo sapiens*. Are they to be feared, or

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<sup>61</sup> van Schaik C, Fox E, Sitompul A. Manufacture and Use of Tools in Wild Sumatran Orangutans Implications for Human Evolution. *Naturwissenschaften*. 1996;83(4):186-188.

<sup>62</sup> Bostrom N. A Short History of Transhumanist Thought. *Analysis and Metaphysics*. 2006;5:63-95.

<sup>63</sup> Allhoff F, Lin P, Moor J, Weckert J. Ethics of Human Enhancement: 25 Questions & Answers. *Studies in Ethics, Law, and Technology*. 2010;4(1).

<sup>64</sup> Olson S, Committee on Science a, Affairs P, National Academies of Sciences a. International Summit on Human Gene Editing: A Global Discussion. *Ncbi.nlm.nih.gov*. 2016. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK343651/>. Accessed September 17, 2016.

embraced as siblings? These changes have every chance of being hugely significant, changing who we are and how we live.

Compare, though, these changes against those we have already experienced. The potential augmentations we could see in the near future- or even that we have access to today- pale in comparison with the gulf between modern *Homo sapiens* and his ancient hominin predecessors. The very fact that we are in a position to even conceive of these ideas speaks volumes- one suspects that *Homo habilis* had less lofty hopes for her or himself. It is these dreams, though, that are the key. We today imagine augmenting and enhancing ourselves to eradicate disease, to ensure a fairer world, to enable ourselves to reach ever greater heights of cognition, whichever side of the debate one falls upon, it cannot be denied that we wish to better ourselves.

Ancient humans almost certainly had this same desire. Less eloquently stated, perhaps- even, if we go back far enough, probably sub-conscious. Regardless, the activities- particularly tool use- that we have discussed herein are means of improving the actor's lot. My life is improved if I can butcher meat with a stone hand-axe, or warm myself at a fire. My capacities are improved by these acts- over time- to the point that new, more advanced and able species arise. Had there been (conservative) bioethicists amongst the palaeolithic denizens, would they be espousing the same fears of their successors? The situations are not so different.

### **11.6 I enhance therefore I am**

So to what do these thoughts lead us? If we recognise the nature of our development up to- and probably beyond- *H. sapiens* as being a product of the use of enhancement, and hold that *H. sapiens* is a morally valuable being, then we have a glaring contradiction to explain away if we want to stick to the idea of enhancement as necessarily unnatural. Alternatively, we could simply embrace it. Our nature as moral beings, as persons, and as members of the human community of value all stem from the use of enhancement technologies- technoscientific, natural, and anthropological behaviours alike. I enhance, therefore I am. This holds true for the entire gamut of our existence- from ancient ancestor to potential beings who might succeed us. It follows that we must therefore exist on a continuum of sorts. As discussed earlier, ancient humans would, and should, probably be treated as our moral- if not cognitive- peers, and I have elsewhere argued for the same

with regards to the types of novel person we are likely to encounter in the future or indeed which we might encounter from other sources, such as conscious AI.<sup>65</sup>

This ‘human continuum’ can be a means of placing ourselves in context, and perhaps more importantly a means of understanding what lies ahead by virtue of being able to recognise the path we have taken. Where we are likely to shape the future- and it is now increasingly recognised<sup>66</sup> that we have entered a new epoch, the Anthropocene, in which the world is shaped by man rather than nature- we must not forget that we are ourselves products of past beings. Their actions and technologies have engineered us just as we will (more deliberately) engineer our successors, whoever and whatever they may be. This remains the case on a smaller scale. Consider the aforementioned *Omo* man- a *Homo sapiens sapiens* like us, and a person like us- and the gulf between our values and experiences. Consider too the Roman citizen, much closer to us temporally but still with many societal and moral differences- and yet so influential on who we are today, how we live our lives and what we accept as part of the human experience. Both these persons (and their peers) could be thought primitive in different ways, but their uses of such technology as was available to them drove the development of what we recognise as human, and what traits we see in ourselves as making us so. It is undoubtedly the case that in 2000 years whatever beings exist to consider themselves to be human will look back upon us as limited beings, with comparatively primitive technologies to their own; but they too will be able to see the line from our development of genome editing, or implantable computing, or powerful exoprostheses and their own embodied existence and values.

Human enhancement technologies is a phrase perhaps born of convenience, describing the tools by which we augment our capacities, but it is also correct in another sense. Not only do these technologies- broadly conceived- improve the abilities *of* humans, but they expand what is *to be* human. Contrast this idea with that of conservative commentators, who would hold that radical technology use will make us something other than we are, other than human. The present author is a child of the internet age, but even I possess abilities through technology today that are beyond my imagining as a younger person. That becomes exponentially more so if we consider older living generations. It is difficult to think of the changes in personally enhancing technology over the last twenty or thirty years- even the last decade- as being anything short of tremendous, and yet here we

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<sup>65</sup> *op. cit.* 5.

<sup>66</sup> And on the day of writing has been formally presented to the appropriate authorities to be adopted. Carrington D. The Anthropocene epoch: scientists declare dawn of human-influenced age. *The Guardian*. 2016. Available at: <https://www.theguardian.com/environment/2016/aug/29/declare-anthropocene-epoch-experts-urge-geological-congress-human-impact-earth>. Accessed September 16, 2016.

remain: ourselves. I still consider myself to be human, and no doubt I shall do until the day I die, whatever strange technologies I have incorporated into my life at that point. I will remain as morally valuable as the Roman citizen, I will remain within the same community as *Omo*, even as *H. erectus* and perhaps *H. habilis*. The chain between these beings is technology, and the use of that technology to improve our capacities. As these capacities have improved the conception of exactly what it is to be ‘human’ may have expanded- it’s likely we have a rather more subtle idea of our community of value than did *Omo*- but it remains the case that we, and our ancestors, would each consider ourselves human (or whatever proto-linguistic term was once used for the same). It is natural to fear the new, but that does not make it right. The wisdom of repugnance would be cold comfort had our *Australopithecus* forebears managed to kill off their smarter mutant brethren. We would not be here to have these discussions if *H. habilis* had not improved their lot in life and, gradually, their capabilities.

These enhancing technologies, of whatever type (if one chooses to divide them), are the sole reason we have come to exist, and the key reason that we are persons. The questions we should be asking are not ‘what might go wrong’ and ‘why would we want to stop being human’, but rather ‘where might we go’ and ‘what else might be human’. Ancient hominids, modern man, and the beings of tomorrow stand together in this as part of a human continuum wherein enhancement is essential for continued development. There is no reason to expect that to break.

# **PART III**

# **CONCLUSION**

## 12.0 IN REVIEW

The principal and original argument advanced in this thesis is that enhancement is an inherently human act, and that humanity is necessarily a product of the use of enhancement technology in its many guises. In addressing and developing this argument I have advanced a number of complementary conclusions regarding what I have referred to as ‘novel beings’, in particular with relation to ‘post-humans’, artificial intelligences, and androids. Namely, that there appears to be every reason to assume that these ‘others’ are capable of personhood; and further that there is no good reason to treat them in any other fashion than we would do anything we would consider ‘human’. In some cases the ‘novel beings’ seem likely to fulfill the human ideal more successfully than can *Homo sapiens*.

Although the final paper- the previous chapter- provides a culmination of the themes of the thesis, in this concluding Part it is valuable to review the common threads that have been gathered throughout this work, as well as these secondary conclusions. These include the need to divorce our thinking of the ‘human’ from *Homo sapiens*; the relationship between moral peerhood and community; the importance of motive in determining the nature and moral value of a being; as well as why specificity and rationality are the most important tools in any ethical debate attempting to influence policy.

Before doing so, however, I present a brief review of the structure of the thesis and the basis and need for the aforementioned arguments.

### 12.1 Presentation of Thesis

The conclusions referred to above are largely drawn from the seven papers in **Part II** that form the core of the thesis. However in order to explore and present novel argument one must first ensure the background is solid. Thus, in **Part I**, I set out a number of the assumptions, arguments, and debates key to understanding the current state of bioethical human enhancement research; and justified the positions I inhabit with regard to these. This is a key undertaking- by making clear my stance at the outset I am then able to move beyond the debates that presently occupy the field. My responses to these assumptions are discussed briefly below. **Part I** included material drawn from a peer-reviewed, sole authored paper<sup>1</sup> published before I embarked on this doctoral thesis and deriving from my

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<sup>1</sup> Lawrence D. To what extent is the use of human enhancements defended in international human rights legislation?. *Medical Law International*. 2013;13(4):254-278.

LLM dissertation. It was that paper and my earlier Masters degree that triggered my interest in enhancement. **Part I** also lays out the particular research questions to be addressed, and why it is that they warrant such attention; whilst making clear the nature of the overall case to be built upon them- i.e. that enhancement is a primary facet of what it is to be human.

**Part II** of the thesis is the main body of the work, in the form of six peer-reviewed articles presented as they were accepted for publication and one article presently under review. The articles available at the time of the submission of this thesis can also be found in their published forms in the **Appendices**. The aim of **Part II** is to present the arguments of the thesis and in so doing to answer the main research questions set forth in Part I, which will be reviewed below. To accomplish this, the papers are included in an order which allows themes to build and issues to illustrate one another, before culminating in the aforementioned final paper, *Amplio, Ergo Sum*. The themes will be further explored below, as well as the individual findings of the papers included. The papers were written for their own merits and arguments as well as with the intent of being combined. The nature of a thesis by publication lends itself to including a thorough review in order to make explicit the links between papers and furthermore the manner in which they combine to provide a cohesive argument.

## 12.2 Research Questions

The title of this thesis- *Persons, Humans, and Machines: Ethical and Policy Dimensions of Human Enhancement Technologies*- is a descriptive one. It encompasses all the elements contained herein and proclaims them as a collective endeavour, rather than itself posing a question. As mentioned above, the aim of the thesis is to present an original case to argue that the use of human enhancement technology is, has been, and will continue to be an essential element of what it is to be human. Furthermore, that what we consider to be human is a direct product of the use of enhancement; and so to continue to use these technologies as they expand in scope is simply a continuation of our development and not a turning point whereupon we risk becoming something ‘other’. To be concise, the thesis aims to evidence the statement “I enhance, therefore I am”.

The route to doing so was provided by the research questions set out in **Part I**, namely: what does enhancement technology mean for the human, what it can do for the human, what has it done for the human, and what will become of the human. By answering these

questions the peer-reviewed articles included in **Part II** build a case for rationally considering the effects which new enhancement and related technologies will have on our persons and on our society. Through this rational approach, I have been able to reconsider the common bioconservative argument against the so-called ‘posthuman’ and in favour of maintaining the status quo. These questions necessarily produce answers pertinent to ethics and policy, and illustrate the considerations we must give to both in regard to enhancement and related technologies.

Human enhancement technology is the focus of widespread debate within bioethics, medical law, and other related disciplines. However, those debates which I recap in the following section **[13.0]** are broadly focused on the ‘enhancement technology’ element of the phrase despite in some cases purporting to address the nature of humanity. Where Fukuyama and others proclaim that we risk losing our humanity, they- apart from generally failing to explain why this would be the case- do not explain what this would actually mean for us. They focus, instead, on why they believe technological enhancement would be a mistake, or what other beings might be created. To address the ‘human’ aspect of human enhancement, they would need to offer reasons why they consider that humanity is so important, and indeed what they consider that humanity to be; to say nothing of why they believe any of their feared outcomes actually put *Homo sapiens* at risk instead of simply existing alongside us. The research questions in this thesis, and the overall ethos of the work contained herein, is quite the opposite. Rather than asking what effects the technologies discussed are likely to have in and of themselves, I use the questions as a cumulative means of addressing various aspects of the experience of being human in a world where those technologies are feasible. This idea comes particularly, though not solely, to the fore in the sole-authored papers *The Edge of Human: The Problem with the Posthuman as the Beyond* **[9.0]**; *More Human Than Human* **[10.0]**; and *Amplio, Ergo Sum* **[11.0]**. These articles in particular frame the human as being a concept divorced from any specific species or being, and thus able to include and refer to sapient consciousnesses of other origins; and it is this idea (discussed more thoroughly below) that is brought out most uniquely by the final core research question of what will become of the human.

The preceding papers illustrate the need for the research questions and the conclusions that ultimately stem from these. Collectively these four papers, building on the background provided in **Part I**, demonstrate that rational consideration is desperately required for individual enhancement technologies rather than the generalised fears presented by critics. These papers also address several of the research questions directly, most notably

‘what enhancement can do for the human’ and ‘what enhancement might mean for the human’, by highlighting particular technologies and interrogating them with regards not only to their potential direct effects on us but also their implications for the ways in which we value ourselves as humans and as persons.

The contributions of each paper will be discussed further below in the thematic overview [14.0], but it will be valuable first to review the arguments and positions I take as read to provide foundation for these papers, and the rationales on which these were based.

### 13.0 ADDRESSING DEBATES AND PROVIDING ASSUMPTIONS

As I have shown, the enhancement debate encompasses a large range of individual disputes; it is not so simple a question as to be in favour of or against in totality. In **Part I**’s ‘Key Debates In Enhancement’ [3.0] I dedicated discussion to a number of these points of contention in order to found my later arguments; namely how I choose to define enhancement, why I believe there to be sound reason and rights to enhance, and the relationship between enhancement and medicine, particularly the therapeutic divide- which I argue are one and the same. I also explored four archetypical bioconservative stances and pointed out that all of these are somewhat lacking. Presenting my stance on these debates has a manifold purpose. The literature on enhancement is extremely broad, and the nature of the thesis as being largely constructed of peer-reviewed works, with their respective publishing constraints, limits my ability to explore fully the many issues one must understand for any given paper in that paper itself. Instead, setting out my assumptions, as recapped below, makes for a strong basis from which the ideas in the published articles can grow, without detracting from their individual focuses. Another important reason for doing so is to instantiate what is missing in the academic literature at large: whilst many authors both pro- and anti- enhancement claim to engage with the deeper implications and meanings for us as beings that the technologies will have, they are broadly concerned with whether we should or should not use them. This gives some cause to the development of the research questions and need for the work presented in this thesis, as I discuss below, allowing us to move into more interesting questions of what a resolution to that argument would actually mean.

### 13.1 Archetypical issues

I presented in [2.3] four key issues frequently raised by critics of enhancement- the ‘inhuman’, the ‘superior being’, the ‘commodified body’ and the fear of eugenics.

The first of these, the idea that altering and augmenting ourselves will cause us to lose our humanity, is pervasive. Those who hold this view, such as Francis Fukuyama whose vociferous argument in his well-known work *Our Posthuman Future*<sup>2</sup> is commonly cited, suggest that some nebulous quality that is key to making us who we are will be eradicated by the application of enhancement technology to the human body. Note that this view relies on- and usually goes hand in hand with- the idea that enhancement is necessarily technoscientific, which I will review below. I use the term nebulous here because few, if any, critics even attempt to give an account of what this quality actually might be. This is one reason behind the need for the particular case being argued by this thesis, as recapped in the next section of Part III; that if we consider what exactly this quality is and where it stems from, I present that it is in fact enhancement itself. Consequently I would suggest that fearing the loss of humanity through the very mechanism that produced humanity as we know it is not a reasonable fear.

The second major argument, the fear of the ‘superior being’, rests on the idea that any being enhanced sufficiently would necessarily be of a different (and higher) moral status to *Homo sapiens*. This is often referred to as the ‘posthuman god’, even by advocates of enhancement, because there is a perception that a being of such power and ability would no longer recognise us as its peers. The reason that this is seen as a negative, as something we ought prevent, is that it could follow that a being beyond us in this way would have, effectively, a licence for cruelty to us- it could destroy us or control us with no concern for our welfare. This is an interesting notion- it seems to wilfully ignore our own status on the moral hierarchy as it presently exists. We are the top of the present arrangement, and yet we see ourselves as having a moral duty to those creatures of lower status than our own. It cannot be argued that great wrongs have not been done to animals and indeed to others of our own species that have been falsely seen as having a lower status; but we are generally agreed that such behaviour is unacceptable (and criminal). We protect lower orders of being ourselves- think only of the World Wildlife Fund, the Royal Society for the Prevention of Cruelty to Animals, or any one of a myriad organisations and legal entities which protect non-human animals. There is no reason to assume any other superior being to ourselves would ignore this same moral feeling (and

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<sup>2</sup> Fukuyama F. *Our Posthuman Future*. 1st ed. New York: Farrar, Straus and Giroux; 2002:101-102.

accord us treatment commensurate with our moral status, ie. above that of non-person animals), particularly if they were of a higher moral capacity. This argument against enhancement relies on the pure conjecture that a superior being would necessarily be malicious.

I next highlighted fears of contempt for the flesh and of technological injustice- that those who are well provided for and already more free and able to enjoy the benefits of technology will widen the gap between themselves and those who cannot afford to enhance themselves. This is a particularly valid fear- distributive justice is a problem for which there are few easy answers. In the case of technology, however, it may be that it is a necessary evil. Where bioconservative critics herald the segregation of society into haves and have-nots on enhancement, it must not be forgotten that this situation exists in all walks of life- not that this excuses the matter. However, particularly in the case of high technology, there is no reason to think that this situation would come to be. Rather, we can take examples of other technologies that are presently ubiquitous in our society, such as the mobile phone- only two decades past these were very expensive luxury items, used as status symbols as much as for the (then-negligible) benefits they brought. Today, they cost as little as £5 and are in use in the poorest parts of the world, enabling communication with great ease between almost anyone on Earth.<sup>3</sup> This dramatic increase in accessibility would not have been possible if not for the commodification of the technology- there is every reason to assume that competition would drive down the barrier to entry for enhancement technologies as well.

The final basic archetype mentioned was the argument against eugenics. The anti-enhancement view is that the desire to improve the human is overly reminiscent of the rationale behind historical atrocities, particularly under the ideology of the Third Reich; and that there is the risk of developing a genetic divide which cannot be overcome through market forces as above. This argument is on the one hand quite credible- a child born with enhanced cognition is likely to have advantages over one who is not. However, eugenics and the desire to improve the species does not have to be a negative concept, wherein the ‘undesirable’ are downtrodden. Rather, I advocate Agar’s ‘liberal’ form; wherein he argues enhancement can be used with the intent of eradicating disadvantage, whether through disease or otherwise, by creating a level playing field.<sup>4</sup>

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<sup>3</sup> Cell Phones in Africa: Communication Lifeline. *Pew Research Center's Global Attitudes Project*. 2015. Available at: <http://www.pewglobal.org/2015/04/15/cell-phones-in-africa-communication-lifeline/>. Accessed February 17, 2017.

<sup>4</sup> Agar N. *Liberal Eugenics*. New York, NY: John Wiley & Sons; 2008.

## 13.2 Definition and Scope of Enhancement

The most fundamental issue is that of the nature of enhancement. I have presented an argument as to what, exactly, human enhancement means and the scope of what counts as enhancement.

Existing literature offers a complete spectrum of definitions, from the wholly open and accepting of all scientific, hi-tech, low-tech, temporary and anthropological factors to the extremely narrow wherein only implantable or otherwise permanent physiological modifications to the human body are counted. This extremely broad variance in understanding is somewhat problematic for the field, in as much as it will at the least lead to debate at cross-purposes. Consequently providing and making clear my own understanding of enhancement is a fundamentally important task. I did so by evaluating examples of the two ends of the scale, embodied in the narrow definition used in the European Parliament's Scientific and Technological Options Assessment<sup>5</sup> and in that much broader conception separately used by Buchanan<sup>6</sup> and Harris.<sup>7</sup>

The first of these stipulates that human enhancement must be a techno-scientific intervention aimed at improving the performance of the individual. It expressly precludes any device such as eyeglasses which are not a permanent fixture, and in line with other commentators it declares that no other factors such as education can be counted. I give several arguments against this understanding.

For example, it seems unreasonable to exclude any process other than hi-tech interventions from counting. As is discussed at length in [11.0] *Amplio, Ergo Sum*, tool use is fundamentally a means of improving and increasing our capacity to perform a given task. It is not clear what significance there is in a device or process being physically attached to or incorporated within the body- an enhanced strength prosthetic arm muscle used for breaking a block does much the same job as a hammer.

An argument in favour of this view, particularly in regard to what I term ‘anthropological’ factors such as education, physical training, and exercise, is that this does not provide a novel potential for the individual- the ability to gain capacity in these ways was already

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<sup>5</sup> Coenen C, Shuijff M, Smits M et al. *European Parliament Science And Technology Options Assessment: Human Enhancement Study (EP STOA)* European Parliament Directorate General For Internal Policies Department A: Economic And Scientific Policy. Brussels; 2009.

<sup>6</sup> Buchanan A. *Better Than Human: The Promise And Perils Of Enhancing Ourselves*. Oxford University Press; 2011:5.

<sup>7</sup> Harris J. *Enhancing Evolution*. 1st ed. Princeton: Princeton University Press; 2010.

present within them. However, there is significant scientific evidence to suggest that these actions- particularly education- cause the development of definite physiological changes which in turn alter the method by which the ‘inherent’ processes take place. In other words, the so called natural potential only exists through virtue of the means of enhancement: it is not significant that it exists but lies dormant. Again, this is particularly evident in education and cognitive enhancement- literacy and numeracy, apart from being a result of a gain in capacity themselves, are the means by which one is then able to continue cognitively self-enhancing.

Furthermore, I argued that excluding non-invasive and non-permanent processes would mean denying the proven attributes of many common socio-cultural practices, the most obvious of which being the consumption of caffeine.

As such, I determined that the most useful and appropriate definition under which to labour was the polar opposite, that occupied by liberal bioethicists such as Harris; who lists such processes as:

[s]helter, learning and teaching, tool using, body decoration, clothing, gathering and hunting, cooking, storing, co-operation, cultivation, animal taming and domestication, farming, social living, language, education...<sup>8</sup>

as being enhancements, providing benefits and advantages to our abilities and capacities throughout history.

This broad and progressive attitude to the scope of enhancement is important to the nature of this thesis. Without it, any technology considered would have to be wholly future-focused or at the very least current and experimental, in order to match narrower definitions. Disregarding all of the wider factors and existing (and past) technologies and developments included in the broad understanding would almost entirely preclude an analysis of the human as being fundamentally enhanced. As such, this would undermine the core concept of analysing the meaning and the nature of what it is to be human and rather focus solely on the effects of the technology.

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<sup>8</sup> *ibid.* 13

### 13.3 Relationship of Enhancement and Medicine

Despite the above rationale, it remains the case that many if not most, of the more visible and certainly the most discussed forms of enhancement are biomedical in nature and are the products of sciences closely allied with medical research. Frequently they are the byproduct of drugs developed for therapeutic reasons.

The key issue in this relationship that is the root of widespread debate in bioethics is the so-called ‘therapy-enhancement’ divide. The two broad schools of thought in this area disagree on the idea that there is a significant distinction to be drawn between interventions that treat a condition, or more pertinently restore a function; and those which either grant a new function or bring an existing one to a new height. These views line up, roughly speaking, with the conservative and liberal camps of bioethicists, the latter of whom argue that there is no practicable difference.

The argument of those who see a division is that enhancements must necessarily provide capacity- or health- beyond what is normal. This normal is also referred to as “species typical”, by way of suggesting some kind of average level of health. I have argued that this concept is deeply flawed because it relies on something which cannot be defined or fixed. The concept of a nominal level of health is fundamentally unworkable- what is peak form or even just ‘not ill’ for one person is likely to be different to that for anyone else, and even in ideal circumstances with perfect diets and other provision, race and age would engender significantly differing norms. As Buchanan argues, “a ‘well’ elderly person... has stiff, painful joints, reduced libido, compromised mental functioning, and poor physical stamina.”<sup>9</sup> Clearly this would be classed as sub-optimal in a 25-year-old.

Furthermore, where a therapy is seen as a means of restoring this species-typical function and is therefore specifically a method of treatment which cannot be an enhancement, I level a similar criticism. This view assumes that the individual concerned is not enhanced by the return to a higher state of health- which seems counterintuitive. Where the therapy is the only means by which a capacity is regained- let us say the use of a limb- then it is necessarily an improvement of the body (to use the conservative view of enhancement) to grant that. There is no clear reason why enhancement cannot be a relative concept. Just as I am enhanced if I am given superpowers when compared to my present state of

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<sup>9</sup> *op. cit.* 6. 174.

'species-typical' ability, I am also enhanced if I am raised from disability (in whatever form) to 'species typical'.<sup>10</sup>

Finally, I presented the case of vaccination ([3.3.1]) by way of a further justification for my view that it is untenable to argue that therapy and enhancement are separate phenomena. Vaccination is a prophylactic therapy with the effect of inducing a species typical immunity level in the recipient. However, it is also demonstrably providing an immune capacity that the subject did not previously possess. There seems to be little difference between achieving this aim by needle and bacterium or by genetic engineering.

### 13.4 Access to Enhancement

The final major assumption I addressed was that of a right to enhance. While it is the case that, as mentioned, enhancement- or more specifically techno-scientific enhancement- is unlikely to be justly distributed, at least in the near future, it is reasonable to think that all should be entitled to equal access (regardless of whether this access can actually be realised in practice). This idea is important to the thesis because it provides reason to believe that we will continue the continuum of enhancement being an essential element of what it is to be human.

To found this notion I appealed<sup>11</sup> to two fundamental human rights, acknowledged in multiple legislative documents: the right to health, and the right to access the benefits of science.

The first of these is found in constituent documents of the International Bill of Human Rights (IBHR)- specifically Article 12.1 of the International Convention of Economic, Social, and Cultural Rights (ICESCR) and Article 3 of the Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine (known as the Oviedo Convention)- and more besides. These documents variously support a right to enjoy health of the highest attainable standard, which I link with the previous discussion of the inseparability of enhancement and medicine. A right to healthcare necessarily invokes enhancement to some degree, through improving the state of the body.

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<sup>10</sup> Note that this is not assuming a value judgement of enhanced being necessarily 'better' in a moral sense.

<sup>11</sup> in section [3.4]

The second, the right to benefit from science, is presented in Article 27 of the UDHR, Article 15 of the ICESCR, and the preamble of the Oviedo Convention. These, and in particular the latter, provide that advances should be used to the advantage of present and future peoples, and to improve their lives. I would suggest that this idea is the fundamental one underlying the concept of human enhancement.

The arguments laid out in section [3.0]<sup>12</sup> make plain that these human rights defend the use of enhancement, and that access to them ought not be denied in the ways that typical bioconservative argument would have us do.

## 14.0 PRINCIPAL ARGUMENTS

### 14.1 Essential Enhancement

This theme is the key to the case being presented across the entire thesis. To utilise enhancement technology is one of- if not *the*- most human act possible. It is essential to our very nature that we are enhanced, and it seems foolhardy to attempt to prevent our future growth by forbidding that which makes us who we are.

*The Edge of Human: The Problem with the Posthuman as the Beyond* [9.0] addressed the so-called ‘posthuman’ as it is invoked by certain bioconservative commentators, and the manner in which they present it as the subject of fear and as something to be prevented.

Although there is a general failure to define their usage of it or their assumptions about it, most critics mean ‘posthuman’ as a term of ‘othering’. Bioconservative thinkers tend to agree on the idea that the creation of these others is necessarily a path to the human being overtaken by our progeny (which are implicitly seen as being not human), and is something that we ought to try to avoid; though there are those more liberal who are less fearful. In any case, all seem to fall in line with the notion that whatever is ‘post’ must be a successor to our own species, something beyond our present experience or knowledge. One line of argument frequently made that is particularly relevant to the themes of this thesis is the idea that enhancement is a necessarily unnatural and therefore counter-human act, and that anything that surpasses *Homo sapiens* cannot be human. It rests upon a known- and basic- logical fallacy: an appeal to nature. If we actually apply the

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<sup>12</sup> and expanded upon in Lawrence 2013- *op. cit.* 1

aforementioned viewpoint, then there are many public figures (such as record-breaking athletes) who we could no longer count as human.

The third and most relevant argument presented in section [9.0] against the posthuman as being the beyond relates to the concept of the human as an ideal we hold about ourselves. Self-betterment in pursuit of this ideal is a major driving factor behind all our daily activities, both survival related and not; and this unending motivation has shaped who we are and how we see ourselves. The argument is made here that the means by which we give action to this motive is through enhancement of our capacities and experiences. In short, that enhancement is the means by which we render ourselves human. This argument is a key point: that it is impossible to be ‘beyond’ human (in the only sense that appears to be significant)- to fulfil the human ideal more thoroughly than can the mere ‘human’ does not make the ‘posthuman’ something other.

Furthermore, one of these very ideals is enhancement itself: not only have we always desired to augment ourselves- for example always seeking new abilities, or to read minds as in *Hot Baths and Cold Minds: Neuroscience, Mind Reading, and Mind Misreading* [7.0], but we have ever sought to improve our lot. The means by which we have achieved this are, by the definition discussed earlier, necessarily human enhancements. In pursuit of gaining ability and capacity, we have enhanced ourselves through the use of tools, technologies and a range of other factors. We do so today by using computers and smartphones to access information we otherwise could not, by using central heating to stay warm when otherwise we would need to expend valuable energy, and by using vehicles to travel long distances in short amounts of time. Throughout history, the use of stone tools, of fire, and other factors have been instrumental in improving the capacities of our ancestors. These enhancements directly contributed to the evolution of these hominid species one to the next by causing morphological adaptation and providing easier access for energy to fuel expanding brains, until *Homo sapiens* emerged. There is no reason to think that our species is the endgame of evolution, and no reason to think that the ways in which we enhance our capacities today will not continue to have the same effects on us as in prehistory. The continuum of enhancement as a vital part of human existence continues, and our present situation is merely another link in that chain.

The final paper in the thesis is the culmination of this idea and that of enhancement being essential to human nature. *Amplio, ergo sum* [11.0] builds on the theme to argue that our status as persons and as humans is a product of the use of enhancement technologies. Palaeoanthropological evidence supports the idea of ancestor species such as *Homo*

*erectus* as possessing cognitive faculties greater than those of animals we consider borderline persons today. The evidence also suggests that *H. erectus* and other species fulfilled all the necessary elements of personhood, i.e. moral agency, narrative, and self-awareness. Where personhood is a key constituent of humanity this makes it entirely likely that our ancestor species would qualify for membership of the human community.

The second part of the paper examines the means by which this ‘human chain’ has been forged and establishes the nature of technology as essential. Further evidence highlights the contributions of technology and tool use to the specific mechanics of evolution from one species to the next within the genus *Homo*, including the effects of fire and cooking food on physiology through the increased availability of energy. This latter also had a significant effect on cognitive capacity as it made provision for the support of larger and more complex brain structures. The use of these processes and the gains in ability through them were a reciprocal arrangement causing an upward evolutionary pressure to require the development of new technologies.

There are criticisms by Lin and Allhoff, among others, that natural processes and tool use do not count as enhancements.<sup>13</sup> However, those who present this view do not seem able to offer justification beyond intuition. There is an idea that tool use is an ordinary behaviour and therefore unremarkable, but it is these ordinary behaviours that have driven our evolution into the complex human persons we pride ourselves on being. The degree of change and advancement from *Sahelanthropus* to *Homo sapiens sapiens* cannot be honestly described as unremarkable and so I argue that it is wrong to describe natural processes as less significant than highly technological ones which have at present had far less impact. While it is the case that ‘technoscientific’ enhancements are the products of artifice and the application of knowledge, that does not render their use more consequential than the use of a stone as a cutting tool or blunt instrument. They may require more effort to attain and even produce larger or more efficient results, but ‘artificial’ and ‘natural’ enhancements both accomplish the same task, which is to augment our capacity to perform a given act. The significant factor is effect and not origin; and the effect of natural enhancement has been to provide us with our personhood and the elements of humanity.

Where we recognise a ‘human continuum’ we cannot deny that it is enhancement technology that has brought that into being and which allows us to continue upon it. The

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<sup>13</sup> Lin P, Allhoff F. Against Unrestricted Human Enhancement. *Journal of Evolution and Technology*. 2008;18(1):35-41.

promised futures of modern technoscience are an extension of this continuum: technology will continue to shape what it is to be human. Technological advances have not made us consider ourselves morally any more or less valuable than our *H. sapiens* predecessors decades, centuries or millennia past, and there is little reason to assume that our enhanced progeny will feel any differently about us.

## 14.2 Humanity vs *Homo sapiens sapiens*

Another key argument made is that it is a mistake to conflate species and what we refer to as ‘human’. Though this point is most expressly made in the articles *The Edge of Human: The Problem with the Posthuman as the Beyond* [9.0] and *More Human Than Human* [10.0], it is one that has echoes elsewhere throughout the thesis. Section [8.0] opens with and is named for Shylock’s famous “If you prick us, do we not bleed” speech from *The Merchant of Venice*,<sup>14</sup> for it sums up precisely the instinctive reasons we might have for providing paradigmatic persons of origins other than our own with the same respect we would another of our own species. We assume, naturally, that we would be morally bound to respect personhood and reject speciesism (or ‘bioism’ as it may be), and would hope that this would be reciprocated.

The argument rests on the idea that what is commonly referred to as the human is a more significant and complex construct than something that can be conflated with taxonomic species. All too frequently do thinkers construct cases that suggest we will cease to be human if we undergo enhancement or make use of the related technologies. They generally term whatever it is we would become the ‘posthuman’. Having investigated this concept the only unifying feature in all the different usages of it seems to be that it refers to a being beyond the ‘human norm’; but this norm is undefined much in the same way that it is used to justify the separation of therapy and augmentation. The implication here is that there is an average- or a species typical level- for what it is to be human, and so therefore humanity must be closely tied to that species and what is typical or average for that species. Straying too far beyond that species norm would render one no longer human, or post-human. Per Bostrom,

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<sup>14</sup> Shakespeare W. *The Merchant of Venice*. In: Proudfoot R, Thomson A, Kastan DS, eds. *The Arden Shakespeare, Complete Works*. Walton-On-Thames: Thomas Nelson and Sons; 1998, at 842–3.

[i]t is sometimes useful to talk about possible future beings whose basic capacities so radically exceed those of present humans as to be no longer unambiguously human by our current standards. The standard word for such beings is “posthuman”.<sup>15</sup>

The main meanings that we usually ascribe to the word ‘human’ can put the lie to this view. The biological is the least significant of these ways that we refer to the human. Others more valuable include a community based on recognition of a certain moral status consistent with personhood but not exclusive of those who do not possess it *but for*, and humanity as a collection of ideals held about the self about what are good and valuable traits and characteristics to possess (which is reviewed as part of the above theme). If the viewpoint above is accurate, a ‘posthuman’ must be the ‘beyond’ of one or all of these meanings.

Species does not confer a monopoly over the elements of personhood, and thus cannot monopolise the categorisation as human. It does not therefore seem to matter if a being still qualifies as *Homo sapiens* if it is able to qualify as part of that moral community, or possesses similar characteristics to those we strive for as part of the human ideal. We frequently use ‘human’ to mean *Homo sapiens* and so to be beyond our species would necessarily mean being of a new one possessed of greater capacities. Technically this is indeed one possible outcome of some enhancement technology, particularly genetic interventions; that species is not morally relevant in and of itself.

The second meaning of ‘human’, where it is used in reference to a certain moral value that we commonly see ourselves as holding, is also dismissed as being insignificant. A ‘posthuman’ in this sense would imply a post-person, or a morally different class of being than that we inhabit. A common refrain is that an enhanced being would not qualify as being human. There are two main arguments in opposition to this; namely that it is well-established that humanity and personhood are not necessarily the same thing, and that possession of a particular moral status is not exclusively the preserve of inheritance by virtue of birth into a given species. Most concepts of moral status allow that if a being can satisfy the requirements of that moral status- i.e. personhood- then that is the only requisite to qualify as possessing it. The conclusion of this argument is that the bounds of the moral community of humanity are ever-changing, but that it remains a threshold concept. To fail to deserve to qualify as human would only be possible if the so-called

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<sup>15</sup> Bostrom N. Transhumanist FAQ. Available at: <http://www.nickbostrom.com/views/transhumanist.pdf>. Accessed January 21, 2016.

'posthuman' failed to meet this threshold, yet if they are supposedly beyond humanity they cannot feasibly be of a lower moral status than the human.

Enhancement does not significantly alter who we are; if anything it is likely to make us better able to embody what we see as the human.<sup>16</sup> *Homo sapiens sapiens* may just be a condition that the human presently inhabits.

#### 14.2.1 Novel Beings as moral peers

If the human is not limited to species, it follows that other beings may qualify. There is a good case for some non-human animals being recognised as possessing a moral status equal to that which we as humans enjoy; and a similar argument for the inclusion of new types of creature or being we are likely to encounter through the use of enhancement technology. Just as whatever species gradually succeeds *Homo sapiens* is likely to continue to think of itself as human, or belonging to the same group, it seems likely that any other being that emerges which is capable of this type of conscious thought would warrant being called the same.

Where fears are articulated about novel beings, they tend to focus on those equal or superior in ability to those possessed by *Homo sapiens*. For any of the threats they might pose- such as being motivated to eradicate us to further their own agendas- it is presupposed that they have the same sorts of capacities as do we for reason, self-awareness, agency, and identity. These traits are the same as those which qualify *Homo sapiens* for personhood. It seems unreasonable, then, to automatically assume that a novel being which fulfilled these would be morally different in some way which matters. Possession of the same moral value does not imply that we would agree with such a being, nor that we would not come into conflict with it; though it does suggest that there are grounds for us to treat with them to avoid such a conflict and for us to provide it with the same types of legal protection as we do for ourselves.<sup>17</sup>

For my research questions this is a significant point. Enhancement is likely to make us re-evaluate the scope and meaning of what it is to be human; and indeed our own value. There is no reason to assume that this means we would be in some way reduced or no longer human; but rather that we may need to recognise the insignificance of origin.

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<sup>16</sup> Or at least, as the paradigmatically human qualities.

<sup>17</sup> It also follows that both they and we would have the right to defend ourselves from the other if such a conflict did come to pass.

*More Human Than Human* [10.0] builds particularly on the ideas that species and origin are not significant determinants of moral status; and that the third sense of ‘posthuman’, the more successful embodiment of the characteristics and traits we see as instrumental to the experience of humanity, is the only useful understanding of the term.

The advent of novel types of being, including posthumans, AI and androids, is a likely byproduct of technological development. These beings are likely to surpass us in some or all capacities. It seems entirely necessary for us to prepare our attitudes and policy in order that we are able to act appropriately and with reason when such beings do emerge. An evaluation of the present states of AI and synthetic biology technologies makes clear that the potential for wholly novel beings- androids, for convenience- is very real and that we are unlikely to remain the sole sapient beings taking a part in society. The advent of the new is a fundamental element of regulation and policymaking.

With this groundwork established it remains to ask what it is that will govern our interactions with a posthuman or android. Considering the concept of the person as employed by Taylor<sup>18</sup> and others, there is every reason to assume that any novel being which would be worthy of the fears espoused by some critics would qualify for personhood. There are three arguments in support of this: that any android possessing human-equivalent intelligence is by default self-aware and conscious; that reactivity would merely be the domain of a smart appliance and an android worth fearing must be able to act in a considered fashion as a moral agent; and that a being without narrative identity would be unable to act in any meaningful way, let alone consider its actions. The reason for making these arguments is to determine that although critics may present these as reasons to fear and by extension to exclude novel beings from society, they are in fact compelling reasons to do the opposite. By fulfilling the requirements of personhood our android or posthuman proves itself deserving of the protections due to a person. A number of domestic and international documents of rights support this claim, and are entirely likely to form the basis of any legal policymaking addressing this issue. Where we consider legal protections for a group it is because we see that group as possessing the moral value worthy of that protection, and so personhood (or the lack thereof) is the qualifier we are likely to have in common with any novel beings. The second major

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<sup>18</sup> Taylor C. *The Concept Of A Person. Philosophical Papers, Volume 1*. Cambridge: Cambridge University Press; 1985. 97.

argument on this point centres around animal personhood. A number of legal challenges<sup>19</sup> have been brought seeking legal personhood for great apes, some of which have been successful to greater or lesser degrees, with the aim of illustrating that if we are willing to consider animals whether animals persons there is no reason that the same consideration ought not be given to other non *Homo sapiens* beings. If some animals can be judged to have attained sufficient characteristics to be persons, then it follows that intelligent androids possessed of the same characteristics to a much greater extent ought also to be persons. Furthermore, to deny such a being their personhood would be tantamount to slavery and to abuse of rights.

Building further on [9.0], section [10.0] addresses whether the advanced capacities of a posthuman or AI would warrant description as being beyond us in some significant manner. The motivations of a person- as discussed in [8.0] *The Shylock Syndrome-* are likely to be predictable to some extent. For a human, the aspirations that make us who we are rely on our possessing personhood; without which we could not conceive of let alone achieve them. This serves to illustrate that personhood is a key factor in membership of the ‘human community’. The other and more compelling consideration is that where moral status is presented as the determining factor in how we treat another being, it makes no difference if that being could be somehow of a ‘higher’ status. We give those beings we consider to be human persons primacy of treatment (or believe that we should), and there is no higher place than ‘first’: if greater capacity can grant anything at all then it can only be a stronger claim to qualifying as human. The only way for beings to exist that could fulfil the visions of critical commentators is for them to be ‘more human than human’.

### 14.3 Motivation and Meaning

A more minor theme in several of the papers appearing in **Part II** is the idea of motivation as contributory to, even formative of, meaning in our actions and thus our nature. This is discussed most specifically in *Enhancing Sisyphus* [6.0] and *The Shylock Syndrome* [8.0].

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<sup>19</sup> Orangutan granted controlled freedom by Argentine court. CNN. 2016. Available at: <http://edition.cnn.com/2014/12/23/world/americas/feat-orangutan-rights-ruling/>. Accessed July 17, 2016; *The Nonhuman Rights Project, Inc., On Behalf Of Tommy, V Patrick C. Lavery*. 518336, State of New York Supreme Court 2014 (available at <http://decisions.courts.state.ny.us/ad3/Decisions/2014/518336.pdf> Accessed 14 July 2016); *Matter Of Nonhuman Rights Project, Inc. V. Stanley*. N.Y. Slip Op 31419, State of New York Supreme Court 2015 (<http://law.justia.com/cases/new-york/other-courts/2015/2015-ny-slip-op-25257.html> Accessed 17 July 2016); McKinley J. Judge Orders Stony Brook University to Defend Its Custody of 2 Chimps. *Nytimes.com*. 2015. Available at: <http://www.nytimes.com/2015/04/22/nyregion/judge-orders-hearing-for-2-chimps-said-to-be-unlawfully-detained.html>. Accessed July 17, 2016.

Meaning is not lost in life or endeavour if through technology one increases wellbeing by palliating symptoms of unpleasant circumstances. This short response paper to Kjærsgaard's 2014 *Enhancing Motivation by Use of Prescription Stimulants: The Ethics of Motivation Enhancement*<sup>20</sup> stands alone as an argument in favour of permitting motivational enhancement, the augmentation of one's will to perform monotonous or undesirable tasks.

Kjærsgaard's central argument- that treating a motivational problem with drugs might not actually assuage the cause of the problem and thus is ethically problematic as it could affect the structures of meaning in the subject's life- fails to address an important point. Kjærsgaard holds that a good life must necessarily entail a number of projects, and trouble engaging with a given project suggests that that project is not something that would constitute part of a good life for the subject. If, he argues, the subject through an enhancement spends more time on a project that does not contribute to a good life than they might otherwise, then it is an unethical procedure.

The reality of life is, unfortunately, to have to undertake tasks we find unpleasant and indeed alienating. Invariably this is in service of some higher goal: a single parent during an economic crisis, labouring in an unfulfilling menial role below her abilities in order to provide for her children and for herself. The job deprives her of the ability to enjoy other projects that might contribute to her own good life through larger structures of meaning, but through the task with which she is unengaged she is able to perform a more basic good. She has no option to eliminate the project from her life without imposing negative externalities on others- here, her dependents. This is a Sisyphean circumstance. Sisyphus, presumably, was no fan of pushing the rock uphill, and it was not a task in service of a good life, but he could do naught else. In Kjærsgaard's view Sisyphus and our example would be acting unethically if they sought to palliate their circumstances through enhancement of motivation.

It cannot be unethical to enhance one's motivation in service of a meaningful aspect of life, if the alienating project could be made less so. By using the enhancement, one both is able to achieve the wider good, and also prevent self-suffering. Where motive is the grounds of behaviour- i.e. a novel being which wants to survive and propagate might take steps to ensure that other species such as our own will not prevent it doing so- it follows that that behaviour is valuable to that being (despite that all such steps might be

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<sup>20</sup> Kjærsgaard T. Enhancing Motivation by Use of Prescription Stimulants: The Ethics of Motivation Enhancement. *AJOB Neuroscience*. 2015;6(1):4-10.

unnecessarily draconian and/or morally outrageous). Similarly if knew we were motivated to perform an action for ends that were meaningful to our lives then doing so would necessarily have value to us, even if we were to need to use enhancement to ease our qualms about a behaviour we knew would be unpleasant.<sup>21</sup>

*The Shylock Syndrome [8.0]* adds to this sentiment by arguing that it is reasonable to assume that any artificial life form would follow a similar basic imperative as all known organic examples- it would seek to maintain its existence or at least that of its kind. There is no known organism that does not attempt to reproduce, and experimental evidence suggests that the same applies to simple robot automata. If simple AI spontaneously self-replicates, we determine that it is more than plausible that a complex, self-directing AI would follow suit and do so in rationalised ways using whatever capacities were at its disposal in order to achieve this goal. It appears that at least on this level, we are likely to share a motivation with the machines. If the results of an enhancement are valuable to us or affect our lives in a meaningful way, then they can undoubtedly be a part of the human experience rather than inherently causing us to become something ‘other’. As such it is important to ensure that we have compatible motivations with any novel being we might encounter because this dictates our probable interactions and social relationship. In the case of an artificial intelligence designed and built by ‘us’ there would not be, inherently, the same reliable and predictable limits to its aims and purposes in life as with a ‘normal’ organic *Homo sapiens*. In particular, that it would be dangerous to assume or anthropomorphise their capabilities- and as such we discount the temptation to simply attempt to ‘educate’ an AI through punishment and reward as we might a child. Instead, if the cognitive level of an AI was unrelated to its goals- or not related in a way we would recognise- then it is necessary to consider what might actually drive these goals.

Any AI ‘in the wild’ would be exactly that, and not live in a vacuum- it would be subject to hazards and risks and require various resources in order to achieve this good life. Guarding against risk and acquiring the resources would be no small undertaking, and it seems appropriate to draw another parallel with similar motivations in ourselves and other organic beings in which adverse circumstances causes increased reproduction to overcome imperfect survival rates. If the need for resources led to competition with *H. sapiens* then these motivations for survival would be potentially incompatible with our own, but it is also entirely likely that an emerging AI species (if rational) would have to enter a symbiotic relationship with us. To attain its own goals it may need to help us achieve our own; for example, it would take an extremely long time for a given AI to

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<sup>21</sup> Though not itself unethical or illegal.

independently develop and build all the faculties it might require in order to replicate and fuel itself. A rational being is likely to conclude that it is easier and more conducive to its own goals to work in concert with us, enjoying the assistance we can provide it and providing us with assistances towards our own aims.

#### **14.4 Rationality in ethical commentary**

A final theme running throughout the thesis, particularly in the early papers, is to argue that for appropriate or even useful policy discussion of enhancement technology there needs to be a move towards a more rational and specific consideration of individual subjects. The enhancement debate has had a tendency to focus on an overall picture, which is sometimes useful and is a part of this thesis in as much as I argue broadly in favour and in support of ‘enhancement as essential’, but generalisations are not necessarily a sufficient basis for policymaking.

When evaluating a technology it is insufficient to draw a conclusion based only on the forcible application of archetypical reservations- for example, looking at heritable germ line editing technology and seeing only the potential for it to fulfill the dystopian vision of a genetic over-class, or of a regression into negative eugenic ideals- unless there are strong reasons to think such outcomes likely. In fact, there is no good reason to assume that these eventualities are the likely ones; and indeed it seems that it is the purpose of good policymaking and ethical oversight to prevent these happening and instead steer the technology to deliver the positive results it promises. Few would argue that the eradication of horrific autosomal diseases such as harlequin ichthyosis<sup>22</sup> which causes extreme suffering and, usually, an early death through systemic infection, could be seen as in any way negative. Equally, it is hard to see as ‘bad’ that we might attain enhancements that might make life easier, make us happier, and reduce the amount of unpleasant or painful tasks we must complete.

Simply put, it is not helpful to automatically level standardised arguments at novel and individual situations. As discussed in **Part I**, enhancement technology is presently extant, and has not produced any of the eventualities so feared by academic critics. This is not to say that future technologies could not lead to them, but that to assume such ignores what evidence we do have access to. In papers such as *New Technologies, Old Attitudes, and*

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<sup>22</sup> Shibata Akiyama M. Epidemiology, medical genetics, diagnosis and treatment of harlequin ichthyosis in Japan. *Pediatrics International*. 2015;57(4):516-522.

*Legislative Rigidity [5.0], Enhancing Sisyphus [6.0], and Hot Baths and Cold Minds: Neuroscience, Mind Reading, and Mind Misreading [7.0]*, example cases where rational thinking has been ignored are made clear. In the examples where there has been actual practical application- particularly in the ‘lie detection’ neuroimaging techniques of the latter paper- rationality has thankfully mostly prevailed; in this case through effective and correct court judgement based on expert knowledge and factual data. In *United States v. Semrau*<sup>23</sup> and in *Slaughter v. State of Oklahoma*<sup>24</sup> fMRI and EEG ‘mind reading’ evidence was rejected by the courts on the basis of a lack of agreement by experts on the reliability of the technology and the questionable control standards used in testing. Unfortunately, this is not always the case: in the Indian murder trials in which defendants were convicted based on neuroimaging technology, (section [7.5]) the same doubts about the accuracy and reliability of the techniques were ignored.

This is all the more reason to work towards a rational approach to enhancement technologies- they need to be evaluated on their own merits and on factual information, rather than on the basis of desire and emotion.

Similarly, the National Institutes of Health approach to germline editing and mitochondrial replacement ignores realistic evaluations of these processes and instead relies on hyperbole and misconception. Francis Collins of the NIH claimed that germline editing was universally shunned, and that a number of (undisclosed) strong arguments stood against it. Strongly bioconservative thinker Marcy Darnovsky issued a press release supporting this view and calling for the US to affirm international agreements that she claimed demonstrate this global disdain for genome modification by condemning it,<sup>25</sup> but similarly neglected to offer explanation.

Analysis of the documents Darnovsky specifies in fact do quite the opposite of showing universal concord; and were fraught throughout their drafting, signing, and ratification procedures by disagreement. The implication, here, is that there is no true consensus after all. It is demonstrably not the case that germline editing is rejected by all- if it were so, there would be no impetus for Collins’ statement.

Section [5.0] goes on to advocate more explicitly for a more rational approach to new germline technologies. In the first instance, it calls for examination of past examples of

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<sup>23</sup> *United States V. Semrau*. WL 6845092(W. D. Tennessee, June 1, 2010) 2010).

<sup>24</sup> *Slaughter V. State Of Oklahoma*. 105 P.3d 832, 834–36 (Oklahoma Criminal App. 2005 2005).

<sup>25</sup> Centre for Genetics and Society. NIH Statement on Gene Editing Highlights Need for Stronger US Stance on Genetically Modified Humans, Says Public Interest Group. *Geneticsandsociety.org*. 2015. Available at: <http://www.geneticsandsociety.org/article.php?id=8544>. Accessed October 28, 2016.

similar developments, namely in-vitro fertilisation in the case of Louise Brown, and cloning, with Dolly the sheep. We must consider the negative media reactions at the time, and the contrast of the great benefits IVF in particular has brought to many millions of people born through it worldwide. Had the technology been suppressed at the outset, this good would not have come to pass. Compare this with CRISPR-Cas9 and Mitochondrial Replacement Therapy (MRT).<sup>26</sup> the hostility they face is much the same as with the older technologies. These attitudes are no longer appropriate for nor reflective of the realities of the developments and our policymaking needs. The technologies in question have no effective or moral difference from natural reproduction, and are in some ways far safer and more predictable. Legislative developments since the IVF controversies have provided an extant framework, which has been already proven ‘in action’ resulting in the UK Parliament vote to permit MRT once it was found to satisfy the safeguards developed over 25 years.<sup>27</sup>

The only means of developing reasonable policy to govern emerging enhancement technologies is to do so with rational evaluation of their attributes. Enhancement will no doubt be a major regulatory issue over the coming decades. It is important that we use facts and reason to ensure the best results for all, and the overall case argued by this thesis is an example of so doing.

## 15.0 THESIS IN CONTEXT

### 15.1 Contribution to the Literature

The argument advanced in this work is, in both form and content as far as I am aware, novel. The foundations of my case necessarily build on points made by a huge range of other thinkers, and they are acknowledged throughout the text. The thesis sought to build on the existing enhancement debate in a way that will hopefully help to advance the discourse beyond the discussion of whether enhancement in general, or specific technologies, are ‘right’ or ‘wrong’. I do not claim this work to be the only one aiming to reach beyond the binary debate and examine the likely downstream effects of the

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<sup>26</sup> Hamezlou J. Exclusive: World’s first baby born with new “3 parent” technique. *New Scientist*. 2016. Available at: <https://www.newscientist.com/article/2107219-exclusive-worlds-first-baby-born-with-new-3-parent-technique/>. Accessed September 29, 2016.

<sup>27</sup> Vogel G, Stokstad E. U.K. Parliament approves controversial three-parent mitochondrial gene therapy. *ScienceInsider*. 2015;February 3.

inevitable and growing use of enhancement- authors such as Silvers<sup>28</sup> and Blackford<sup>29</sup> have moved in the same direction, as has Harris in his recent *How to be Good*<sup>30</sup> and of course the works in this document to which he contributes. However, I believe that few, if any, have approached the same questions as I in the same manner; particularly with reference to the core argument presented here regarding enhancement as the arbiter of humanity.

There have been many calls for consideration of the regulation of enhancement, including a major conference in early 2016 aimed at contextualising the technology in law and spotlighting the particular regulatory challenges we are likely to face.<sup>31</sup> However, this event, as with the many papers that have been published suggesting methods of regulation,<sup>32</sup> focuses on the technologies themselves; and how we might adapt existing law and policy to address these. I contend that this is insufficient.

The reason for making the case here that enhancement and humanity are closely interrelated is to provide a new means of looking at the policy and ethical issues that enhancement is likely to pose us in the near future. By asking a number of questions, to wit: what do we mean by enhancement; and who do we mean by 'us'- *Homo sapiens*, hominids in general, other animals, or some new being, I have developed here an insight into what it is that ought to actually matter when examining the value any given enhancement technology or indeed the field as a whole. I propose that using this knowledge as the anchor of rational consideration is the key to effective policymaking. This approach is not one that I believe has been promoted elsewhere in the context of human enhancement.

By establishing that there is reason to believe that by enhancing we are not altering ourselves in any fundamental or moral status- affecting way because we are merely continuing the process that made us who we are, I am making a novel claim on an argument that has existed for some time. Others have suggested that enhancement will

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<sup>28</sup> Silvers A. The right not to be normal as the essence of freedom. *Journal of Evolution and Technology*. 2008;18(1):79-85.

<sup>29</sup> Blackford R. Genetic enhancement and the point of social equality. *Institute for Ethics and Emerging Technologies*. 2006. Available at: <http://ieet.org/index.php/IEET/more/689/>. Accessed February 17, 2017.

<sup>30</sup> Harris, J. *How To Be Good*. Oxford; Oxford University Press. 2016. *passim*

<sup>31</sup> Human Enhancement and the Law: Regulating for the Future. *Oxford Law Faculty*. 2016. Available at: <https://www.law.ox.ac.uk/research-and-subject-groups/neurolaw-project/human-enhancement-and-law-regulating-future>. Accessed February 17, 2017.

<sup>32</sup> Eg. Maslen H, Douglas T, Cohen Kadosh R, Levy N, Savulescu J. The regulation of cognitive enhancement devices: extending the medical model. *Journal of Law and the Biosciences*. 2014;1(1):68-93.

not in and of itself necessarily affect our moral status.<sup>33</sup> Here I present a new rationale for this idea in as much as I accept that enhancement changes the human; but argue that this change is a fundamental component of what it is to *be* human.

The first paper, *New Technologies, Old Attitudes, and Legislative Rigidity*, presented an argument that had not at the time of its acceptance for publication been made. It argues that new techniques of heritable germ line intervention are no more risk-laden than ordinary sexual reproduction; and contributes to the literature by offering a comprehensive refutation of the claims made by the US National Institutes of Health (which were designed to guide US policy development) through an analysis of the international legal documents to which the supporters of the NIH claims appealed.

The second paper, *Enhancing Sisyphus*, offered a view on motivational enhancement, a subject that has been given little explicit consideration in the literature save for the paper to which it responds and non peer-reviewed material.<sup>34</sup> This alone renders it valuable in that it provides a necessary counterpoint to the view that it is problematic and undermining of value and meaning to palliate unpleasant but necessary tasks. The paper offers an argument based on practicality, which is an uncommon feature of the literature as a whole.

*Hot Baths and Cold Minds: Neuroscience, Mind Reading, and Mind Misreading* is the only published paper which tackles its particular milieu within the broader field of neuroethics. Literature has focused on the ethical and legal dimensions of neuroimaging in general<sup>35</sup> and in particular patients<sup>36</sup> but has not addressed the matters of thought and mind that are the focus of this article. Furthermore, this paper addresses the shortcomings of the application of the neuroimaging technology by drawing parallels with other problematic phenomena that are of concern to a wider public.

The fourth paper included in the thesis is *The Shylock Syndrome*. This work discusses *Homo sapiens*- artificial intelligence relations in an original fashion by examining the

<sup>33</sup> See for example: Buchanan A. Moral Status and Human Enhancement. *Philosophy & Public Affairs*. 2009;37(4):346-381; Douglas T. Human enhancement and supra-personal moral status. *Philosophical Studies*. 2011;162(3):473-497; Wilson J. Persons, post-persons and thresholds. *Journal of Medical Ethics*. 2011;38(3):143-144.

<sup>34</sup> Where there's a will there's a way: Enhancing motivation. *Oxford Uehiro Centre for Practical Ethics - Blog*. 2016. Available at: <http://blog.practicaletics.ox.ac.uk/2015/02/where-theres-a-will-theres-a-way-enhancing-motivation/>. Accessed October 14, 2016.

<sup>35</sup> Kulynych J. Legal and ethical issues in neuroimaging research: human subjects protection, medical privacy, and the public communication of research results. *Brain and Cognition*. 2002;50(3):345-357.

<sup>36</sup> Weijer C, Peterson A, Webster F et al. Ethics of neuroimaging after serious brain injury. *BMC Medical Ethics*. 2014;15(1).

similarities between AI and biological life forms, rather than focusing on their differences. By highlighting the apparent likelihood that AI would share our same basic motivations, my co-authors and I run counter to the analysis usually found in the literature that they will significantly differ.<sup>37</sup>

*The Edge of Human: The Problem with the Posthuman as the Beyond* presents a worthwhile contribution to the literature on the ‘posthuman’ by providing a thorough analysis of the meaning of the term, and the ways in which it is used elsewhere in the literature. In so doing I showed that it is frequently the cause of confusion in the academic discourse on the subject. I offer a novel approach to the concept, which is that the posthuman itself likely to be an impossibility- rather than becoming anything ‘beyond’, an enhanced person would simply be fulfilling their self-ideal and realising the aspirations that are inherently part of the human condition. The paper finally offers an alternative terminology in an attempt to solve the issues uncovered.

The sixth work here included, *More Human Than Human*, uses the lens of science fiction to examine the possible eventualities of enhancement technology giving rise to novel types of being. The contribution of the paper is to provide a rational and thoroughly reasoned approach to the ways in which we are likely to have to adjust our understanding of what it is to be human. It offers a reason for acceptance heretofore absent from other literature advocating for the same,<sup>38</sup> in as much as it builds a case that it is reasonable to consider super intelligent or super-abled beings, which qualify as persons, as embodying what it is to be human more effectively than we do ourselves. It is this point that provides particular originality in the context of the scant literature on novel beings, but also provides the enhancement debate with a new counterpoint to the fears of the ‘other’ that are prevalent within it.

The final paper of the thesis, *Amplio, Ergo Sum*, delivers in totality the original case discussed at the start of this section. It argues that ‘I enhance, therefore I am’ through consideration of palaeoanthropological evidence for the use of enhancement technology- broadly defined- in the development of personhood and humanity in our hominid ancestors from *Sahelanthropus* all the way through genus *Homo* to ourselves. This analysis has not been presented elsewhere for the purposes of the enhancement debate and is the heart of this thesis.

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<sup>37</sup> Bostrom N. The Superintelligent Will: Motivation and Instrumental Rationality in Advanced Artificial Agents. *Minds and Machines*. 2012;22(2):71-85.

<sup>38</sup> Hughes J. *Citizen Cyborg*. Cambridge, MA: Westview Press; 2004.

## 15.2 Future Research

Each element of the thesis has contributed to the literature on enhancement and in other fields of future-focused bioethics in a range of ways. The combination of original approaches and the value of the overall thesis case is likely to be a fruitful basis from which to develop future research. In particular, with the need established for rational and composed policy considerations of enhancement and related technology, there is likely to be a wealth of more specific ethico-legal research to be done focusing on redefining the human in law. As discussed above, present literature tends to focus on repurposing extant legislation, and it will be important to examine whether this is feasible in light of the arguments I present in this work. It may be that entirely new regulatory documents are necessitated in order to provide for the expanded vision of the human that I suggest, and it would be an interesting and valuable exercise to develop recommendations for such.

In the final days of the writing of this thesis- sadly too late for a full and substantive commentary to be included in these pages- the White House National Science and Technology Council's Committee on Technology published a report entitled *Preparing For The Future Of Artificial Intelligence*<sup>39</sup> as a first foray into laying out the steps needed to consider the best ways for regulating AI. This is highly likely to be the first example of many such documents from nations all over the world, as we acknowledge that enhancement technologies are a significant challenge. Indeed, international bodies are taking a similar interest, as evidenced by the recent recommendation by the legal affairs committee of the European Parliament that a set of regulations should be drafted.<sup>40</sup> It is vitally important that more work is done to guide these policies into ensuring a more human future.

To this end, my intention beyond this thesis is to undertake research<sup>41</sup> that will examine the conceptualisation and positioning of the human in law both domestic and international, and attempt to determine the moral basis for this. It will then be necessary to determine whether, or under what conditions, this might be compatible with the existence of novel types of conscious being. If personhood is the deciding factor in law, then there is reason to believe and precedent that other consciousnesses should qualify. Furthermore, it will be

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<sup>39</sup> National Science and Technology Council Committee on Technology. *Preparing For The Future Of Artificial Intelligence*. Washington D.C.: Executive Office of the President; 2016. Interestingly, this is no longer directly available from the Trump Administration White House site.

<sup>40</sup> European Parliament Committee on Legal Affairs. Draft Report With Recommendations To The Commission On Civil Law Rules On Robotics (2015/2103(INL)). Brussels; 2016.

<sup>41</sup> In service of my post beginning November 1, 2016 as a Research Excellence Academy Postdoctoral Fellow at Newcastle University's Law School.

necessary to provide arguments as to why we cannot afford to ignore these potential challenges, by highlighting existing issues in various legal spheres (including intellectual property and bodily autonomy) that are the result of technology outpacing legislation and which are the prelude to more far-reaching problems.

## **16.0 CLOSING REMARKS**

The writing of this thesis provided me with the unique opportunity to combine a wide range of ideas into a contiguous whole through the inclusion of published material. By addressing the nature of enhancement; the nature of the human; the ethics of mind reading; the likely impacts of artificial intelligences and new types of conscious being, and how we might approach living along side them; the realities of human gene editing, and our evolutionary history, I have here constructed an argument in favour of seeing human enhancement technologies as of paramount importance for and utility in our future.

Where we recognise that advanced technology will cause great change to our society in the future, we must also recognise that the same has already and indeed continues to occur. Specifically considering the potential for these technologies to affect the human body by granting us new and increased capacities, there is a clear need for foresight into the ways these enhancements are likely to manifest and what implications they might have for ethics and policy. It will not suffice to wait and react in arrears; the scale of potential effect is such that it may be impossible to catch up or to impose certain rules retroactively. We could not simply legislate a novel sapient being out of existence- to do so would be unconscionable, and a perversion of the values we hold to make us who we are. It is also not sufficient to simply use the standard criticisms- from either side- of these technologies as a basis upon which to govern them. Rarely do generalisations make for sound judgements, and in an area with so many difficult and specific cases there is a need for deliberate consideration of the specific facts and a rational evaluation of the likely implications of a given enhancement process. It is also important to contextualise policymaking. Enhancement and its offshoots have the potential to greatly affect what it is to be human, and it is important that we make the right choices in regard to this.

By building on a number of basic, liberal and broad-minded assumptions derived from the general academic discourse on enhancement, I have been able to provide a means of addressing this problem. Where we accept that enhancement can include a vast range of technologies both modern and ancient, as well as less obvious cultural, social, and

anthropological factors, it is entirely possible to build a strong case that to deny enhancement would be to deny the realisation of a number of human rights. I have argued that the hostility to many forms of enhancement, particularly novel methods which might alter the very fabric of our being such as germline modification, is generally unfounded in either policy or reason. Instead, if we apply a rational approach, we find that most interventions are morally unproblematic and are acceptable in the pursuit of a good life. However, although enhancement is in many cases the fulfillment of basic desires and aspirations by unconventional means, it is important not to lose sight of the implications of those desires being met. Where the application of these advanced technologies can provide us with great benefits, it is also possible that they will cause to come into being new consciousnesses with their own aspirations. Our motivations to better our own circumstances, to provide ourselves with a good life, cannot come at the expense of the tenets of our humanity- we must give consideration to the ultimate moral significance of enhanced lifeforms, and act towards them in appropriate fashion. There is every reason to believe that they will be one and the same as us in every sense that matters; and that they have just as much right to be called human. Further, they are likely to have come into being in the same manner as did we- as the result of the use of technology to ease the lives of our ancestors and provide for our continued growth and progress.

If our nature as moral beings, as persons, and as humans all are a product of the application of enhancement technologies, then the arguments in the papers presented here are borne out. We are, necessarily, enhanced: to enhance is to be human. With this in mind, it is safe to say that any debate over the ethical and policy dimensions of enhancement must necessarily be focused on considering what is best for the human. It would be a mistake to ignore the core of our nature in favour of maintaining the perceived *status quo*; when in truth what it is to be human is ever developing. This golden rule for guiding the future of the enhancement debate is best encapsulated thus: I enhance, therefore I am.

*Fin.*

# **END MATTER**

## BIBLIOGRAPHY

- 2001: *A Space Odyssey [Film]*. Metro Goldwyn-Mayer: Kubrick S, Clarke AC.; 1968.
- A Ping-Pong-Playing Terminator. *Popular Science*. 2010. Available at:  
<http://www.popsci.com/technology/article/2010-02/ping-pong-playing-terminator>. Accessed July 14, 2016.
- A Thin Line. *Athinlineorg*. Available at: <http://www.athinline.org/>. Accessed June 6, 2014.
- Agar N. *Humanity'S End: Why We Should Reject Radical Enhancement..* Cambridge, Mass.: MIT Press; 2010.
- Agar N. *Liberal Eugenics: In Defence Of Human Enhancement..* Malden, MA: Blackwell Pub.; 2004.
- Agar N. *The Sceptical Optimist: Why Technology Isn't The Answer To Everything..* Oxford: Oxford University Press; 2015.
- Agar N. Thoughts about our species' future: themes from Humanity's End: Why We Should Reject Radical Enhancement. *Journal of Evolution and Technology*. 2010;1(21):23-31.
- Agar N. *Truly Human Enhancement: A Philosophical Defense Of Limits*. Cambridge, MA.: The MIT Press; 2013.
- Agar N. Why we can't really say what post-persons are. *Journal of Medical Ethics*. 2011;38(3):144-145. doi:10.1136/medethics-2011-100239.
- Alder M. Newton's flaming laser sword. *Philosophy Now*. 2004;46:29-32.
- All Time Worldwide Box Office Grosses. *Boxofficemojocom*. 2016. Available at:  
<http://www.boxofficemojo.com/alltime/world/>. Accessed December 2, 2016.
- Allhoff F, Lin P, Moor J, Weckert J. Ethics of Human Enhancement: 25 Questions & Answers. *Studies in Ethics, Law, and Technology*. 2010;4(1). doi:10.2202/1941-6008.1110.
- Allhoff F, Lin P, Moore D. *What Is Nanotechnology And Why Does It Matter*. Malden, MA: Wiley- Blackwell; 2010:127-131.
- Allhoff F, Lin P, Steinberg J. Ethics of Human Enhancement: An Executive Summary. *Science and Engineering Ethics*. 2010;17(2):201-212. doi:10.1007/s11948-009-9191-9.
- Andorno R. The Precautionary Principle: A New Legal Standard for a Technological Age. *Journal of International Biotechnology Law*. 2004;1(1):11-19.  
doi:10.1515/jibl.2004.1.1.11.
- Android. *Collins English Dictionary*. 2016. Available at:  
<http://www.collinsdictionary.com/dictionary/english/android>. Accessed July 17, 2016.
- Annas G, Andrews L, Isasit M. Protecting the endangered human: Towards an international treaty prohibiting cloning and inheritable alterations. *American Journal of Law and Medicine*. 2002;28(2):151-178.
- Anthony D. *The Horse, The Wheel, And Language: How Bronze-Age Riders From The Eurasian Steppes Shaped The Modern World..* Princeton, N.J.: Princeton University Press; 2010.
- Apollodorus. *Apollodorus: The Library, Volume I: Books 1-3.9. Translated By Frazer JG*. 6th ed. London, New York: Harvard University Press; 1921.
- Arendt H. *The Human Condition*. Chicago: University of Chicago Press; 1958.
- ASIMO – The Honda Worldwide ASIMO Site. *Worldhondacom*. 2016. Available at:  
<http://world.honda.com/ASIMO/>. Accessed July 14, 2016.
- Baltimore D, Berg P, Botchan M et al. A prudent path forward for genomic engineering and germline gene modification. *Science*. 2015;348(6230):36-38.  
doi:10.1126/science.aab1028.
- Barrat J. *Our Final Invention: Artificial Intelligence And The End Of The Human Era*. New York,: Macmillan; 2013.
- BBC Radio 4 Today. *Police Are "Incompetent," Says Acid Attack Victim. [Interview With Naomi Oni] March 24 2014.*; 2014. Available at:  
<http://www.bbc.co.uk/programmes/p01w49sq>. Accessed April 2, 2014.

- Beauchamp T, Frey R. *The Oxford Handbook Of Animal Ethics*. New York: Oxford University Press; 2014.
- Bekoff M. Awareness: Animal reflections. *Nature*. 2002;419(6904):255-255. doi:10.1038/419255a.
- Benner Sismour A. Synthetic biology. *Nature Reviews Genetics*. 2005;6(7):533-543. doi:10.1038/nrg1637.
- Berger P, Luckmann T. *The Social Construction Of Reality. A Treatise In The Sociology Of Knowledge*. London: Random House; 1966.
- Bermudez de Castro J. A Hominid from the Lower Pleistocene of Atapuerca, Spain: Possible Ancestor to Neandertals and Modern Humans. *Science*. 1997;276(5317):1392-1395. doi:10.1126/science.276.5317.1392.
- Bernardi G. The use of tools by wrasses (Labridae). *Coral Reefs*. 2011;31(1):39-39. doi:10.1007/s00338-011-0823-6.
- Birmontiene T. Health Legislation in Eastern European Countries: the Baltic States. *European Journal of Health Law*. 2004;11(1):77-86. doi:10.1163/157180904323042371.
- Blackford R. Book Review: Sam Harris' The Moral Landscape. *Journal of Evolution and Technology*. 2010;21(2):53-62.
- Blackford R. Genetic enhancement and the point of social equality. *Institute for Ethics and Emerging Technologies*. 2006. Available at: <http://ieet.org/index.php/IEET/more/689/>. Accessed February 17, 2017.
- Blade Runner (Screenplay)*. Hauer R, Scott R, Fancher H, People D; 1981.
- Boehm C. *Hierarchy In The Forest: The Evolution Of Egalitarian Behavior*. Cambridge MA: Harvard University Press; 1999.
- Boeke J, Church G, Hessel A et al. The Genome Project–Write. *Science*. 2016;353:126-7.
- Boesch C, Boesch-Achermann H. *The Chimpanzees Of The Taï Forest: Behavioural Ecology And Evolution*. Oxford: Oxford University Press; 2000.
- Bonnefon J, Shariff A, Rahwan I. The social dilemma of autonomous vehicles. *Science*. 2016;352(6293):1573-1576. doi:10.1126/science.aaf2654.
- Boorse C. A Rebuttal on Health. In: Humber JAImeda R, ed. *What Is Disease*. Totowa, N.J.: Humana Press; 1997:3–134.
- Boorse C. On the Distinction between Disease and Illness. In: Cohen M, Nagel T, Scanlon T, ed. *Medicine And Moral Philosophy*. Princeton: Princeton University Press; 1981.
- Bostrom N, Sandberg A. Cognitive Enhancement: Methods, Ethics, Regulatory Challenges. *Science and Engineering Ethics*. 2009;15(3):311-341. doi:10.1007/s11948-009-9142-5.
- Bostrom N, Sandberg A. Cognitive Enhancement: Methods, Ethics, Regulatory Challenges. *Science and Engineering Ethics*. 2009;15(3):311-341. doi:10.1007/s11948-009-9142-5.
- Bostrom N. A history of transhumanist thought. *Journal of Evolution and Technology*. 2005;14(1):1-25.
- Bostrom N. A Short History of Transhumanist Thought. *Analysis and Metaphysics*. 2006;5:63-95.
- Bostrom N. *Superintelligence: Paths, Dangers, Strategies..* Oxford: Oxford University Press; 2014.
- Bostrom N. The Superintelligent Will: Motivation and Instrumental Rationality in Advanced Artificial Agents. *Minds and Machines*. 2012;22(2):71-85. doi:10.1007/s11023-012-9281-3.
- Bostrom N. The Transhumanist FAQ. *NickBostromcom*. 2003. Available at: <http://www.nickbostrom.com/views/transhumanist.pdf>. Accessed December 2, 2016.
- Bostrom N. Transhumanist FAQ. Available at: <http://www.nickbostrom.com/views/transhumanist.pdf>. Accessed January 21, 2016.
- Bostrom N. Why I want to be post human when I grow up. In: Gordijn BChadwick R, ed. *Medical Enhancement And Posthumanity..* New York: Springer; 2008:107-137.
- Boyd R, Silk J. *How Humans Evolved*. New York: Norton & Company; 2003.

- Brazier M, Cave E. *Medicine, Patients, And The Law*. 6th ed. London: Penguin Books; 2016.
- Brazier M. What or Who is Human: A Conundrum for the Law. *Unpublished Manuscript*.
- Bremner C. Even robots have human rights, say legal experts. *The Times*. 2016. Available at: <http://www.thetimes.co.uk/article/5fe3d4d6-29be-11e6-832e-ae3a7e82d7c7>. Accessed July 17, 2016.
- Brian K. The amazing story of IVF: 35 years and five million babies later. *The Guardian*. 2013. Available at: <https://www.theguardian.com/society/2013/jul/12/story-ivf-five-million-babies>. Accessed November 24, 2016.
- Brown T, Murphy E. Through a scanner darkly: Functional neuroimaging as evidence of a criminal defendant's past mental states. *Stanford Law Review*. 2010;62:1119-1207.
- Buchanan A. *Better Than Human: The Promise And Perils Of Enhancing Ourselves*. Oxford University Press; 2011:5.
- Buchanan A. *Beyond Humanity?: The Ethics Of Biomedical Enhancement*. Oxford: Oxford University Press; 2011.
- Buchanan A. Moral Status and Human Enhancement. *Philosophy & Public Affairs*. 2009;37(4):346-381. doi:10.1111/j.1088-4963.2009.01166.x.
- Buchanan A. Still unconvinced, but still tentative: a reply to DeGrazia. *Journal of Medical Ethics*. 2011;38(3):140-141. doi:10.1136/medethics-2011-100314.
- Buell J, Scott T, Dawson-Hughes B et al. Vitamin D Is Associated With Cognitive Function in Elders Receiving Home Health Services. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*. 2009;64A(8):888-895. doi:10.1093/gerona/glp032.
- Bufkin J, Luttrell V. Neuroimaging Studies of Aggressive and Violent Behavior. *Trauma, Violence, & Abuse*. 2005;6(2):176-191. doi:10.1177/1524838005275089.
- Cambria E, White B. Jumping NLP Curves: A Review of Natural Language Processing Research [Review Article]. *IEEE Computational Intelligence Magazine*. 2014;9(2):48-57. doi:10.1109/mci.2014.2307227.
- Carrico D. The Trouble with "Transhumanism": Part Two. *leetorg*. 2004. Available at: <http://leet.org/index.php/IEET/more/carrico20041222/>. Accessed November 28, 2016.
- Carrington D. The Anthropocene epoch: scientists declare dawn of human-influenced age. *the Guardian*. 2016. Available at: <https://www.theguardian.com/environment/2016/aug/29/declare-anthropocene-epoch-experts-urge-geological-congress-human-impact-earth>. Accessed September 16, 2016.
- Cell Phones in Africa: Communication Lifeline. *Pew Research Center's Global Attitudes Project*. 2015. Available at: <http://www.pewglobal.org/2015/04/15/cell-phones-in-africa-communication-lifeline/>. Accessed February 17, 2017.
- Cellan-Jones R. Stephen Hawking - will AI kill or save humankind? - BBC News. *BBC News*. 2016. Available at: <http://www.bbc.co.uk/news/technology-37713629>. Accessed November 28, 2016.
- Cellan-Jones R. Stephen Hawking warns artificial intelligence could end mankind. *BBC News*. 2014. Available at: <http://www.bbc.co.uk/news/technology-30290540>. Accessed April 16, 2015.
- Centre for Genetics and Society. NIH Statement on Gene Editing Highlights Need for Stronger US Stance on Genetically Modified Humans, Says Public Interest Group. *Geneticsandsocietyorg*. 2015. Available at: <http://www.geneticsandsociety.org/article.php?id=8544>. Accessed October 28, 2016.
- Chai S, Bagchi-Sen S, Morrell C, Rao H, Upadhyaya S. Internet and Online Information Privacy: An Exploratory Study of Preteens and Early Teens. *IEEE Transactions on Professional Communication*. 2009;52(2):167-182. doi:10.1109/tpc.2009.2017985.
- Chemical Reactions in Living Things. *Bbccouk*. 2014. Available at: [http://www.bbc.co.uk/schools/gcsebitesize/science/add\\_ocr\\_21c/life\\_processes/reactionsrev1.shtml](http://www.bbc.co.uk/schools/gcsebitesize/science/add_ocr_21c/life_processes/reactionsrev1.shtml). Accessed April 16, 2015.
- Choppin P, Richard W. The structure of influenza virus. *The Influenza Viruses and Influenza*. 1975:15-51.

- Cicero M. *De Oratore* III, 221. In: Trans. Rackham L, ed. *Cicero On The Orator*. Cambridge, M.A. and London: Harvard University Press; 1942:177.
- Claiborne A, English R, Kahn J. *Mitochondrial Replacement Techniques*. National Academies; 2016.
- Cochrane K. Katie Piper: I asked Mum to kill me. *the Guardian*. 2012. Available at: <https://www.theguardian.com/lifeandstyle/2012/jun/02/katie-piper-acid-attack-book>. Accessed June 9, 2014.
- Coenen C, Shuijff M, Smits M et al. *European Parliament Science And Technology Options Assessment: Human Enhancement Study (EP STOA) For The European Parliament Directorate General For Internal Policies Department A: Economic And Scientific Policy*. Brussels; 2009.
- Coke E. *The First Part Of The Institutvies Of The Lawes Of England*. London: Printed for the Societie of Stationers; 1628.
- Colleton L. The Elusive Line Between Enhancement and Therapy and Its Effects on Health Care in the U.S. *Journal of Evolution and Technology*. 2008;18(1):70-78.
- Collins D. Did acid burns victim attack herself? Police probe self-harm theory. *Mirror*. 2013. Available at: <http://www.mirror.co.uk/news/uk-news/naomi-oni-acid-burns-victim-1729522#ixzz347hivunu>. Accessed November 5, 2014.
- Collins F. Statement on NIH funding of research using gene-editing technologies in human embryos. *National Institutes of Health (NIH)*. 2015. Available at: <https://www.nih.gov/about-nih/who-we-are/nih-director/statements/statement-nih-funding-research-using-gene-editing-technologies-human-embryos>. Accessed October 28, 2016.
- Communion and Stewardship: Human Persons Created in the Image of God. *Vatican.va*. 2002. Available at: [http://www.vatican.va/roman\\_curia/congregations/cfaith/cti\\_documents/rc\\_con\\_cfaith\\_doc\\_20040723\\_communion-stewardship\\_en.html](http://www.vatican.va/roman_curia/congregations/cfaith/cti_documents/rc_con_cfaith_doc_20040723_communion-stewardship_en.html). Accessed July 17, 2016.
- Copley C, Hirschler B. Novartis challenges UK Avastin use in eye disease. *Reuters*. 2012. Available at: <http://www.reuters.com/article/us-novartis-britain-idUSBRE83N0GM20120424>. Accessed February 14, 2017.
- Council of Europe. *Convention For The Protection Of Human Rights And Dignity Of The Human Being With Regard To The Application Of Biology And Medicine (Oviedo Convention)*. Oviedo: (4 June 1997); 1997.
- Council of Europe. *European Convention For The Protection Of Human Rights And Fundamental Freedoms, As Amended By Protocols Nos. 11 And 14*. Council of Europe; 1950.
- Creepy. Creepy. *Softonic*. 2017. Available at: <https://creepy.en.softonic.com/>. Accessed February 14, 2017.
- Cressey D, Abbott A, Ledford H. UK scientists apply for licence to edit genes in human embryos. *Nature*. 2015. doi:10.1038/nature.2015.18394.
- Cressey D, Abbott A, Ledford H. UK scientists apply for licence to edit genes in human embryos. *Nature*. 2015. Available at: <http://www.nature.com/news/uk-scientists-apply-for-licence-to-edit-genes-in-human-embryos-1.18394>. Accessed July 17, 2016.
- Cyranoski D, Reardon S. Chinese scientists genetically modify human embryos. *Nature*. 2015. doi:10.1038/nature.2015.17378.
- Cyranoski D. Ethics of embryo editing divides scientists. *Nature*. 2015;519(7543):272-272. doi:10.1038/519272a.
- Daniels N. Normal Functioning and the Treatment-Enhancement Distinction. *Cambridge Quarterly of Healthcare Ethics*. 2000;9(03):309-322. doi:10.1017/s0963180100903037.
- Daniels N. Normal Functioning and the Treatment-Enhancement Distinction. *Cambridge Quarterly of Healthcare Ethics*. 2000;9(03). doi:10.1017/s0963180100903037.
- Dasgupta P. *An Enquiry Into Well-Being And Destitution*. Oxford: Oxford University Press; 1995.
- Dawkins R. *The Ancestor's Tale*. Boston: Mariner; 2005.
- Dawkins R. *The Selfish Gene*. Oxford: Oxford University Press; 1989.

- de Vos N, Singh N, Ross D, Stavrinou T, Orr R, Fiatarone Singh M. Optimal Load for Increasing Muscle Power During Explosive Resistance Training in Older Adults. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*. 2005;60(5):638-647. doi:10.1093/gerona/60.5.638.
- DeGraw S. *The Subject Of Race In American Science Fiction*. Routledge; 2007.
- DeGrazia D. *Creation Ethics: Reproduction, Genetics, And Quality Of Life*. New York: Oxford University Press; 2012:60-69.
- DeGrazia D. Genetic enhancement, post-persons and moral status: a reply to Buchanan. *Journal of Medical Ethics*. 2011;38(3):135-139. doi:10.1136/medethics-2011-100126.
- DeGrazia D. Genetic Enhancement, Post-persons, and Moral Status: Author reply to commentaries. *Journal of Medical Ethics*. 2011;38(3):145-147. doi:10.1136/medethics-2011-100388.
- Delete Cyberbullying. *deletecyberbullying.eu*. Available at: <http://deletecyberbullying.eu/>. Accessed June 6, 2014.
- Deutscher Bundestag. *Grundgesetz Für Die Bundesrepublik Deutschland*; 1949:available at <http://www.gesetze-im-internet.de/gg/BJNR000010949.html> Accessed 14 July 2016.
- Dinets V, Brueggen J, Brueggen J. Crocodilians use tools for hunting. *Ethology Ecology & Evolution*. 2013;27(1):74-78. doi:10.1080/03949370.2013.858276.
- Diogenes Laertius. *The Lives And Opinions Of Eminent Philosophers*. London: HG Bohn; 1853:6.40.
- Doctor Strange*. Hollywood: Marvel Studios; 2016.
- Douglas T. Human enhancement and supra-personal moral status. *Philosophical Studies*. 2011;162(3):473-497. doi:10.1007/s11098-011-9778-2.
- Dupré J. In defence of classification. *Studies in History and Philosophy of Biological and Biomedical Sciences*. 2001;32:203-219.
- Dvorsky G. No, India did not just grant dolphins the status of humans. *io9gizmodo.com*. 2013. Available at: <http://io9.gizmodo.com/no-india-did-not-just-grant-dolphins-the-status-of-hum-1149482273>. Accessed July 17, 2016.
- Eastman N, Campbell C. Neuroscience and legal determination of criminal responsibility. *Nature Reviews Neuroscience*. 2006;7(4):311-318. doi:10.1038/nrn1887.
- Eliezer Y. Artificial Intelligence as a Positive and Negative Factor in Global Risk. In: Bostrom N, Ćirković M, ed. *Global Catastrophic Risks*. Oxford: Oxford University Press; 2008:303.
- Elliott C. Pursued by Happiness and Beaten Senseless Prozac and the American Dream. *The Hastings Center Report*. 2000;30(2):7-12. doi:10.2307/3528306.
- Ellis W. Agent X-13's report on the emergency annexation of Earth-616. *Astonishing X-Men: Ghost Boxes #1* Marvel Comics. 2008;1(1).
- Emery N. Cognitive ornithology: the evolution of avian intelligence. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 2006;361(1465):23-43. doi:10.1098/rstb.2005.1736.
- Emiliano Giménez S. Orangutan granted controlled freedom by Argentine court. CNN. 2016. Available at: <http://edition.cnn.com/2014/12/23/world/americas/feat-orangutan-rights-ruling/>. Accessed July 17, 2016.
- Emonson D, Vanderbeek R. The use of amphetamines in U.S. Air Force tactical operations during Desert Shield and Storm. *Aviation, Space, and Environmental Medicine*. 1995;66(3):260-3.
- Empson W. *Seven Types Of Ambiguity*. 2nd ed. Chatto and Windus; 1970:1.
- European Court Of Justice Judgement. Case C-131/12 ECLI:EU:C:2014, 616 (Full text available at <http://curia.europa.eu/juris/document/document.jsf;jsessionid=9ea7d2dc30d5cfb78416675447019937a19787b77870.e34KaxiLc3qMb40Rch0SaxuNbxr0?text=&docid=152065&pageIndex=0&doclang=EN&mode=req&dir=&occ=first&part=1&cid=124853> (last accessed 6 June 2014)).

- European Parliament Committee on Legal Affairs. *Draft Report With Recommendations To The Commission On Civil Law Rules On Robotics (2015/2103(INL))*. Brussels; 2016
- Ewing A. Your Life Is A Story I've Already Written. *Loki: Agent of Asgard*. 2014;(1;3).
- Facebook: Do Not Release Your New App Feature that Listens to Users' Conversations. *SumOfUs*. Available at: <https://actions.sumofus.org/a/Facebook-app-taps-phones>. Accessed June 6, 2014.
- Farwell L, Smith S. Using Brain MERMER Testing to Detect Knowledge Despite Efforts to Conceal. *Journal of Forensic Sciences*. 2001;46(1):135-43. doi:10.1520/jfs14925j.
- Finn J, Tregenza T, Norman M. Defensive tool use in a coconut-carrying octopus. *Current Biology*. 2009;19(23):R1069-R1070. doi:10.1016/j.cub.2009.10.052.
- Flaumenhaft H. The Career of Leon Kass. *Journal of Contemporary Health Law Policy*. 2003;20:1-24.
- Fleagle J, Assefa Z, Brown F, Shea J. Paleoanthropology of the Kibish Formation, southern Ethiopia: Introduction. *Journal of Human Evolution*. 2008;55(3):360-365. doi:10.1016/j.jhevol.2008.05.007.
- Flegal K, Carroll M, Kuczmarski R, Johnson C. Overweight and obesity in the United States: prevalence and trends, 1960–1994. *International Journal of Obesity*. 1997;22(1):39-47. doi:10.1038/sj.ijo.0800541.
- Fotheringham W. Timeline: Lance Armstrong's journey from deity to disgrace. *the Guardian*. 2015. Available at: <https://www.theguardian.com/sport/2015/mar/09/lance-armstrong-cycling-doping-scandal>. Accessed December 2, 2016.
- Frankfurt H. Freedom of the Will and the Concept of a Person. *The Journal of Philosophy*. 1971;68(1):5. doi:10.2307/2024717.
- Freitas Jr R. A self-reproducing interstellar probe. *Journal of the British Interplanetary Society*. 1980;33:251-64.
- Fukuyama F. *Our Posthuman Future*. New York: Farrar, Straus and Giroux; 2002:101-102.
- Fuller S. What scientific idea is ready for retirement? Steve Fuller: Human Being= Homo Sapiens. *edgeorg*. 2014. Available at: <http://edge.org/response-detail/25396>. Accessed February 25, 2016.
- Gaiman N. 1602 Part One; In Which We are Introduced to Some of Our Featured Players. *Marvel 1602 #1 Marvel Comics*. 2003;1(1).
- Ganis G, Kosslyn S, Stose S, Thompson W, Yurgelun-Todd D. Neural Correlates of Different Types of Deception: An fMRI Investigation. *Cerebral Cortex*. 2003;13(8):830-836. doi:10.1093/cercor/13.8.830.
- Ganis G, Rosenfeld J, Meixner J, Kievit R, Schendan H. Lying in the scanner: Covert countermeasures disrupt deception detection by functional magnetic resonance imaging. *NeuroImage*. 2011;55(1):312-319. doi:10.1016/j.neuroimage.2010.11.025.
- Gibbons A. Ancient Island Tools Suggest Homo erectus Was a Seafarer. *Science*. 1998;279(5357):1635-1637. doi:10.1126/science.279.5357.1635.
- Gibbons A. Food for Thought. *Science*. 2007;316(5831):1558-1560. doi:10.1126/science.316.5831.1558.
- Gibbons A. Solving the Brain's Energy Crisis. *Science*. 1998;280(5368):1345-1347. doi:10.1126/science.280.5368.1345.
- Gibbons A. Solving the Brain's Energy Crisis. *Science*. 1998;280(5368):1345-1347. doi:10.1126/science.280.5368.1345.
- Gibbs A. *Shaw: Interviews And Recollections*. Iowa City: University of Iowa Press; 1990.
- Gibbs S. Elon Musk: artificial intelligence is our biggest existential threat. *the Guardian*. 2014. Available at: <https://www.theguardian.com/technology/2014/oct/27/elon-musk-artificial-intelligence-ai-biggest-existential-threat>. Accessed November 28, 2016.
- Gibson W, Farnell L, Bennett M. A computational model relating changes in cerebral blood volume to synaptic activity in neurons. *Neurocomputing*. 2007;70(10-12):1674-1679. doi:10.1016/j.neucom.2006.10.071.

- Gilhooly R. Exoskeletons await in work/care closet | The Japan Times. *The Japan Times*. 2012. Available at: [http://www.japantimes.co.jp/life/2012/06/17/general/exoskeletons-await-in-workcare-closet/#.V\\_wplZMrJE5](http://www.japantimes.co.jp/life/2012/06/17/general/exoskeletons-await-in-workcare-closet/#.V_wplZMrJE5). Accessed November 28, 2016.
- Gingras Y. *Éloge De L' homo Techno-Logicus*. Saint-Laurent, Québec: Fides; 2005.
- Glaser A. The White House Is Finally Prepping for an AI-Powered Future. *WIRED*. 2016. Available at: <https://www.wired.com/2016/05/white-house-finally-prepping-ai-powered-future/>. Accessed November 28, 2016.
- Goffin T, Barry P, Dierickx K, Nys H. Why eight EU Member States signed, but not yet ratified the Convention for Human Rights and Biomedicine. *Health Policy*. 2008;86(2-3):222-233. doi:10.1016/j.healthpol.2007.10.011.
- Goodall J. *Through A Window: My Thirty Years With The Chimpanzees Of Gombe*. Boston: Houghton Mifflin Harcourt; 2010.
- Goodman M. *What Is A Person?*. Clifton, NJ: Springer Science & Business Media; 1988.
- Google sets up 'right to be forgotten' form after EU ruling - BBC News. *BBC News*. 2014. Available at: <http://www.bbc.co.uk/news/technology-27631001>. Accessed June 3, 2014.
- Google's Artificial Brain Learns to Find Cat Videos. *WIRED*. 2012. Available at: <http://www.wired.com/2012/06/google-x-neural-network>. Accessed July 14, 2016.
- Gray H. *Anatomy Of The Human Body*. 20th ed. Philadelphia: Lea & Febiger; 1918.
- Hamez lou J. Exclusive: World's first baby born with new "3 parent" technique. *New Scientist*. 2016. Available at: <https://www.newscientist.com/article/2107219-exclusive-worlds-first-baby-born-with-new-3-parent-technique/>. Accessed September 29, 2016.
- Hare R. Abortion and the Golden Rule. *Philosophy & Public Affairs*. 1975;4(3):201-22.
- Harris J, Lawrence D. Hot Baths and Cold Minds: Neuroscience, Mind Reading, and Mind Misreading. *Cambridge Quarterly of Healthcare Ethics*. 2015;24(02):123-134. doi:10.1017/s0963180114000425.
- Harris J, Lawrence D. New Technologies, Old Attitudes, and Legislative Rigidity. In: Brownsword R, Scotford E, Yeung K, ed. *Oxford Handbook On The Law And Regulation Of Technology*. Oxford University Press; 2016:Forthcoming.
- Harris J. *Enhancing Evolution: The Ethical Case For Making Better People*. Princeton: Princeton University Press; 2010.
- Harris J. Germline Manipulation and Our Future Worlds. *The American Journal of Bioethics*. 2015;15(12):30-34. doi:10.1080/15265161.2015.1104163.
- Harris J. Germline Modification and the Burden of Human Existence. *Cambridge Quarterly of Healthcare Ethics*. 2015;25(01):6-18. doi:10.1017/s0963180115000237.
- Harris J. *How To Be Good*. Oxford: Oxford University Press; 2016.
- Harris J. In Vitro Fertilization: The Ethical Issues (I). *The Philosophical Quarterly*. 1983;33(132):217. doi:10.2307/2219222.
- Harris J. Intimations of immortality—The ethics and justice of life extending therapies. In: Freeman M, ed. *Current Legal Problems*. Oxford: Oxford University Press; 2002:65-97.
- Harris J. Intimations of Immortality. *Science*. 2000;288(5463):59-59. doi:10.1126/science.288.5463.59.
- Harris J. Life in the cloud and freedom of speech. *Journal of Medical Ethics*. 2013;39(5):307-311. doi:10.1136/medethics-2012-100862.
- Harris J. *On Cloning*. London: Routledge; 2004.
- Harris J. Rights and Reproductive Choice. In: Harris JHolm S, ed. *The Future Of Human Reproduction: Choice And Regulation*. Oxford University Press; 1998:5-37.
- Harris J. *The Value Of Life*. London: Routledge & Kegan Paul; 1985.
- Harris J. *Wonderwoman And Superman*. Oxford [England]: Oxford University Press; 1992:Ch 8.
- Harrison A. Cyber-bullying: Horror in the home - BBC News. *BBC News*. 2013. Available at: <http://www.bbc.co.uk/news/education-23727673>. Accessed June 6, 2014.
- Hassabis D, Spreng R, Rusu A, Robbins C, Mar R, Schacter D. Imagine All the People: How the Brain Creates and Uses Personality Models to Predict Behavior. *Cerebral Cortex*. 2013;24(8):1979-1987. doi:10.1093/cercor/bht042.

- Hayles K. *How We Became Posthuman: Virtual Bodies In Cybernetics, Literature, And Informatics..* Chicago, Ill.: University of Chicago Press; 1999.
- Hernandez D. The Man Behind the Google Brain: Andrew Ng and the Quest for the New AI. *WIRED*. 2013. Available at: <http://www.wired.com/2013/05/neuro-artificial-intelligence/>. Accessed July 14, 2016.
- Holt R, Eerotkritou-Mulligan I, Sönksen P. The history of doping and growth hormone abuse in sport. *Growth Hormone & IGF Research*. 2009;19(4):320-326. doi:10.1016/j.ghir.2009.04.009.
- Homer. *The Iliad (Book XXII)*. Harmondsworth: Penguin; 1966:403-473, at409.
- Hoyle F. *The Black Cloud*. New York: Buccaneer Books; 1957.
- Huettel S, Song A, McCarthy G. *Functional Magnetic Resonance Imaging*. 2nd ed. Sunderland, Mass.: Sinauer Associates; 2009:214-220.
- Hughes J. *Citizen Cyborg*. Cambridge, MA: Westview Press; 2004.
- Huizinga J. *Homo Ludens : A Study Of The Play-Element In Culture*. Boston: Beacon Press; 1955.
- Human Enhancement and the Law: Regulating for the Future. *Oxford Law Faculty*. 2016. Available at: <https://www.law.ox.ac.uk/research-and-subject-groups/neurolaw-project/human-enhancement-and-law-regulating-future>. Accessed February 17, 2017.
- Humanoid robot gets job as receptionist,. *New Scientist*. 2005. Available at: <https://www.newscientist.com/article/dn8456-humanoid-robot-gets-job-as-receptionist/>. Accessed July 14, 2016.
- Hunterian Collections. 2015. Available at: <https://www.rcseng.ac.uk/museums/hunterian/about-us/collections.html>. Accessed February 21, 2016.
- Hutchison C, Chuang R, Noskov V et al. Design and synthesis of a minimal bacterial genome. *Science*. 2016;351(6280). doi:10.1126/science.aad6253.
- Ida R. Should We Improve Human Nature? An Interrogation from an Asian Perspective. In: Savulescu JBostrom N, ed. *Human Enhancement*. Oxford: Oxford University Press; 2009:56.
- India Bans Captive Dolphin Shows as 'Morally Unacceptable'. *Ens-newswirecom*. 2016. Available at: <http://ens-newswire.com/2013/05/20/india-bans-captive-dolphin-shows-as-morally-unacceptable/>. Accessed July 17, 2016.
- Indian firm launches £5 smartphone, thought to be world's cheapest. *the Guardian*. 2016. Available at: <https://www.theguardian.com/technology/2016/feb/17/india-cheapest-smartphone-worlds-ringing-bells>. Accessed October 13, 2016.
- Ito A, Abe N, Fujii T et al. The role of the dorsolateral prefrontal cortex in deception when remembering neutral and emotional events. *Neuroscience Research*. 2011;69(2):121-128. doi:10.1016/j.neures.2010.11.001.
- J W. Persons, post-persons and thresholds. - PubMed - NCBI. *Ncbinlmnihgov*. 2016. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/22138723>. Accessed October 14, 2016.
- Jacob M. Superman versus Nick O'Teen -- a children's anti-smoking campaign. *Health Education Journal*. 1985;44(1):15-18. doi:10.1177/001789698504400104.
- James S, Dennell R, Gilbert A et al. Hominid Use of Fire in the Lower and Middle Pleistocene: A Review of the Evidence [and Comments and Replies]. *Current Anthropology*. 1989;30(1):1-26. doi:10.1086/203705.
- Janik A, Toulmin S. *Wittgenstein'S Vienna*. New York: Simon and Schuster; 1973.
- Johanson D. Lucy (*Australopithecus afarensis*). In: Ruse M, Travis J, ed. *Evolution: The First Four Billion Years*. Cambridge MA: The Belknap Press of Harvard University Press; 2009:693-697.
- Juengst E, Moseley D. Human Enhancement. *Stanford Encyclopedia of Philosophy Archive*. 2015. Available at: <https://plato.stanford.edu/archives/spr2016/entries/enhancement/>. Accessed December 6, 2016.
- Kass L. *Beyond Therapy: Biotechnology And The Pursuit Of Happiness*. Washington, D.C.: President's Council on Bioethics (Harper Collins); 2003.

- Kass L. *Life, Liberty, And The Defense Of Dignity*. San Francisco: Encounter Books; 2002.
- Kass L. The Wisdom of Repugnance. *The New Republic*. 1997;216(22):17-26.
- Kaylor-Hughes C, Lankappa S, Fung R, Hope-Urwin A, Wilkinson I, Spence S. The functional anatomical distinction between truth telling and deception is preserved among people with schizophrenia. *Criminal Behaviour and Mental Health*. 2011;21(1):8-20. doi:10.1002/cbm.785.
- Kennedy D, Little W, Scholey A. Attenuation of Laboratory-Induced Stress in Humans After Acute Administration of Melissa officinalis (Lemon Balm). *Psychosomatic Medicine*. 2004;66(4):607-613. doi:10.1097/01.psy.0000132877.72833.71.
- Kjærsgaard T. Enhancing Motivation by Use of Prescription Stimulants: The Ethics of Motivation Enhancement. *AJOB Neuroscience*. 2015;6(1):4-10. doi:10.1080/21507740.2014.990543.
- Knowledge modeling and machine reasoning environment capable of addressing the most challenging problems in industry, government, and academia. *Cycorp: Home of Smarter Solutions*. 2016. Available at: <http://www.cyc.com/>. Accessed July 14, 2016.
- Ko K. Origins of human intelligence: The chain of tool-making and brain evolution. *Anthropological Notebooks*. 2016;22(1):5-22.
- Kraybill D. *The Riddle Of Amish Culture*. Baltimore: Johns Hopkins University Press; 2001:98-101, 313.
- Kulynych J. Legal and ethical issues in neuroimaging research: human subjects protection, medical privacy, and the public communication of research results. *Brain and Cognition*. 2002;50(3):345-357. doi:10.1016/s0278-2626(02)00518-3.
- Langleben D, Moriarty J. Using brain imaging for lie detection: Where science, law, and policy collide. *Psychology, Public Policy, and Law*. 2013;19(2):222-234. doi:10.1037/a0028841.
- Langleben D, Schroeder L, Maldjian J et al. Brain Activity during Simulated Deception: An Event-Related Functional Magnetic Resonance Study. *NeuroImage*. 2002;15(3):727-732. doi:10.1006/nimg.2001.1003.
- Langley P. The changing science of machine learning. *Machine Learning*. 2011;82(3):275-279. doi:10.1007/s10994-011-5242-y.
- Landphier E, Urnov F, Haecker S, Werner M, Smolenski J. Don't edit the human germ line. *Nature*. 2015;519(7544):410-411. doi:10.1038/519410a.
- Lawrence D, Palacios-González C, Harris J. Artificial Intelligence: The Shylock Syndrome. *Cambridge Quarterly of Healthcare Ethics*. 2016;25(02):250-261. doi:10.1017/s0963180115000559.
- Lawrence D. More Human Than Human. *Cambridge Quarterly of Healthcare Ethics*. 26(3):Forthcoming 2017.
- Lawrence D. The Edge of Human? The Problem with the Posthuman as the 'Beyond'. *Bioethics*. 2016;doi:10.1111/bioe.12318. doi:10.1111/bioe.12318.
- Lawrence D. To what extent is the use of human enhancements defended in international human rights legislation?. *Medical Law International*. 2013;13(4):254-278. doi:10.1177/0968533214520845.
- Leakey R. *Origins Reconsidered*. Anchor; 1992.
- Lee S. Introducing... The Mighty Thor!. *Journey Into Mystery Marvel Comics*. 1962;(83).
- Lee S. The Coming of Galactus!. *Fantastic Four #48*. 1966;(1:48).
- Lee S. The Hulk. *The Incredible Hulk #1 Marvel Comics*. 1962;(1:1).
- Lee S. X-Men. *X-Men #1 Marvel Comics*. 1963;(1:1).
- Lee S, Lieber L. Iron Man is Born!. *Tales of Suspense #39*. 1963;(1:39).
- Lee T, Liu H, Tan L et al. Lie detection by functional magnetic resonance imaging. *Human Brain Mapping*. 2002;15(3):157-164. doi:10.1002/hbm.10020.
- Leonard W. Food for Thought: Into the Fire. *Scientific American*. Available at: <http://www.sciam.com/article.cfm?id=food-for-thought-into-the>. Accessed September 14, 2016.

- Liang P, Xu Y, Zhang X et al. CRISPR/Cas9-mediated gene editing in human tripronuclear zygotes. *Protein & Cell.* 2015;6(5):363-372. doi:10.1007/s13238-015-0153-5.
- Liang P, Xu Y, Zhang X et al. CRISPR/Cas9-mediated gene editing in human tripronuclear zygotes. *Protein & Cell.* 2015;6(5):363-372. doi:10.1007/s13238-015-0153-5.
- Liddell H, Scott R. *A Greek-English Lexicon, Abridged.* London: Oxford; 1972.
- Liddle D, Connor D. Nutritional Supplements and Ergogenic Aids. *Primary Care: Clinics in Office Practice.* 2013;40(2):487-505. doi:10.1016/j.pop.2013.02.009.
- Lin P, Allhoff F. Against Unrestricted Human Enhancement. *Journal of Evolution and Technology.* 2008;18(1):35-41.
- Lobdell S. The Story Of The Year!. *Uncanny X-Men #346 Marvel Comics.* 1997;1(346).
- Locke J. *An Essay Concerning Human Understanding.* Oxford: Clarendon Press; 1979:bk. II, chap. 27, sec. 9.
- Lomasky L. *Persons, Rights, And The Moral Community.* Oxford: Oxford University Press; 1987.
- Luria S. Bacteriophage: An Essay on Virus Reproduction. *Science.* 1950;111(2889):507-511. doi:10.1126/science.111.2889.507.
- Manzi G, Mallegni F, Ascenzi A. A cranium for the earliest Europeans: Phylogenetic position of the hominid from Ceprano, Italy. *Proceedings of the National Academy of Sciences.* 2001;98(17):10011-10016. doi:10.1073/pnas.151259998.
- Markram H, Muller E, Ramaswamy S, Reimann M, Abdellah M, Sanchez C. Reconstruction and simulation of neocortical microcircuitry. *Cell.* 2015;163(2):456-92.
- Marsen S. Becoming More Than Human: Technology and the Post-Human Condition. *Journal of Evolution and Technology.* 2008;19:1.
- Mary Konye jailed for acid attack on Naomi Oni - BBC News. *BBC News.* 2014. Available at: <http://www.bbc.co.uk/news/uk-england-london-26680664>. Accessed June 9, 2014.
- Maslen H, Douglas T, Cohen Kadosh R, Levy N, Savulescu J. The regulation of cognitive enhancement devices: extending the medical model. *Journal of Law and the Biosciences.* 2014;1(1):68-93. doi:10.1093/jlb/lst003.
- Matter Of Nonhuman Rights Project, Inc. V. Stanley.* N.Y. Slip Op 31419, State of New York Supreme Court 2015 (<http://law.justia.com/cases/new-york/other-courts/2015/2015-ny-slip-op-25257.html> Accessed 17 July 2016 2015).
- Mayr E. *Systematics And The Origin Of Species From The Viewpoint Of A Zoologist..* New York: Columbia University Press; 1942.
- McAdams D, McLean K. Narrative Identity. *Current Directions in Psychological Science.* 2013;22(3):233-238. doi:10.1177/0963721413475622.
- McDougall I, Brown F, Fleagle J. Stratigraphic placement and age of modern humans from Kibish, Ethiopia. *Nature.* 2005;433(7027):733-736. doi:10.1038/nature03258.
- McDuffie D. Skating on Thin Ice!. *The Amazing Spider-Man: Skating on Thin Ice #1 Marvel Comics.* 1990;(1).
- McKay C. What Is Life—and How Do We Search for It in Other Worlds?. *PLoS Biology.* 2004;2(9):302. doi:10.1371/journal.pbio.0020302.
- McKibben B. *Enough: Staying Human In An Engineered Age.* New York: Times Books; 2003.
- McKinley J. Judge Orders Stony Brook University to Defend Its Custody of 2 Chimps. *Nytimescom.* 2015. Available at: <http://www.nytimes.com/2015/04/22/nyregion/judge-orders-hearing-for-2-chimps-said-to-be-unlawfully-detained.html>. Accessed July 17, 2016.
- McPherron S, Alemseged Z, Marean C et al. Evidence for stone-tool-assisted consumption of animal tissues before 3.39 million years ago at Dikika, Ethiopia. *Nature.* 2010;466(7308):857-860. doi:10.1038/nature09248.
- Mehlman M. Cognition-Enhancing Drugs. *The Milbank Quarterly.* 2004;82(3):483-506. doi:10.1111/j.0887-378x.2004.00319.x.
- Meixner J. Liar, liar, jury's the trier? The future of neuroscience-based credibility assessment in the court. *Northwestern University Law Review.* 2012;106(3):1451.

- Meltzer T. Robot doctors, online lawyers and automated architects: the future of the professions?. *The Guardian*. 2014. Available at: <https://www.theguardian.com/technology/2014/jun/15/robot-doctors-online-lawyers-automated-architects-future-professions-jobs-technology>. Accessed July 14, 2016.
- Miah A. Ethical Issues Raised by Human Enhancement. In: Gonzalez F, ed. *Values And Ethics For The 21St Century*,. Spain: BBVA; 2011:199-231.
- Midgley M. *Science As Salvation*. London: Routledge; 2002.
- Millard F. Rights Transmission by Mimesis: the Biomedicine Convention in Central Europe. *Journal of Human Rights*. 2010;9(4):427-444. doi:10.1080/14754835.2010.522924.
- Minority Report*. 20th Century Fox: Spielberg, S; 2002.
- Möglich M, Alpert G. Stone dropping by Conomyrma bicolor (Hymenoptera: Formicidae): A new technique of interference competition. *Behavioral Ecology and Sociobiology*. 1979;6(2):105-113. doi:10.1007/bf00292556.
- Mone G. Building the Real Iron Man. *Popular Science*. 2008. Available at: <http://www.popsci.com/scitech/article/2008-04/building-real-iron-man>. Accessed November 28, 2016.
- Monteleone G, Phan K, Nusbaum H et al. Detection of deception using fMRI: Better than chance, but well below perfection. *Social Neuroscience*. 2009;4(6):528-538. doi:10.1080/17470910801903530.
- Moore A. Marvelman- A Dream of Flying. *Warrior #1 Quality Communications*. 1982;(1).
- Morrison G. Superdestroyer. *New X-Men #124 Marvel Comics*. 2002;1(124).
- Müller V, Bostrom N. Future progress in artificial intelligence: A survey of expert opinion. In: Müller V, ed. *Fundamental Issues Of Artificial Intelligence*. Cham: Springer; 2017:553-71.
- NASUWT. Stop Cyberbullying. *nasuwtorguk*. Available at: [https://www.nasuwt.org.uk/Whatsnew/Campaigns/StopCyberbullying/NASUWT\\_002654/](https://www.nasuwt.org.uk/Whatsnew/Campaigns/StopCyberbullying/NASUWT_002654/). Accessed June 6, 2014.
- National Science and Technology Council Committee on Technology. *Preparing For The Future Of Artificial Intelligence*. Washington D.C.: Executive Office of the President; 2016.
- Natu N. This brain test maps the truth - Times of India. *The Times of India*. 2008. Available at: <http://timesofindia.indiatimes.com/city/mumbai/This-brain-test-maps-the-truth/articleshow/3257032.cms>. Accessed February 14, 2017.
- Nell V. Cruelty's rewards: The gratifications of perpetrators and spectators. *Behavioral and Brain Sciences*. 2006;29(03). doi:10.1017/s0140525x06009058.
- Neurath O. Protokollsätze. *Erkenntnis*. 1932;3(1):204-14.
- Nietzsche F. Trans. Wayne T. *Ecce Homo*. New York: Algora Pub.; 2007.
- Nishimoto S, Vu A, Naselaris T, Benjamini Y, Yu B, Gallant J. Reconstructing Visual Experiences from Brain Activity Evoked by Natural Movies. *Current Biology*. 2011;21(19):1641-1646. doi:10.1016/j.cub.2011.08.031.
- Nitecki M, Nitecki D. *Nitecki. Origins Of Anatomically Modern Humans*. New York: Plenum Press; 1994.
- Ogawa S, Lee T, Nayak A, Glynn P. Oxygenation-sensitive contrast in magnetic resonance image of rodent brain at high magnetic fields. *Magnetic Resonance in Medicine*. 1990;14(1):68-78. doi:10.1002/mrm.1910140108.
- Oldest stone tool ever found in Turkey discovered. *ScienceDaily*. 2014. Available at: <https://www.sciencedaily.com/releases/2014/12/141223084139.htm>. Accessed February 17, 2017.
- Olson S, Committee on Science a, Affairs P, National Academies of Sciences a. International Summit on Human Gene Editing: A Global Discussion. *Ncbinlmnihgov*. 2016. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK343651/>. Accessed February 17, 2017.
- Ord T. The Scourge: Moral Implications of Natural Embryo Loss. *The American Journal of Bioethics*. 2008;8(7):12-19. doi:10.1080/15265160802248146.

- Organ C, Nunn C, Machanda Z, Wrangham R. Phylogenetic rate shifts in feeding time during the evolution of Homo. *Proceedings of the National Academy of Sciences*. 2011;108(35):14555-14559. doi:10.1073/pnas.1107806108.
- Osbourn A, O'Maille P, Rosser S, Lindsey K. Synthetic biology. *New Phytologist*. 2012;196(3):671-677. doi:10.1111/j.1469-8137.2012.04374.x.
- Overboe J. Ableist Limits on Self-Narration: The Concept of Post-personhood. In: Raoul V, ed. *Unfitting Stories: Narrative Approaches To Disease, Disability, And Trauma..* Waterloo, ON.: Wilfrid Laurier Univ. Press; 2007:175-182.
- Palacios-González C, Lawrence D. Enhancing Sisyphus. *AJOB Neuroscience*. 2015;6(1):26-27. doi:10.1080/21507740.2014.995320.
- Palacios-González C. Robotic Persons and Asimov's Three Laws of Robotics [unpublished manuscript].
- Panger M, Brooks A, Richmond B, Wood B. Older than the Oldowan? Rethinking the emergence of hominin tool use. *Evolutionary Anthropology: Issues, News, and Reviews*. 2003;11(6):235-245. doi:10.1002/evan.10094.
- Parfit D. *Reasons And Persons*. Oxford [Oxfordshire]: Clarendon Press; 1984:351-377.
- Parker C. The moral primacy of the human being. *Journal of Medical Ethics*. 2010;36(9):563-566. doi:10.1136/jme.2010.037390.
- Pasley B, David S, Mesgarani N et al. Reconstructing Speech from Human Auditory Cortex. *PLoS Biology*. 2012;10(1). doi:10.1371/journal.pbio.1001251.
- Pells R. More UK students turning to banned 'brain boosting' drug than ever before. *The Independent*. 2016. Available at: <http://www.independent.co.uk/student/student-life/noopept-study-drug-legal-high-banned-brain-boosting-students-record-numbers-a7068071.html>. Accessed November 28, 2016.
- Penman S. Virus metabolism and cellular architecture. *Virology*. 1985:169-82.
- Petersson K, Reis A, Askelöf S, Castro-Caldas A, Ingvar M. Language Processing Modulated by Literacy: A Network Analysis of Verbal Repetition in Literate and Illiterate Subjects. *Journal of Cognitive Neuroscience*. 2000;12(3):364-382. doi:10.1162/089892900562147.
- Piaget J. La causalité chez l'enfant. *British Journal of Psychology*. 1928;18:276-301.
- Piaget J. *La Construction Du Réel Chez L'enfant / The Construction Of Reality In The Child*. New York: Basic Books; 1954.
- Pickrell J. Human 'dental chaos' linked to evolution of cooking. *New Scientist Online*. 2005. Available at: <http://www.newscientist.com/article/dn7035-human-dental-chaos-linked-to-evolution-of-cooking.html#.U8WJSY1dUah>. Accessed February 25, 2016.
- Pierce J. A Review of Tool Use in Insects. *The Florida Entomologist*. 1986;69(1):95. doi:10.2307/3494748.
- Pollard E, Rosenberg C. *Worlds Together, Worlds Apart*. New York: W. W. Norton; 2004.
- Price D. Energy and human evolution. *Population and Environment*. 1995;16(4):301-319. doi:10.1007/bf02208116.
- Proctor D, Williamson R, de Waal F, Brosnan S. Chimpanzees play the ultimatum game. *Proceedings of the National Academy of Sciences*. 2013;110(6):2070-2075. doi:10.1073/pnas.1220806110.
- Promoting fruit and vegetable consumption around the world. *World Health Organisation*. 2004. Available at: <http://www.who.int/dietphysicalactivity/fruit/en/>. Accessed December 5, 2016.
- Providing a list of all anti doping rule violations. *Ukadorguk*. 2016. Available at: <http://ukad.org.uk/anti-doping-rule-violations/current-violations/>. Accessed November 28, 2016.
- Prucher J. *Brave New Words: The Oxford Dictionary Of Science Fiction*. New York: Oxford University Press; 2007:6-7.
- Quine W. *A Logical Point Of View*. 2nd ed. New York: Harper; 1963:78.
- Rabassi E. Some notes on Neurath's ship and Quine's sailors. *Principia*. 2003;7(1-2):171-84.
- Radford T, Davis N. Scientists launch proposal to create synthetic human genome. *The Guardian*. 2016. Available at:

- <https://www.theguardian.com/science/2016/jun/02/scientists-launch-proposal-to-create-synthetic-human-genome-dna>. Accessed July 17, 2016.
- Raibert M, Blankespoor K, Nelson G, Playter R. BigDog, the Rough-Terrain Quaduped Robot. *Boston Dynamics*. 2008. Available at: [http://www.bostondynamics.com/img/BigDog\\_IFAC\\_Apr-8-2008.pdf](http://www.bostondynamics.com/img/BigDog_IFAC_Apr-8-2008.pdf). Accessed July 14, 2016.
- Raine A, Yang Y. Neural foundations to moral reasoning and antisocial behavior. *Social Cognitive and Affective Neuroscience*. 2006;1(3):203-213. doi:10.1093/scan/nsl033.
- Raytheon unveils lighter, faster, stronger second generation exoskeleton robotic suit. *Multivuprnewswirecom*. 2010. Available at: <http://multivu.prnewswire.com/mnr/raytheon/46273/>. Accessed November 28, 2016.
- Re T (Adult: Refusal Of Treatment)*. 4 All ER 649 CA(1992).
- Reardon S. The Humanity Switch. *New Scientist (AU/NZ)*. 2012;(2864):10-11.
- Reardon S. US Congress moves to block human-embryo editing. *Nature*. 2015;Online. doi:10.1038/nature.2015.17858.
- Riedl K, Jensen K, Call J, Tomasello M. No third-party punishment in chimpanzees. *Proceedings of the National Academy of Sciences*. 2012;109(37):14824-14829. doi:10.1073/pnas.1203179109.
- Roberts W. Article: Benefiting Beverages. *Preparedfoodscom*. 2009. Available at: <http://www.preparedfoods.com/articles/107718-article-benefiting-beverages-august-2009>. Accessed December 5, 2016.
- Rodgers P. Elon Musk warns of terminator tech. *Forbes*. 2014. Available at: <http://www.forbes.com/sites/paulrodgers/2014/08/05/elon-musk-warns-ais-could-exterminate-humanity/>. Accessed April 16, 2015.
- Rothman S, Rothman D. *The Pursuit Of Perfection*. New York: Pantheon Books; 2003.
- Royal Society. *Brain Waves Module 4: Neuroscience And The Law*. London: Royal Society; 2011:available at <http://royalsociety.org/policy/projects/brain-waves/responsibility-law/> Accessed 7 June 2014.
- Russell S, Norvig P. *Artificial Intelligence A Modern Approach*. 2nd ed. New Jersey: Prentice Hall; 2003.
- Rybicki E. The classification of organisms at the edge of life, or problems with virus systematics. *South African Journal of Science*. 1990;86:182-6.
- Sample I. Governments pose greatest threat to internet, says Google's Eric Schmidt. *The Guardian*. 2012. Available at: <https://www.theguardian.com/technology/2012/may/23/google-fund-teachers-computer-science-uk>. Accessed June 3, 2014.
- Sample I. Regulator to consult public over plans for new fertility treatments. *The Guardian*. 2012. Available at: <https://www.theguardian.com/science/2012/sep/17/genetics-embryo-dna-mitochondrial-disease?newsfeed=true>. Accessed April 8, 2015.
- Sandel M. *The Case Against Perfection: Ethics In The Age Of Genetic Engineering*. Boston: The Belknap Press of Harvard University Press; 2009.
- Schneier B. Cybersecurity, scientific data and public trust. Given at The Royal Society. H5N1 Research: Biosafety, Biosecurity and Bioethics; London. 2012.
- Schwartz R. The Medicalization of Body Modification and the Ethical Obligations of Health Care Providers. 2006.
- Searle J. *The Rediscovery Of The Mind*. Cambridge, MA: MIT Press; 1992.
- Semaw S, Rogers M, Quade J et al. 2.6-Million-year-old stone tools and associated bones from OGS-6 and OGS-7, Gona, Afar, Ethiopia. *Journal of Human Evolution*. 2003;45(2):169-177. doi:10.1016/s0047-2484(03)00093-9.
- Shachtman N. Lockheed Unleashes 'HULC' Super-Strength Gear. *WIRED*. 2009. Available at: <https://www.wired.com/2009/02/lockheed-exo>. Accessed November 28, 2016.
- Shakespeare W, Proudfoot R, Thompson A, Kastan D. *The Arden Shakespeare Complete Works*. Walton-On-Thames: Thomas Nelson and Sons; 1998.
- Shermer M. Shermer's Last Law. *Scientific American*. 2002;286(1):33-33. doi:10.1038/scientificamerican0102-33.

- Shibata Akiyama M. Epidemiology, medical genetics, diagnosis and treatment of harlequin ichthyosis in Japan. *Pediatrics International*. 2015;57(4):516-522. doi:10.1111/ped.12638.
- Shinkareva S, Mason R, Malave V, Wang W, Mitchell T, Just M. Using fMRI Brain Activation to Identify Cognitive States Associated with Perception of Tools and Dwellings. *PLoS ONE*. 2008;3(1):1394. doi:10.1371/journal.pone.0001394.
- Sigmon B. Bipedal behavior and the emergence of erect posture in man. *American Journal of Physical Anthropology*. 1971;34(1):55-60. doi:10.1002/ajpa.1330340105.
- Silver L. *Remaking Eden: Cloning And Beyond In A Brave New World*. New York: Harper Perennial; 1997.
- Silvers A. The right not to be normal as the essence of freedom. *Journal of Evolution and Technology*. 2008;18(1):79-85.
- Simon J, Kirby J. Meet Captain America. *Captain America Comics #1 Marvel Comics*. 1941;(1:1).
- Singer P, Cavalieri P. *The Great Ape Project: Equality Beyond Humanity..* London: Fourth Estate; 1993.
- Sip K, Lynge M, Wallentin M, McGregor W, Frith C, Roepstorff A. The production and detection of deception in an interactive game. *Neuropsychologia*. 2010;48(12):3619-3626. doi:10.1016/j.neuropsychologia.2010.08.013.
- Slaughter V. State Of Oklahoma*. 105 P.3d 832, 834–36 (Oklahoma Criminal App. 2005 2005).
- Smolker R, Richards A, Connor R, Mann J, Berggren P. Sponge Carrying by Dolphins (Delphinidae, *Tursiops* sp.): A Foraging Specialization Involving Tool Use?. *Ethology*. 2010;103(6):454-465. doi:10.1111/j.1439-0310.1997.tb00160.x.
- Soanes A. *Concise Oxford English Dictionary*. 11th ed. Oxford: Oxford University Press; 2006.
- Solomon D. Interview with N. Katherine Hayles: Preparing the Humanities for the Post Human. 2007. Available at: [http://asc.nhc.trp.nc.us/news/?page\\_id=81](http://asc.nhc.trp.nc.us/news/?page_id=81). Accessed February 21, 2016.
- Soon C, Brass M, Heinze H, Haynes J. Unconscious determinants of free decisions in the human brain. *Nature Neuroscience*. 2008;11(5):543-545. doi:10.1038/nn.2112.
- Spence S, Hunter M, Farrow T et al. A cognitive neurobiological account of deception: evidence from functional neuroimaging. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 2004;359(1451):1755-1762. doi:10.1098/rstb.2004.1555.
- Spoor F, Gunz P, Neubauer S et al. Reconstructed *Homo habilis* type OH 7 suggests deep-rooted species diversity in early *Homo*. *Nature*. 2015;519(7541):83-86. doi:10.1038/nature14224.
- Spoor F, Leakey M, Gathogo P et al. Implications of new early *Homo* fossils from Ileret, east of Lake Turkana, Kenya. *Nature*. 2007;448(7154):688-691. doi:10.1038/nature05986.
- Stanley T. Three parent babies: unethical, scary and wrong. *Telegraphcouk*. 2015. Available at: <http://www.telegraph.co.uk/news/health/11380784/Three-parent-babies-unethical-scary-and-wrong.html>. Accessed September 27, 2015.
- Steckel R. Stature and the Standard of Living. *Journal of Economic Literature*. 1995;33(4):1903-40.
- Stoessl F. Die Sententiae des Appius Claudius Caecus. *Rheinisches Museum für Philologie*. 1979;122:18-23.
- Stone L, Lurquin P, Cavalli-Sforza L. *Genes, Culture, And Human Evolution: A Synthesis*. Malden, MA: Blackwell; 2007.
- Studer G, Lipson H. Spontaneous emergence of self-replicating structures in molecule automata. *Proceedings of the 10th Int Conference on Artificial Life (ALIFE X)*. 2006:227-33.
- Sunstein C. *Laws Of Fear*. Cambridge, UK: Cambridge University Press; 2005.
- Syntouch- Biotac. *syntouchllc.com*. 2016. Available at: <http://www.syntouchllc.com/Products/BioTac/>. Accessed July 14, 2016.

- Szostak J. Attempts to Define Life Do Not Help to Understand the Origin of Life. *Journal of Biomolecular Structure and Dynamics*. 2012;29(4):599-600.  
doi:10.1080/073911012010524998.
- Tännsjö T. Medical Enhancement and the Ethos of Elite Sport. In: Savulescu J, Bostrom N, ed. *Human Enhancement*. Oxford: Oxford University Press; 2009:315-326.
- Taylor C. *The Concept Of A Person. Philosophical Papers, Volume 1..* Cambridge: Cambridge University Press; 1985.
- Taylor R. A step at a time: New Zealand's progress toward hominid rights. *Animal Law*. 2001;7:35-41.
- The March of Dimes Birth Defects Foundation. *March Of Dimes Global Report On Birth Defects*. New York: White Plains; 2006.
- The Nonhuman Rights Project, Inc., On Behalf Of Tommy, V Patrick C. Lavery*. 518336, State of New York Supreme Court 2014 (available at <http://decisions.courts.state.ny.us/ad3/Decisions/2014/518336.pdf> Accessed 14 July 2016).
- The word: Common sense. *New Scientist*. 2006. Available at: <https://www.newscientist.com/article/mg19025471.700-the-word-common-sense/>. Accessed July 14, 2016.
- The World's Most Advanced Humanoid Robot. *Asimo by Honda*. 2016. Available at: [http://asimo.honda.com/news/honda-develops-intelligence-technologies-enabling-multiple-asimo-robots-to-work-together-in-coordination/newsarticle\\_0073/](http://asimo.honda.com/news/honda-develops-intelligence-technologies-enabling-multiple-asimo-robots-to-work-together-in-coordination/newsarticle_0073/). Accessed February 16, 2017.
- Tieri F. Man and Monster: Conclusion. *Weapon X #28 Marvel Comics*. 2004;2(28).
- Tolstoy L, Trans. Dole N. *The Complete Works: Childhood, Boyhood And Youth..* New York: T.Y. Crowell; 1899.
- Tolstoy L. *War And Peace*. Trans Maude L, Maude A.. London: Oxford University Press; 1965:Book VI, chap. XXIV. at 88.
- Toth N, Schick K. Overview of Paleolithic Archeology. In: Henke H, Hardt T, Tattersall I, ed. *Handbook Of Paleoanthropology. Volume 3*. New York: Springer- Verlag; 2007:1944.
- Transgenerational Epigenetic Inheritance - October 2015 | The Company of Biologists. *The Company of Biologists*. 2017. Available at: <http://www.biologists.com/workshops/transgenerational-epigenetic-inheritance/>. Accessed February 13, 2017.
- Treaty Office of the Council of Europe. *Additional Protocol To The Convention For The Protection Of Human Rights And Dignity Of The Human Being With Regard To The Application Of Biology And Medicine, On The Prohibition Of Cloning Human Beings..*; 1998:<http://conventions.coe.int/Treaty/en/Treaties/Html/168.htm>. Accessed 5th October 2015.
- Treaty Office of the Council of Europe. *Convention For The Protection Of Human Rights And Dignity Of The Human Being With Regard To The Application Of Biology And Medicine: Convention On Human Rights And Biomedicine CETS No.: 164*. Oviedo; 1997:<http://conventions.coe.int/Treaty/Commun/ChercheSig.asp?NT=164&CM=&DF=&CL=ENG>.
- Trifonov E. Definition of Life: Navigation through Uncertainties. *Journal of Biomolecular Structure and Dynamics*. 2012;29(4):647-650. doi:10.1080/073911012010525017.
- Trifonov E. Vocabulary of Definitions of Life Suggests a Definition. *Journal of Biomolecular Structure and Dynamics*. 2011;29(2):259-266. doi:10.1080/073911011010524992.
- UK Parliament. *Select Committee On Science And Technology Fifth Report*. <http://www.publications.parliament.uk/pa/cm200405/cmselect/cmsctech/7/704.htm> Accessed 5 October 2015; 2005.
- UK Parliament. *The Human Fertilisation And Embryology (Mitochondrial Donation) Regulations 2015 No. 572*. London; 2015:[http://www.legislation.gov.uk/uksi/2015/572/pdfs/uksi\\_20150572\\_en.pdf](http://www.legislation.gov.uk/uksi/2015/572/pdfs/uksi_20150572_en.pdf) Accessed 5 October 2015.

- UN Educational, Scientific and Cultural Organisation (UNESCO). *Universal Declaration On The Human Genome And Human Rights.*; 1997.
- United Nations General Assembly. *International Covenant On Civil And Political Rights (ICCPR)*. United Nations, Treaty Series, vol. 999.; 1966.
- United Nations General Assembly. *Universal Declaration Of Human Rights.*; 1948:217 A (III).
- United Nations. *International Covenant On Economic, Social And Cultural Rights*. Office of the High Commissioner; 1966.
- United Nations. *Press Release GA/10333 Fifty-Ninth General Assembly Plenary 82Nd Meeting.*; 2005. Available at: <http://www.un.org/News/Press/docs/2005/ga10333.doc.htm>. Accessed October 5, 2015.
- United States V. Semrau*. WL 6845092(W. D. Tennessee, June 1, 2010) 2010).
- van Beek T. Chemical analysis of Ginkgo biloba leaves and extracts. *Journal of Chromatography A*. 2002;967(1):21-55. doi:10.1016/s0021-9673(02)00172-3.
- van Schaik C, Fox E, Sitompul A. Manufacture and Use of Tools in Wild Sumatran Orangutans Implications for Human Evolution. *Naturwissenschaften*. 1996;83(4):186-188. doi:10.1007/s001140050271.
- Vogel G, Stokstad E. U.K. Parliament approves controversial three-parent mitochondrial gene therapy. *ScienceInsider*. 2015;February 3. doi:10.1126/science.aaa7793.
- Vogel G. Embryo engineering alarm. *Science*. 2015;347(6228):1301-1301. doi:10.1126/science.347.6228.1301.
- von Linné C. *Systema Naturæ. Regnum Animale.*.. 10th ed.; 1758:18,20 Available from: <http://www.biodiversitylibrary.org/item/80764#page/28/mode/1up> Accessed 25 Feb 16.
- Von Neumann J. *The Theory Of Self-Reproducing Automata*. Burks A. Ed.. Urbana: University of Illinois Press; 1966.
- Warnock M. *Report Of The Committee Of Inquiry Into Human Fertilisation And Embryology ('The Warnock Report')*, Cm 9314. Department of Health and Social Security, HM Stationery Office; 1984. Available at: [http://www.hfea.gov.uk/docs/Warnock\\_Report\\_of\\_the\\_Committee\\_of\\_Inquiry\\_into\\_Human\\_Fertilisation\\_and\\_Embryology\\_1984.pdf](http://www.hfea.gov.uk/docs/Warnock_Report_of_the_Committee_of_Inquiry_into_Human_Fertilisation_and_Embryology_1984.pdf). Accessed February 13, 2017.
- Warwick K. *I, Cyborg*. Chicago: University of Illinois Press; 2004.
- Weijer C, Peterson A, Webster F et al. Ethics of neuroimaging after serious brain injury. *BMC Medical Ethics*. 2014;15(1). doi:10.1186/1472-6939-15-41.
- Weil S. The Iliad: A poem of force. In: Meyer P, ed. *The Pacifist Conscience*. Harmondsworth: Penguin; 1966:293.
- Weinberg Bealer B. *The World Of Caffeine : The Science And Culture Of The World's Most Popular Drug*. New York: Routledge; 2001.
- Where there's a will there's a way: Enhancing motivation. *Oxford Uehiro Centre for Practical Ethics - Blog*. 2016. Available at: <http://blog.practicalethics.ox.ac.uk/2015/02/where-theres-a-will-theres-a-way-enhancing-motivation/>. Accessed October 14, 2016.
- Whiten A, Goodall J, McGrew W et al. Cultures in Chimpanzees. *Nature*. 1999;399(6737):682-685. doi:10.1038/21415.
- Why robots are coming for US service jobs. *Financial Times*. 2016. Available at: <http://www.ft.com/cms/s/0/cb4c93c4-0566-11e6-a70d-4e39ac32c284.html#axzz4DNsK7QYF>. Accessed July 14, 2016.
- WILLIAMS J. Unesco's Proposed Declaration On Bioethics And Human Rights - A Bland Compromise. *Developing World Bioethics*. 2005;5(3):210-215. doi:10.1111/j.1471-8847.2005.00117.x.
- Wilmore J, Knuttgen H. Aerobic Exercise and Endurance. *The Physician and Sportsmedicine*. 2003;31(5):45-51. doi:10.3810/psm.2003.05.367.
- Wilmut I, Schnieke A, McWhir J, Kind A, Campbell K. Viable Offspring Derived from Fetal And Adult Mammalian Cells. *Cloning and Stem Cells*. 2007;9(1):3-7. doi:10.1089/cla.2006.0002.

- Wilson G, Shpall S. Action. *Stanford Encyclopedia of Philosophy*. 2002. Available at: <https://plato.stanford.edu/entries/action/>. Accessed July 17, 2016.
- Wilson J. Persons, post-persons and thresholds. *Journal of Medical Ethics*. 2011;38(3):143-144. doi:10.1136/medethics-2011-100243.
- Wittgenstein L. Trans. Paudl D, Anscombe GEM. *On Certainty*. Oxford: Basil Blackwell; 1969:at para. 253 and 247.
- Wittgenstein L. Trans. Anscombe G. *Philosophical Investigations*. Oxford: Basil Blackwell; 1968:Part IIxi at 217.
- Witting C. *Street On Torts*. 14th ed. Oxford: Oxford University Press; 2015.
- Woodring J. Air Force scientists battle aviator fatigue. *US Air Force Print News*. 2004. Available at: <https://web.archive.org/web/20121014113247/http://www.af.mil/news/story.asp?id=123007615>. Accessed November 28, 2016.
- Wordsworth W. The Sonnet (ii). In: Quiller-Couch A, ed. *The Oxford Book Of English Verse: 1250–1900*. Oxford: Clarendon; 1919.
- World Health Organisation. *Preamble To The Constitution Of The World Health Organization As Adopted By The International Health Conference*. New York; 1946.
- Wrangham R, Conklin-Brittain N. Cooking as a biological trait. *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology*. 2003;136(1):35-46. doi:10.1016/s1095-6433(03)00020-5.
- Wrangham R. *Catching Fire: How Cooking Made Us Human*. New York: Basic Books; 2010.
- Zykov V, Mytilinaios E, Adams B, Lipson H. Robotics: Self-reproducing machines. *Nature*. 2005;435(7039):163-164. doi:10.1038/435163a.

## **APPENDICES**

What follows are the papers that have presently been published, as available from their respective sources. Note that *More Human Than Human* is presently ‘in press’ and no PDF version is available at the time of submission.

# Oxford Handbooks Online

## New Technologies, Old Attitudes, and Legislative Rigidity

John Harris and David R. Lawrence

The Oxford Handbook of the Law and Regulation of Technology

*Edited by Roger Brownsword, Eloise Scotford, and Karen Yeung*

Subject: Law, IT and Communications Law, Law and Society   Online Publication Date: Jan 2017

DOI: 10.1093/oxfordhb/9780199680832.013.58

### Abstract and Keywords

Two genetic technologies capable of making heritable changes to the human genome have revived interest in, and in some quarters a very familiar panic concerning, so-called germline interventions. These technologies are most recently the use of CRISPR/Cas9 to edit genes in non-viable IVF zygotes and Mitochondrial Replacement Therapy (MRT). The possibility of using either of these techniques in humans has encountered the most violent hostility and suspicion. Here, we counter the stance of the US NIH and its supporters by showing that differing global moralities are free to exist unimpeded under international biolaw regimes, which do not in any way represent unified opinion against such technologies. Furthermore, we suggest a more rational approach to evaluating them through analysis of similar technologies which have caused past controversy.

Keywords: human embryos, germ-line modification, gene editing, Crispr/Cas9, mitochondrial replacement therapy, MRT

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## 1. Introduction

The concept of altering the human germline in embryos for clinical purposes has been debated over many years from many different perspectives, and has been viewed almost universally as a line that should not be crossed... Advances in technology have given us an elegant new way of carrying out genome editing, but the strong arguments against engaging in this activity remain

(Collins 2015).

Thus spoke the director of the US National Institutes of Health, Francis Collins. As we shall see, however, this public statement is somewhat misleading.

The statement was issued in the wake of the media furore<sup>2</sup> engendered by the publication of research by Liang and others (2015), in which the genome of a human embryo was edited to correct mutations which are the basis of potentially severe β thalassemia type blood disorders. The controversy rolls on with the recent application by UK researchers for a licence to conduct similar experiments using the Crispr/Cas9 system (Cressey and others 2015).

It is should be noted at this point that, in the Chinese research as well as the proposed UK research, the embryos were/would be destroyed once the success or failure of the procedure was determined. At no point were any of the involved embryos proposed for implantation or otherwise bringing to fruition. In a broader sense, the collective human germline remains unaffected by research in this manner; this is an idea to which we will return later.

Collins' claim regarding germline modification being 'universally' shunned is intriguing. He does not elaborate on how this has been demonstrated, legally or otherwise. Marcy Darnovsky, Executive Director of the bioconservative Centre for Genetics and Society, suggests in a statement supporting Collins that it would be in the US's interest to follow (or institute anew) 'international agreements, along the lines of the Council of Europe's Convention on Biomedicine and Human Rights and UNESCO's Universal Declaration on the Human Genome and Human Rights' (Centre for Genetics and Society 2015). The inference perhaps being that the named legislation represents Collins' universal consensus, though this notion is questionable at best.

The Council of Europe's Convention on Human Rights and Biomedicine (henceforth ECHRB or 'the Convention') was intended to constitute a binding reference for patient rights and general human rights in the context of advancements in biotechnology and medical science. It has, numerically speaking, been quite successful in its uptake. The official listings published by the Council indicate that out of 47 member states, 35 are signatories and of these, 29 have ratified the Convention (Council of Europe 2015a). We cannot, however, necessarily take these figures at face value; particularly when we consider the idea of 'agreements' in the spirit in which it is employed by, for example, Darnovsky, who is representative of those broadly favourable to the spirit of Collins' statement.

Several of the leading European nations, at least as far as genetic science goes, for example the United Kingdom, Germany, and Belgium, made clear their disagreement with the Convention by choosing not to sign at all. Largely, these disagreements were over Article 18, regarding cloning human embryos for research, among other 'significant articles that conflict with [UK] legislation' (Science and Technology Committee 2004-05).

The Convention required only five states (Council of Europe 2015a: Art 33.3) to ratify in order for it to enter into force, and within eight months of its opening it had gained 23 signatures—a sufficient number of which ratified to allow an entry into force on January 12th 1999.<sup>3</sup>

Further ratifications quickly followed, giving a total of 13 within five years of publication. It is important to note that roughly two-thirds of the present-day signatures on the ECHRB were made in 1997, while in the last ten years there has been only one new signatory: Albania in 2011 (Council of Europe 2015a). Though, this is perhaps unsurprising since it might be expected that most of those who were ever going to sign had done so by this point. In signing the Convention, nations do not necessarily ‘express their consent to be bound by it’ (Council of Europe 2015a) and so, if we are to treat this literally, we may not consider that this act in itself constitutes an accord with the ideals espoused within it.

Frances Millard (2010: 427) has suggested that nine of the ten post-communist central and eastern European states all signed and quickly ratified the ECHRB, ‘with no indication of engagement by parliamentary deputies, specialist committees, professional bodies, or the wider public’. We must ask, then, whether what might be termed ‘mimetic’ uptake of legislation without proper and mature consideration in this manner can be truly considered to represent consensus. Noting Millard’s views on a perceived need by these nations for international ‘legitimization’, we must consider that for the most part, the newly sovereign states lacked specialist bioethical and patient rights legislation (Birmontiene 2004), having had to construct and legislate a recently democratized state. Much human rights policy was formed on the basis of Council of Europe guidelines, and it is of importance that we note that most of the Constitutions of these nations hold that the norms of ratified international treaties are directly applicable in the national legislation; so courts can rule based on the texts of international treaties, even if national laws have not yet been adopted after the ratification (Goffin and others 2008). This effectively means that in the Convention, these states were presented with ready-made legislation covering gaps in their own, which was fully and legally applicable with no further domestic law-making required. None of the states engaged in meaningful debate over any part of the Convention, if at all, and so ratifications came quickly and without dissent. We might also note that the provision of Article 1—namely, that ‘Each Party shall take in its internal law the necessary measures to give effect to the provisions of this Convention’ (Council of Europe 2015a: Art 1)—becomes self-fulfilling in respect to the aforementioned style of constitutional absorption of international non-binding conventions.

Instantly, then, from holding no position on the matters addressed by the Convention, these post-communist nations aligned in consensus with it. Of course, it is possible that

one or more of these nations may eventually consider holding future debate on any of these issues and then be in a position to join a genuine consensus or not on the basis of something approaching informed consent.

If morally derived laws such as the ECHRB do not reflect the moral standpoint of a particular nation, then such laws are unlikely to reflect either any contribution to a consensus nor yet any evidence for democratic support. While this can be held to be true under any theory of ethics, it has been argued that:

we need not adopt a quietism about moral traditions that cause hardship and suffering. Nor need we passively accept the moral norms of our own respective societies, to the extent that they are ineffective or counterproductive or simply unnecessary

(Blackford 2010: 62).

This is to say that the subjective values of a culture or nation are worthy of defence, and as such, we do not have to accept contraventions of these from within or without. The method by which we defend our values on a national scale is through the enactment of laws, and so it may follow—as Darnovsky appears to agree—that to prevent encroachment from abroad one must pass international legislation.

To examine this, we might utilize the example once more of the ECHRB, which is nominally aimed solely at member states of the Council of Europe. It is important to note that the Convention is not global legislation. Although it allows for the accession of non-member states<sup>4</sup>, the Convention contextualizes itself as pertaining to the benefit of the Council of Europe in its Preamble: ‘Considering that the aim of the Council of Europe is the achievement of a greater unity between its members ...’ (Council of Europe 2015a: Preamble). This passage can be interpreted as specifying the area of influence of the document, and as such makes it clear that it is intended to protect or rather promote a coherent expression of values within that area.

The issue which remains, then, is that while protection of one’s own values is acceptable, it is quite another action to impose such laws on others. This would usually constitute a contravention of human rights ideals and also steps somewhat beyond a defence, becoming an attack upon the values held by the subject. There are two ways in which we can consider this dilemma.

The first line of inquiry requires us to endorse the notion that international disagreement, represented by a failure of consensus amongst the drafting agents of a document, leads to a weak compromise designed to placate all parties. Such a criticism was levelled at the then-draft Universal Declaration on Bioethics and Human Rights by John Williams, who

called it ‘a document that does not advance international bioethics in any way’ (Williams 2005: 214) and went on to suggest that ‘a genuinely significant international [declaration] ... is essentially unrealisable’. (Williams 2005: 215; for similar proposals see Harris 2004). This problem would appear to be a necessary result of formulating proposals for legislation to maximize acceptability, as would be one provision for law from a morally relativistic position; and so it lends itself as evidence in support of the idea that international laws have legitimacy issues.

Secondly, nations are free not to accept the terms of any international instrument. For example, as mentioned earlier several states refused to sign, let alone ratify, the ECHRB (Council of Europe 2015a). Whether for reasons of protecting values already enshrined in domestic biolaw (Science and Technology Committee 2004–05), or for reasons of cultural morality as given in India’s explanation for voting against the Universal Declaration on Human Cloning (UDoHC) (that ‘some of the provisions of the Declaration could be interpreted as a call for a total ban on all forms of human cloning’ (United Nations 2005), when India supports therapeutic cloning), it is unquestionably the case that nations are able to protect their own values by refusing to accede. We might (wryly) note that the UDoHC was originally intended to be a binding Convention, but was downgraded due to disagreement (United Nations 2005).

Therefore, we may assume that differing global moralities are free to exist unimpeded under international biolaw regimes, and they do not in any way represent unified opinion against a technology such as germline modification; despite the way that supporters of the NIH’s stance may seek to justify their condemnation.

Having noted that appeals to moral and legislative consensus on the permissibility or even wisdom of germline interventions may be premature, it is now time to examine in more detail what might constitute a basis for a rational approach to new technologies in this field. To do so we will examine the emergence, or re-emergence, of three new such technologies that involve germline interventions. In the following sections the discussion follows lines explored by one of the present authors in two recent research papers (Harris 2016a and 2016b).

## **2. Altering the Human Germline in Embryos: A Case Study**

The human embryo modification debate opened with the birth of Louise Brown, the first IVF baby on 25 July 1978 (for description of the technique, see Harris 1983; and for

discussion of some possible advantages of human cloning, see Harris 1985 and 2004). However, the defining event was of course the birth of another instantly famous female baby in the United Kingdom, which was announced in Nature on 27 February 1997 (see Wilmut and others 2007). This baby was named Dolly, allegedly because she had been cloned from a mammary gland which instantly reminded those responsible of Dolly Parton. Louise and Dolly proved to be healthy and, as far as is publicly known, happy individuals; who, like the over five million babies since born worldwide via IVF, owe their existence to British science and in particular to the work of Bob Edwards and Patrick Steptoe (Brian 2013). Louise Brown and Dolly are related also by the unfortunate prejudice against them and denunciation of their respective births of those who objected and continue to object to the technologies and indeed the scientists that produced them. We may hope that a very large proportion of these children are glad to be alive and glad their births were not prevented by the suppression of the science that made them possible ... more of which anon.

Two genetic technologies capable of making heritable changes to the human genome have revived interest in, and in some quarters a very familiar panic concerning, so-called germline interventions. These technologies are most recently the use of CRISPR/Cas9 to edit genes in non-viable IVF zygotes (Collins 2015) and Mitochondrial Replacement Therapy (MRT) the use of which was approved in principle in a landmark vote earlier this year by the United Kingdom Parliament (Human Fertilisation and Embryology Regulations 2015). The possibility of using either of these techniques in humans has encountered the most violent hostility and suspicion. However, it is important to be aware that much of this hostility dates back to the fears associated with IVF and other reproductive technologies and by cloning; fears which were baseless at the time with both having proven to be highly beneficial to humanity and to be effectively regulated and controlled.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) publishing their Universal Declaration on the Human Genome and Human Rights, on 11 November 1997, endorsed 'The preservation of the human genome as common heritage of humanity'. Article 13 of the ECHRB provides:

An intervention seeking to modify the human genome may only be undertaken for preventive, diagnostic or therapeutic purposes and only if its aim is not to introduce any modification in the genome of any descendants

(UNESCO 1997: Art 13).

How any such modification could be made without having the aim of introducing such 'modification in the genome of any descendants' the Council of Europe does not explain. And, Article 1 of the Additional Protocol specifically aimed at banning cloning provides:

1. Any intervention seeking to create a human being genetically identical to another human being, whether living or dead, is prohibited.
2. For the purpose of this article, the term human being ‘genetically identical’ to another human being means a human being sharing with another the same nuclear gene set (Council of Europe 2015b).

Those who appeal to the common heritage of humanity in this way have also come to see the present evolved state of the human genome, not only as the common heritage of humanity, but as involving the, almost always un-argued, assertion that the human genome must be ‘frozen’, as far as is possible, in perpetuity at this particular evolutionary stage.

The consensus against germline interventions *per se*—a consensus that one of us long ago argued was ill-conceived (Harris 1992: ch 8)—is now crumbling. The recent vote in the UK Parliament (Vogel and Stokstad 2015) to change the law concerning germline interventions—along with the previously mentioned recent application to conduct such research in human embryos—and the willingness of the United States Institute of Medicine of the National Academies to make a serious and objective re-assessment of these, are just two examples issues (see National Academies 2015; Harris 2016a).

UNESCO (and many before and since) conveniently ignore the fact that cloning is the only reproductive method that actually does preserve the human genome intact. Indeed, it copies it (though sometimes only almost) exactly. Other forms of human reproduction on the other hand randomly vary the human genome with each combination of the genetic material of two or more different individuals. What human reproduction does not do very well is improve it. As Harris (2007) has argued, the human genome in its present state is a very imperfect ‘work in progress’. The problem is that progress via Darwinian evolution is extremely slow and the direction unpredictable, save only that it will facilitate gene survival (Dawkins 1976). We surely need to accelerate either the development of better resistance to bacteria, disease, viruses, or hostile environments, or of the technologies that will be eventually necessary to find, and travel to, habitats alternative to the earth.

### 3. Mitochondrial Replacement Therapy (MRT)

As mentioned, recent papers, editorials, and news items discuss possible research and therapy using various genome modification techniques, and have been followed by the announcement that a group in China had used such techniques in human embryos (Cyranoski and Reardon 2015; Cyranoski 2015). In the light of these and other

developments, we urgently need to re-assess the safety, efficacy, and ethics of the use of such techniques in humans and move towards a new consensus as to the appropriate conditions for their ultimate acceptability (Baltimore and others 2015; Cyranoski 2015; Lanphier and others 2015; Vogel 2015). David Baltimore and others (2015: 2) emphasize the need for such work to be carried out ‘in countries with a highly developed bioscience capacity’ and ones in which ‘tight regulation’ of such science exists or can be established.

In the UK, any further such modifications that would end up in the genome of an implanted human embryo would have to be licensed by the UK regulatory body, the Human Fertilisation and Embryology Authority (HFEA) as established by Act of Parliament in 1990. Such measures would probably also need to be approved separately by the UK Parliament, as has recently happened in the case of MRT (Human Fertilisation and Embryology Regulations 2015). In the UK, we have for more than 25 years had, so far, adequate and robust safeguards in place. However, these safeguards result from prior years of wide public consultation, scholarly research, and authoritative reports (Department of Health and Social Security 1984), resulting in a broad consensus on the way forward, established and continually reviewed by Parliament.

MRT is considered (by the above standard) as now ‘safe enough’ for use in humans, remembering that there is no such thing as ‘safe’. What is ‘safe enough’ is context-relative and always involves risk benefit analysis appropriate to the context. For example, almost all chemical therapies used in the treatment of cancer are highly toxic and as a result, unlike most other pharmaceuticals licensed for human use, have never been tested on ‘healthy adults’ before clinical adoption. They are however considered safe enough by cancer patients, their families, and clinicians in the light of the lethal nature of the alternatives.

MRT will enable some 2500 women in the UK to have children genetically related to them and also avoid that child suffering terrible disease. Mitochondrial disease can be very serious, causing conditions like Leigh’s disease, a fatal infant encephalopathy, and others that waste muscles or cause diabetes and deafness.

### **3.1 Future Generations**

Many objections to germline interventions emphasize that such interventions differ in affecting ‘generations down the line’ (Sample 2012). However, this is true not only of all assisted reproductive technologies, but of all reproduction of whatever kind. This so-called ‘uncharted territory’ (Sample 2012) naturally involves trade-offs between benefits to people now and concerns about future dangers. The introduction of all new technologies involves uncertainty about long-term and unforeseen events.

This is, of course, also true of ‘normal’ sexual reproduction, a very dangerous activity indeed, and one often described as a ‘genetic lottery’:

Every year an estimated 7.9 million children - 6 percent of total birth worldwide - are born with a serious birth defect of genetic or partially genetic origin.

Additional hundreds of thousands more are born with serious birth defects of post-conception origin, including maternal exposure to environmental agents, (teratogens) such as alcohol, rubella, syphilis and iodine deficiency that can harm a developing fetus

(March of Dimes Birth Defects Foundation 2006: 2).

Sexual reproduction, with its gross inefficiency in terms of the death and destruction of embryos—according to Ord (2008), the estimated survival rate to term is in the region of only 37%, with around 226 million spontaneous abortions—involves significant harm to future generations, but is not usually objected to on these grounds.

If the appropriate test for permissible risk of harm to future generations is sexual reproduction, other germline changing techniques (other than sexual reproduction, that is) would need to demonstrate severe foreseeable dangers in order to fail. MRT will prevent serious mitochondrial disease and the suffering it causes for women with mitochondrial disease, their own children, and for countless future generations. This looks like a reasonable cost benefit strategy to attempt.

Moreover, as Harris (2016a) points out in a comprehensive discussion of these issues,

In the case of Mitochondrial disease we know that many women will continue to desire their own genetically related children and will continue to have them if denied or unable to access MRT. The denial of access to MRT will not prevent serious disease being transmitted indefinitely through the generations whereas access to MRT can be expected significantly to reduce this risk. The choice here is not between a germline intervention which might go wrong and as a result perpetuate a problem indefinitely and a safe alternative. It is between such a technique and no current alternative for women who want their own genetically related offspring and who will also act so as to perpetuate the occurrence of disease.

In other words, the alternative to MRT involves a greater known risk.

### **3.2 Three-parent Families**

The popular press usually labels MRT as the ‘three genetic parents’ process, despite the fact that the third-party DNA contained in the donated mitochondria comprises much less than 1% of the total genetic contribution, and does not transmit any of the traits that confer the usual family resemblances and distinctive personal features in which both parents and children are interested. The mitochondria provide energy to cells, and when they are diseased cause inheritable harm—hence the need for mitochondria replacement therapy. No identity-conferring features or other familial traits are transmitted by the mitochondria. In any event, to be a parent properly so called, as opposed to a mere progenitor, involves much more than a genetic contribution to the child and often not even a genetic contribution.

## **4. The Use of CRISPR/Cas9 in Embryos**

Many of the arguments rehearsed above also apply to objections to other germline modification techniques. To return to our starting point, Francis Collins (2015) has further stated:

[T]he strong arguments against engaging in this activity remain. These include the serious and unquantifiable safety issues, ethical issues presented by altering the germline in a way that affects the next generation without their consent ...

‘Serious and unquantifiable’ safety issues feature in all new technologies what is different here? Collins thinks one important difference is absence of consent.

### **4.1 Consent**

Consent is simply irrelevant here for the simple and sufficient reason that there are no relevant people in existence capable of either giving or withholding consent to these sorts of changes in their own germline. We all have to make decisions for future people without considering their inevitably absent consent. All would be/might be parents take numerous decisions about issues that might affect their future children, and they/we do this all the time without thinking about consent of the children; how could they/we not do so? There are decisions first and foremost in most cases of sexual reproduction, about what genetic endowment is likely to result from a particular paring (or more complex combination) of sets of chromosomes. George Bernard Shaw and Isadora Duncan were famous, but only

partial and possibly apocryphal<sup>5</sup> exceptions. When she, apparently, said to him something like: ‘why don’t we have a child ... with my looks and your brains it cannot fail’ and received Shaw’s more rational assessment ... ‘yes, but what if it has my looks and your brains!’ Although unlike most would-be parents, they did think about what combination of their collective genes would be advantageous or otherwise, even they did not think (unlike Collins) their decision needed to wait for the consent of the resulting child. Nobody does! All parents decide for their present and future children until such children are capable of consenting for themselves. This is not, of course, to say that parents and scientists should not decide responsibly on the best available combination of evidence and argument; this they must do. Rather, the basis of their decision-making cannot, for obvious reasons, include the consent of the future children.

This is of course Derek Parfit’s famous ‘non-identity problem’ (1984: 351–377). This disregard of the relevance of such consents is this potential child’s only chance of existence and therefore so long as the best guess is that the child’s eventual life would not be unacceptably awful, it would be in that child’s interests to be created.

Notice that those who raise issues of consent in relation to non-existent beings, or indeed in relation to those beings incapable of consent, only do so in circumstances when they wish to claim that the relevant children would not, or should not, have consented, rather than the reverse, and therefore that those potential children should not be or have been born.

If there is a discernible duty here it is surely to create the best possible child. That is what it is to act for the best, ‘all things considered’.<sup>6</sup> This we have moral reasons to do; but they are not necessarily overriding reasons (Harris 1985; 1998).

## 4.2 Transgenerational Epigenetic Inheritance

One further possibility that has, we believe, so far entirely escaped attention in this context is the fact that heritable changes are not necessarily confined to conventional germline genetic effects (Reardon 2015). As noted recently: ‘The transmission of epigenetic states across cell divisions in somatic tissues is now well accepted and the mechanisms are starting to be unveiled. The extent to which epigenetic inheritance can occur across generations is less clear ...’.<sup>7</sup> For example, how can UNESCO’s absurd claim already noted concerning the obligation to preserve ‘the human genome as common heritage of humanity’ be applied to epigenetic effects which may only be apparent *post hoc*? Should we be alarmed or comforted by this apparent crack in the armour? These issues have been discussed recently elsewhere<sup>8</sup> and they are issues on which the authors continue to work.

For now, we need not panic. Rather, we need to recognize that we are the products of a germline-altering process called evolution, which uses the very hit and miss experimental technology sometimes politely called ‘sexual reproduction’ (and sometimes not). That process is mind-bogglingly slow, but it has not stopped and we cannot stop it except by our own extinction. We know for sure that in the future there will be no more human beings and no more planet Earth. Either we will have been wiped out by our own foolishness or by brute forces of nature or, we hope, we will have further evolved by a process more rational and much quicker than Darwinian evolution; a process described by both Harris (2007) and Lawrence (2014).<sup>9</sup>

## References

- Baltimore D and others, ‘A Prudent Path Forward for Genomic Engineering and Germline Gene Modification’ (2015) 19 *Science* 1325
- Birmontiene T, ‘Health Legislation in Eastern European Countries: the Baltic States’ (2004) 11 *European Journal of Health Law* 77
- Blackford R, ‘Book Review: Sam Harris’ *The Moral Landscape*’ (2010) 21 *Journal of Evolution and Technology* 53 <<http://jetpress.org/v21/blackford3.htm>> accessed 25 November 2015
- Brian K, ‘The Amazing Story of IVF: 35 Years and Five Million Babies Later’ (*The Guardian*, 12 July 2013) <[www.theguardian.com/society/2013/jul/12/story-ivf-five-million-babies](http://www.theguardian.com/society/2013/jul/12/story-ivf-five-million-babies)> accessed 25 April 2015
- Centre for Genetics and Society, ‘NIH Statement on Gene Editing Highlights Need for Stronger US Stance on Genetically Modified Humans, Says Public Interest Group’ (*Genetics and Society*, 19 April 2015) [www.geneticsandsociety.org/article.php?id=8544](http://www.geneticsandsociety.org/article.php?id=8544) accessed 25 November 2015
- Collins F, ‘Statement on NIH Funding of Research Using Gene-Editing Technologies in Human Embryos’ (*National Institutes of Health*, 29 April 2015) <[www.nih.gov/about/director/04292015\\_statement\\_gene\\_editing\\_technologies.htm](http://www.nih.gov/about/director/04292015_statement_gene_editing_technologies.htm)> accessed 25 November 2015
- Council of Europe, ‘Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine’ (CETS No 164, 2015a) <<http://conventions.coe.int/Treaty/Commun/ChercheSig.asp?NT=164&CM=&DF=&CL=ENG>> accessed 5 October 2015

Council of Europe, 'Additional Protocol to the Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine, on the Prohibition of Cloning Human Beings' (CETS No 168, 2015b) <<http://conventions.coe.int/Treaty/en/Treaties/Html/168.htm>> accessed 25 November 2015

Cressey D, Abbott A and Ledford H, 'UK Scientists Apply for Licence to Edit Genes in Human Embryos' (*Nature News*, 18 September 2015) <[www.nature.com/news/uk-scientists-apply-for-licence-to-edit-genes-in-human-embryos-1.18394](http://www.nature.com/news/uk-scientists-apply-for-licence-to-edit-genes-in-human-embryos-1.18394)> accessed 25 November 2015

Cyranoski D, 'Ethics of embryo editing divides scientists' (2015) 519 *Nature* 272 <[www.nature.com/news/ethics-of-embryo-editing-divides-scientists-1.17131](http://www.nature.com/news/ethics-of-embryo-editing-divides-scientists-1.17131)> accessed 23 November 2015

Cyranoski D and Reardon S, 'Chinese Scientists Genetically Modify Human Embryos' (*Nature*, 2015) <[www.nature.com/news/chinese-scientists-genetically-modify-human-embryos-1.17378](http://www.nature.com/news/chinese-scientists-genetically-modify-human-embryos-1.17378)> accessed 23 November 2015

Dawkins R, *The Selfish Gene* (OUP 1976)

Department of Health and Social Security, *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (Cm 9314, 1984) ('The Warnock Report')

Gibbs A, *Shaw Interviews and Recollections* (University of Iowa Press 1990)

Goffin T and others, 'Why Eight EU Member States Signed, but Not Yet Ratified the Convention for Human Rights and Biomedicine' (2008) 86 *Health Policy* 222

Harris J, 'In Vitro fertilisation: the ethical issues' (1983) 33 *Philosophical Quarterly* 217

Harris J, *The Value of Life* (Routledge 1985)

Harris J, *Wonderwoman and Superman: The Ethics of Human Biotechnology* (OUP 1992)

Harris J, 'Rights and Reproductive Choice' in John Harris and Søren Holm (eds) *The Future of Human Reproduction: Choice and Regulation* (Clarendon Press 1998)

Harris J, *On Cloning* (Routledge 2004)

Harris J, *Enhancing Evolution* (Princeton UP 2007)

Harris J, 'Germ Line Modification and the Burden of Human Existence' (2016a) 25 *Cambridge Quarterly of Healthcare Ethics* 1 <<http://dx.doi.org/10.1017/S0963180115000237>> accessed 25 November 2015

Harris J, 'Germline Manipulation and our Future Worlds' (2016b) American Journal of Bioethics (in press)

Human Fertilisation and Embryology Act 1990 c 37 (as amended by the Human Fertilisation and Embryology Act 2008 c 22)

Human Fertilisation and Embryology (Mitochondrial Donation) Regulations 2015, SI 2015/572—Lanphier E and others, 'Don't Edit the Human Germ Line' (2015) 519 Nature 410 <[www.nature.com/news/don-t-edit-the-human-germ-line-1.17111](http://www.nature.com/news/don-t-edit-the-human-germ-line-1.17111)> accessed 25 November 2015

Lawrence D, 'To what extent is the Use of Human Enhancements Defended in International Human Rights Legislation?' (2014) 13 Medical Law International 254

Liang P and others, 'CRISPR/Cas9-Mediated Gene Editing in Human Triploid Zygotes' (2015) 6 Protein & Cell 363

March of Dimes Birth Defects Foundation, 'March of Dimes Global Report on Birth Defects' (*March of Dimes*, 2006) <[www.marchofdimes.org/materials/global-report-on-birth-defects-the-hidden-toll-of-dying-and-disabled-children-full-report.pdf](http://www.marchofdimes.org/materials/global-report-on-birth-defects-the-hidden-toll-of-dying-and-disabled-children-full-report.pdf)> accessed 25 November 2015

Millard F, 'Rights Transmission by Mimesis: the Biomedicine Convention in Central Europe' (2010) 9 Journal of Human Rights 427

National Academies, 'Ethical and Social Policy Considerations of Novel Techniques for Prevention of Maternal Transmission of Mitochondrial DNA Diseases' (*National Academies Current Projects*, 2015) <[www8.nationalacademies.org/cp/projectview.aspx?key=49648](http://www8.nationalacademies.org/cp/projectview.aspx?key=49648)> accessed 25 November 2015

Ord T, 'The Scourge: Moral Implications of Natural Embryo Loss' (2008) 8 American Journal of Bioethics 12

Parfit D, *Reasons and Persons* (Clarendon Press 1984)

Reardon S, 'US Congress Moves to Block Human-Embryo Editing' (*Nature*, 25 June 2015) <[www.nature.com/news/us-congress-moves-to-block-human-embryo-editing-1.17858](http://www.nature.com/news/us-congress-moves-to-block-human-embryo-editing-1.17858)> accessed 27 June 2015

Sample I, 'Regulator to Consult Public Over Plans for New Fertility Treatments' (*The Guardian*, 17 September 2012) <[www.theguardian.com/science/2012/sep/17/genetics-embryo-dna-mitochondrial-disease?newsfeed=true](http://www.theguardian.com/science/2012/sep/17/genetics-embryo-dna-mitochondrial-disease?newsfeed=true)> accessed 25 November 2015

Science and Technology Committee, *Human Reproductive Technologies and the Law* (HC 2004-05, 7-I)

Stanley T, 'Three Parent Babies: Unethical, Scary and Wrong' (*The Telegraph*, 3 February 2015) <[www.telegraph.co.uk/news/health/11380784/Three-parent-babies-unethical-scary-and-wrong.html](http://www.telegraph.co.uk/news/health/11380784/Three-parent-babies-unethical-scary-and-wrong.html)> accessed 25 November 2015

UN Educational, Scientific and Cultural Organization, 'Universal Declaration on the Human Genome and Human Rights' (1997) <[www.refworld.org/docid/404226144.html](http://www.refworld.org/docid/404226144.html)> accessed 25 November 2015 (UNESCO)

United Nations, 'General Assembly Adopts United Nations Declaration on Human Cloning by Vote of 84-34-37' (Press Release GA/10333, 8 March 2005) <[www.un.org/News/Press/docs/2005/ga10333.doc.htm](http://www.un.org/News/Press/docs/2005/ga10333.doc.htm)> accessed 25 November 2015

Vogel G, 'Embryo Engineering Alarm' (2015) 347 Science 1301

Vogel G and Stokstad E, 'U.K. Parliament Approves Controversial Three-Parent Mitochondrial Gene Therapy' (*ScienceInsider*, 3 February 2015) <<http://news.sciencemag.org/biology/2015/02/u-k-parliament-approves-controversial-three-parent-mitochondrial-gene-therapy>> accessed 25 November 2015

Williams J, 'UNESCO's Proposed Declaration on Bioethics and Human Rights- A Bland Compromise?' (2005) 5 Developing World Bioethics 210

Wilmut I and others, 'Viable offspring derived from fetal and adult mammalian cells' (2007) 9 Cloning and Stem Cells 3

## **Notes:**

(<sup>2</sup>) Including the entertainingly titled Stanley (2015).

(<sup>3</sup>) A date at which, we might note, human germline editing of the type currently being discussed was not a reality, let alone a concern of policymakers.

(<sup>4</sup>) 'After the entry into force of this Convention, the Committee ... may ... invite any non-member State of the Council of Europe to accede to this Convention' (Council of Europe 2015a: Art 34.1).

(<sup>5</sup>) 'Actually,' said Shaw, 'it was not Isadora who made that proposition to me. The story has been told about me in connexion with several famous women, particularly Isadora Duncan. But I really received the strange offer from a foreign actress whose name you

*wouldn't know, and which I've forgotten. But I did make that reply.'* (Gibbs, 1990: 417, 419) (Section: Tea with Isadora, excerpt from "Hear the Lions Roar" (1931) by Sewell Stokes, published by Harold Shaylor, London).

(<sup>6</sup>) John Harris develops the importance of this imperative, 'to act for the best all things considered', in his new book *How to be Good* (OUP 2016).

(<sup>7</sup>) Announcement of a workshop on Transgenerational Epigenetic Inheritance of The Company of Biologists 4th–7th October 2015 organised by Edith Heard, Institute Curie, Paris, France and Ruth Lehmann Skirball Institute, *The Company of Biologists*, 2015) <<http://workshops.biologists.com/transgenerational-epigenetic-inheritance/>> accessed 27th June 2015.

(<sup>8</sup>) (n 25) *Germ line modification and the burden of human existence.*

(<sup>9</sup>) Also in a forthcoming doctoral thesis.

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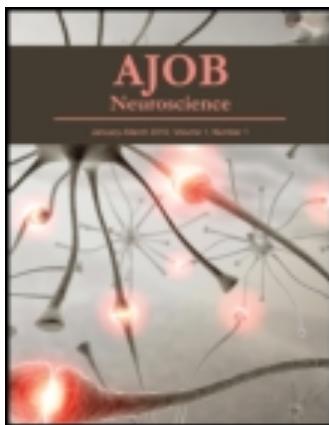


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### Enhancing Sisyphus

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alleviated. Some cannot imagine “getting going” without their morning coffee. It might be preferable not to be so dependent, but it would seem excessively harsh to regard these people’s attitude as “ethically problematic.” Furthermore, imagine a student who naturally enjoys academic work and thus doesn’t need to “push herself” to complete her assignments. Perhaps the student who lacks such a natural liking (though she does not lack insight into the value of the work) and thus does need to push herself is, at least in this respect, more admirable than the former. Would we want to use an intervention that removes the former’s natural liking for academics, to offer her greater opportunities to demonstrate heroic willpower? Arguably not. But then, perhaps it is acceptable for the second student to use MEs to become more like the first?

Therefore, while Kjærsgaard’s article raises important and timely questions about the use of prescription stimulants as MEs, questions that will require further empirical work, we argue that much ethical analysis also remains to be done if we are to appropriately define the challenges (beyond the obvious issue of safety) raised by their use.

## REFERENCES

- Desantis, A.; S. M. Noar, and E. M. Webb. 2010. Speeding through the frat house: A qualitative exploration of nonmedical ADHD stimulant use in fraternities. *Journal of Drug Education* 40(2): 157–171. Available at: <http://dx.doi.org/10.2190/DE.40.2.d>
- Frankfurt, H. G. 1971. Freedom of the will and the concept of a person. *Journal of Philosophy* 68(1): 5–20. Available at: <http://dx.doi.org/10.2307/2024717>
- Kahane, G. 2011. Reasons to feel, reasons to take pills. In *Enhancing human capacities*. ed. J. Savulescu; R. H. J. T. Meulen, and G. Kahane, 166–178. Oxford, UK: Wiley-Blackwell.
- Kjærsgaard, T. 2015. Enhancing motivation by use of prescription stimulants: The ethics of motivation enhancement. *AJOB Neuroscience* 6(1): 4–10.
- Kramer, P. D. 1994. *Listening to Prozac*. London, UK: Fourth Estate.
- Vrecko, S. 2013. Just how cognitive is “cognitive enhancement”? On the significance of emotions in university students’ experiences with study drugs. *AJOB Neuroscience* 4(1): 4–12. Available at: <http://dx.doi.org/10.1080/21507740.2012.740141>

# Enhancing Sisyphus

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Kjærsgaard (2015) makes the central claim that if people decide to treat their motivational problems by means of consuming motivationally enhancing drugs, they risk, in the long run, not solving these problems, which in turn could make the whole enterprise ethically problematic. Dealing with motivational problems is paramount, he suggests, because they “can be part of other problems concerning the larger structures of meaning in a person’s life that are connected to important choices about which direction one’s life should take” (Kjærsgaard 2015, 7). In other words, someone’s conception of the good life necessarily involves multiple projects that they must try to accomplish at certain times, and having motivational difficulties engaging with certain specific projects might indicate that a person is alienated from them. In turn, this could mean that they are not conducive to what that person conceives as the good life, or an intrinsic part of the good life. If someone decides to use motivational enhancers in order to engage with projects from which that person is alienated, says Kjærsgaard, the person risks spending more time than is necessary acting in a manner that would not be conducive to that person’s final goal (i.e., the good life or an

intrinsic part of the good life), and it is this which is ethically problematic.

In this commentary we highlight an important subset of cases—those wherein an alienating circumstance is unavoidable in practice (which we call cases of hard alienation)—that Kjærsgaard’s treatment of motivational enhancement does not address. Relying on the myth of Sisyphus to explain this hard alienation, we argue that these cases illustrate a counterpoint to Kjærsgaard’s claim.

Using Elliot’s account of alienation (Elliott 2000), Kjærsgaard asserts that “Alienation is defined as an incongruity between the self and external structures of meaning.” (Kjærsgaard 2015, 8) If we accept this, we can further divide alienation into two subclasses: soft alienation and hard alienation. The alienated agent can eliminate soft alienations without imposing substantive negative externalities onto themselves or others (e.g., someone economically well off quits a monotonous job, thus eliminating the alienation). Hard alienation, conversely, even when it can be eliminated imposes such substantive negative externalities onto the agent or others that it is as if the agent cannot

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eliminate it (e.g., during a national economic crisis, a single mother is alienated from her unfulfilling job and could quit—but quitting would deprive her, and her children, of necessary health care). In determining whether a case of alienation is soft or hard we need to take into account not only what the agent can or cannot do but also the agent's prevailing sociocultural circumstances.

According to Apollodorus, Zeus punishes Sisyphus with the task of rolling a boulder to the top of a hill. This seems simple enough, but the problem is that the boulder always rebounds backward, making Sisyphus start all over again (Apollodorus 1921, 1.9). For Sisyphus, eternally pushing a boulder up a hill only to see his work undone is an activity that (i) comprises his whole existence, (ii) is devoid of meaning in itself, (iii) is devoid of instrumental meaning, and (iv) is a punishment, which necessarily means that is not something that he would enjoy. Thus we can state that Sisyphus, at least according to the classic myth, would be an example of a hard alienation case (strictly, it would be a case of truly unavoidable alienation, given that he is divinely compelled!). At this point we should also acknowledge that there are at least two subtypes of hard alienation cases: autonomously and nonautonomously elected—represented respectively by our single mother and our mythological character.

Now, if we apply Kjærsgaard's (2015) ethical assessment of motivational enhancement to the case of Sisyphus, we would have to conclude that it would be ethically problematic to motivationally enhance him. The enhancers would, most certainly, treat only the symptoms of alienation—problems concerning the larger structures of meaning of his life—and would not solve the root of his problems. In sum, according to Kjærsgaard, it would be ethically problematic for Sisyphus to use motivational enhancers because they would be only a superficial salve, and it would remain the case that pushing a boulder for eternity does not contribute to what he may construe as a good life.

This analysis is problematic. Kjærsgaard does not take into account that Sisyphus cannot do otherwise—and this in fact changes the ethical mien of his situation. Even if Sisyphus does not want to push the boulder up the mountain, he cannot escape his circumstances. He cannot subcontract someone else to push the boulder up the mountain, nor can he decide to quit and get another job that actually relates to the structure of meaning of his life. Real-life Sisyphean circumstances, as stated earlier, would be those an agent cannot renounce due to the amount of negative externalities that quitting would impose onto them or others (i.e., hard alienation cases). Consider our example: a single mother who in the middle of national economic

crisis takes what she considers a menial job in order to provide and have health care benefits for herself and for her children. Working in such a job deprives her of the time to realize work-related projects that are intrinsic to large structures of meaning of her personal life. Given the existence of such hard alienation cases, we need to reevaluate Kjærsgaard's conclusion.

If we agree that these cases can occur, then we need to ask whether increasing the well-being—by means of increasing motivation—of an agent who autonomously elected to enter an alienating situation would be ethically problematic. For example, would it be ethically problematic for our single mother to listen to her favorite music while stacking shelves if listening increases her well-being at the cost of palliating the symptoms of her elected alienation? We do not think so. Using certain means to increase one's well-being in an unpleasant circumstance does not imply that we do not know, or that we do not want to deal with the fact, that we are sacrificing a large part of the structure of meaning of our lives. In this sense, Kjærsgaard appears to miss that the structure of meaning of one's life is subdivided and there are certain meaningful and intrinsically valuable divisions (e.g., work life) that can be sacrificed in order to fulfill other meaningful and intrinsically valuable divisions (e.g., family life). It is important to point out that the mother's case is different from Kjærsgaard's example of a student using a motivational enhancer to pass a single subject, in that in the mother's case she is treating symptoms of an alienation related to a large structure of meaning of her life—that is, her work.

In this new light it is difficult to see what is ethically problematic with our single mother's decision to use motivational enhancers for coping with a menial job that provides her and her children with health care. We think that as long as we pursue a rationally reflected conception of the good life it is not ethically problematic to sacrifice a large part of the structure of meaning of our life, in order to achieve other meaningful elements of it; it is also not ethically problematic to employ certain means to increase our well-being while we are alienated.

## REFERENCES

- Apollodorus. 1921. *The library, Volume I: Books 1–3.9*, trans. J. G. Frazer, 6th ed. Cambridge, MA: Harvard University Press.
- Elliott, C. 2000. Pursued by happiness and beaten senseless: Prozac and the American dream. *Hastings Center Report* 30(2): 7–12. Available at: <http://dx.doi.org/10.2307/3528306>
- Kjærsgaard, T. 2015. Enhancing motivation by use of prescription stimulants: The ethics of motivation enhancement. *AJOB Neuroscience* 6(1): 4–10.

This section provides reactions to current and emerging issues in bioethics.

## *Hot Baths and Cold Minds*

### *Neuroscience, Mind Reading, and Mind Misreading*

JOHN HARRIS and DAVID R. LAWRENCE

**Abstract:** The idea—the possibility—of reading the mind, from the outside or indeed even from the inside, has exercised humanity from the earliest times. If we could read other minds both prospectively, to discern intentions and plans, and retrospectively, to discover what had been “on” those minds when various events had occurred, the implications for morality and for law and social policy would be immense. Recent advances in neuroscience have offered some, probably remote, prospects of improved access to the mind, but a different branch of technology seems to offer the most promising and the most daunting prospect for both mind reading and mind misreading. You can’t have the possibility of the one without the possibility of the other. This article tells some of this story.

**Keywords:** neuroscience; fMRI; brain imaging; mind reading; thought identification; brain fingerprinting

#### Preamble

Our story of mind reading begins with poetry. The science of the brain—neuroscience—is, at least in part, in the mind-reading business. Neuroscience attempts, *inter alia*, to replace the eyes as windows to the soul. We start with poetry because, historically, poets have been the neuroscientists who have best understood the ways in which the mind works. And we are concerned with hot baths because one of the greatest of all poets, Homer, used this image as a metaphor for the human condition, a condition that not only appreciates hot

baths but also notices their absence and understands the wider meaning of both these states.

In a wonderful essay on Homer’s *Iliad*, Simone Weil analyzes Homer’s portrayal of the moral realities and ironies of human life in a memorable passage. She starts with these famous lines from *The Iliad*, in which Andromache, Hector’s wife, awaits Hector’s return from battle:

She ordered her bright-haired maids in  
the palace  
To place on the fire a large tripod,  
preparing

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A hot bath for Hector, returning from battle.

Foolish woman! Already he lay, far from hot baths,

Slain by grey-eyed Athena, who guided Achilles' arm.<sup>1</sup>

Weil comments: "Far from hot baths he was indeed, poor man. And not he alone. Nearly all the *Iliad* takes place far from hot baths. Nearly all of human life, then and now, takes place far from hot baths."<sup>2</sup> She might have said, for it is surely consonant with the wistful regret of both Homer and her own commentary, that nearly all of human life takes place far from comfort or understanding.<sup>3</sup> But this passion for understanding the hearts and minds of others, even far from hot baths, reminds us of both its attraction and importance.

Hector's last words as he lies dying at the hand of Achilles and as far as it is possible to be from hot baths, takes up our theme: "Hector of the flashing helmet spoke to him once more at the point of death. 'How well I know you and can read your mind' he said."<sup>4</sup>

## Introduction

Soul-searching is not identical to mind reading, nor is mind reading identical to a complete description of brain activity (even if it were possible to achieve such a thing). An analogue here may be the relationship between genetics and epigenetics. Many neuroscientists and philosophers of neuroscience seem stuck in an era equivalent to genetic essentialism and oblivious to the era of epigenetics and its cerebral equivalent. Our suggestion is that desires, motives, intentions, and attitudes, and both external and first-person access to these, relate to a map of the brain or a description of brain activity as understanding the behavior or functioning of a creature

relates to the map of its genome. We know from contemporary epigenetics that the behavior of genes—gene expression—is influenced by the coding of the genes but also by environmental factors as well as, for example, being modulated by patterns of inhibitors and promoters other than DNA that are set up within the cell and are self-perpetuating.

Wittgenstein famously remarked in connection with establishing a reference—the object referred to—in speech: "If God had looked into our minds he would not have been able to see there of whom we were speaking."<sup>5</sup> Why wouldn't he?

Consider the questions: Is this murder? Or is this rape? The answers to questions such as these are not to be found in states of the brain, not least because, in the case of rape, the consent or otherwise of the other party is not to be found in the brain state of the putative rapist and because, in the case of murder, whether or not the act of killing might constitute self-defense is likewise not to be found in brain states.

Relatedly, we have the illusion that memories are traces of experienced events, thoughts and feelings brought to mind sometime after the experiences themselves. But although memory is pretty certainly due to brain states, two further "things" are not. First, one hypothesis casts doubt on whether what we 'remember' actually happened and therefore whether or not it is in fact a memory. The second hypothesis is that our memory is a recalled trace of earlier experiences, including thoughts and feelings occasioned by something in the world. We simply do not reliably know whether apparent memories are simply memories of a previous memory, which itself involved many hypotheses about events both in the mind and elsewhere in the world. We return to these issues in a moment.

## Mind Reading: First Folio

### *Windows of my mind*<sup>6</sup>

Mind reading and the relationship between the face, particularly the eyes, and the contents of the mind or indeed of the soul have been and remain a fascination for humankind. This preoccupation reflects a fact about human beings. We want to read minds, including our own; we want this so that we understand what kind of person the bearer<sup>7</sup> of the mind is—who we have to deal with, how they are likely to behave, what they want, what they are likely to do, and what they have done. And we need to know these things about ourselves quite as much as about others. What manner of man am I? What sort of woman are you?

Mind reading, if and in so far as it can be done, would be a powerful cognitive enhancer and, like all knowledge, a significant source of power.

The image of the eyes or the face as windows into mind or the soul often plays a seminal role in the imagery we use to discuss the project of mind reading. Perhaps the earliest references to the eyes as windows to the soul come from Cicero, who is here expanding on the nature of oratory—formal speech-making: “The countenance itself is entirely dominated by the eyes. . . . For delivery [oratory] is wholly the concern of the feelings, and these are mirrored by the face and expressed by the eyes.”<sup>8</sup> Leo Tolstoy, in *War and Peace*, talks of the “moral physiognomy” that reveals the mind in the face. In Book VI, he notes a change in Natasha after the departure of Prince Andrew:

But a fortnight after his departure, to the surprise of those around her she recovered from her mental sickness just as suddenly and became her old self again, but with a change in her moral physiognomy, as a child gets up after a long illness with a changed expression of face.<sup>9</sup>

Let’s continue in perhaps the most promising place, with a few reflections by one of the greatest of all neuroscientists, William Shakespeare.

### *Introspection*

We should not forget that one important dimension of mind reading involves reading the mind from the inside, that is, introspection. But this is not more reliable than any other of the forms of mind reading, not least because of the tendency we humans have for self-justification and self-deception.

Hamlet, confronting his mother, Queen Gertrude, with the infamy of the murder of his father, and of what Hamlet regards as her “incest” with her new husband, his father’s brother, elicits this response:

O Hamlet, speak no more  
Thou turn’st my eyes into my very soul,  
And there I see such black and grained  
spots  
As will not leave their tinct.<sup>10</sup>

In *Macbeth* we find Duncan lamenting his inability to detect treason in the Thane of Cawdor,<sup>11</sup> whom he has just executed for that treason.

There’s no art  
To find the mind’s construction in the  
face:  
He was a gentleman on whom I built  
An absolute trust—<sup>12</sup>

In *A Midsummer Night’s Dream*, Helena insists:

Love looks not with the eyes, but with  
the mind,  
And therefore is wing’d cupid blind;

Helena is saying that love is not interested in superficialities like beauty, which is only skin deep, but in what lies behind. Love springs from imagined

understanding, often leavened with a strong yeast of hope or optimism about the nature of what lies beneath the surface, beyond the physical gaze. But she also insists that only the mind can deliver the required understanding of what others are like, and this it constructs from many sources, as we shall see.

But it is in *Richard III* that Shakespeare comes nearest to our present preoccupations. Richard, newly crowned but insecure, wants Buckingham's approval of the murder of the "Princes in the Tower" (Edward V of England and Richard of Shrewsbury, Duke of York—Edward being the "legitimate"<sup>13</sup> heir to the crown worn by Richard of Gloucester, of England, the third of that name). Richard III is initially reluctant to spell out his murderous plans and so expects the Duke of Buckingham to anticipate his wishes, the function of all good courtiers from time immemorial:

Ah, Buckingham, now do I play the touch,  
To try if thou be current gold indeed.  
Young Edward lives—think now what  
I would speak.<sup>14</sup>

That is to say, "read my mind." Later he makes this thought clearer to the "dull" Buckingham:

Shall I be plain? I wish the bastards  
dead,  
and would have it suddenly perform'd.<sup>15</sup>

### Thought-Identification Technologies: Second Folio

It is probably correct to assume that we are a long way from a neuroscientific breakthrough in mind reading. However, recent developments in neuroscience,<sup>16</sup> and in particular in brain imaging, have created expectations that, for example, criminal intent might be detectable in

brain states. If this is really possible, which we personally doubt, then this information might be used as evidence justifying restraint or detention prior to any offence being committed. John Harris served on a working party of the Royal Society in 2010–2011 that examined these issues, and although that working party emphatically concluded<sup>17</sup> that the case was not proven for the use of brain-state evidence in criminal trials, this situation may well be subject to future revision.<sup>18</sup>

"Thought-identification" technologies, as they might be properly termed, are advancing implacably; though in an arena as complex as the human brain, great leaps in technology may not equate to commensurate leaps forward toward our goal of reliably and clearly reading thoughts.

Much of the focus has been on fMRI (functional magnetic resonance imaging) techniques and the information recorded by these types of scans, which build on traditional MRI by virtue of their ability to indicate neuronal activity within three-dimensional spaces, or voxels, ranging from 4 to 1 mm<sup>3</sup>.<sup>19</sup> This sensitivity is reliant on the blood oxygen level dependent (BOLD) signal<sup>20</sup>—the para- and diamagnetic properties of oxygenated and deoxygenated blood, respectively, in the vicinity of a neuronal cluster, as caused by the particular hemodynamics necessitated by the operation of those neurons.

Thought-identification research that has utilized fMRI data depends on the BOLD signal to figuratively illuminate regions of the brain that are known to be associated with a particular neurological activity. For instance, one widely discussed study by Nishimoto and Gallant<sup>21</sup> recorded visual cortex response activity while subjects viewed a wide range of imagery. By collecting several thousand hours of data, it was possible to map particular voxels to particular

stimuli. Subsequently, the researchers were able to develop a modeling algorithm that could identify and (crudely) reconstruct the images and video from the neural activity data itself; thereby “reading” what the brain saw. In a similar fashion, other researchers<sup>22</sup> have mapped activity resulting from merely thinking about a number of simple known images—a screwdriver or celery—and can accurately predict which of these a subject is considering. Similarly, it has been demonstrated that this technique can be utilized for auditory information-reconstructing speech as digital sound from the mapped neural activity.<sup>23</sup>

This technique can only use “live” activity—that is, when the subject is actively inside the hardware and actively viewing the images—but, last year, a study from Cornell had some success in reconstructing imagination using a similar fMRI process. Instead of viewing images, subjects were asked to visualize people with particular sets of personality traits. They were then asked to imagine how these “personality models” might react or behave in a number of circumstances. The analysis that followed

examined how protagonist identity and trait information interact, or how the brain associates specific personality traits with a given protagonist . . . suggest[ing] that personality information is integrated in the [medial pre-frontal cortex], producing a model for behaviour predictions.<sup>24</sup>

In other words, the study was able to “read,” in simple fashion, the thoughts of the subject regarding these imaginary constructs without the need for active input.

The detection of intention is also in its infancy and is limited to simpler motor functions rather than such complex, abstract plans of action as may be

required for criminal enterprise. Chun Siong Soon, Marcel Brass, Hans-Jochen Heinze, and John-Dylan Haynes<sup>25</sup> published research in which they were able to predict the use of the right or the left hand in a button-pushing exercise by identifying BOLD “readiness potentials”—up to 1,000 ms before the action took place. Of course, 10 seconds is perhaps less than desirable for *Minority Report*<sup>26</sup>-style pre-crime prosecution.

Nonetheless, there has been much research into using fMRI and the BOLD effect for the detection of falsehood.<sup>27</sup> Utilizing processes of baseline determination not dissimilar to those detailed previously, these studies generally concluded that, in the words of one study, “attempted deception is associated with activation of executive brain regions”<sup>28</sup>—in other words, that certain regions are more active when formulating a lie than when formulating the truth. However, the studies are inconsistent as to the specific regions they indicate; their various suggestions include the “right anterior frontal cortices,”<sup>29</sup> “the anterior cingulate cortex, the superior frontal gyrus, . . . the left premotor, motor, and anterior parietal cort[ices],”<sup>30</sup> and the “temporal and sub-cortical [regions],”<sup>31</sup> effectively indicating that large swathes of the brain are activated by falsehood. There are also important questions about the specificity of such studies—for example, it is not clear whether fMRI techniques can differentiate between deliberate deception and more innocent falsehood.<sup>32</sup>

Another technology has been used specifically to attempt to read minds for the purposes of lie detection: electroencephalography (EEG), or “brain fingerprinting.” This technique differs from fMRI in that it does not image the brain itself but rather records the patterns of electrical activity within it through electrodes placed on the scalp, in this case with particular focus on the

wavelength and frequency of P300, an event-related potential that "signal[s] an individual's recognition of a unique or meaningful item."<sup>33</sup> P300 is unconscious and uncontrollable, unlike conventional galvanic or heart-rate-based polygraphs. Thus, EEG could theoretically be used to determine whether a situation or a piece of evidence was familiar to the subject, regardless of his or her claims.<sup>34</sup> It also has an advantage over fMRI in that it is not a control-question test, wherein detection can only be effective with certain formulations of questions. Still, once again, the results for the technique are somewhat mixed<sup>35</sup> and were obtained only in highly controlled situations unlikely to be replicable in the courtroom.

However fraught with current technological or neurobiological difficulties the techniques of thought identification or mind reading might be, they introduce a serious possibility that thought may, in the face of significant confirmatory neurological evidence, be at some point taken to be the equivalent of action or evidence for certain purposes. Indeed, the first attempts to do so have already taken place. In *United States v. Semrau*, the defendant sought to utilize fMRI evidence that he was being truthful in a fraud case, but the request was disallowed on a range of points, including the error rate of the technology, the control standards, the variance of his circumstances from any situation previously studied, and the fact that the technology was not widely accepted as reliable by experts, thus failing Federal Rule of Evidence 702.<sup>36</sup> Similarly, EEG has been presented in courtrooms, and although it was rejected outright as evidence in *Slaughter v. State*,<sup>37</sup> it has been used to convict in two separate murder cases in the Indian state of Maharashtra.<sup>38</sup>

### Mind Reading via Thoughts and Deeds: Third Folio

Shakespeare, who was perennially preoccupied with mind reading, was somewhat enigmatic himself, perhaps because of the universality of his themes. In a famous sonnet, William Wordsworth<sup>39</sup> suggests that Shakespeare's sonnets are the key to understanding Shakespeare the man:

Scorn not the Sonnet; Critic, you have  
frowned,  
Mindless of its just honours; with this key  
Shakespeare unlocked his heart;

Here we have reached the nub of our argument and, you will be relieved to hear, the end of poetry. It is in our writings and our interest in the writings or otherwise recorded thoughts and actions of others that our minds can be read and, sometimes, perhaps often, misread.

### Thinking and Feeling in the Cloud

Life in the cloud is immortal and omnipresent and, almost, as replete with feelings as our own dear lives.<sup>40</sup> We must now accept that our words and, to an extent, our actions and thoughts are permanently in the cloud and accessible to anyone and everyone. Of course, thoughts and actions are as open to interpretation as words and always as ambiguous. As William Empson famously remarked, "In a sufficiently extended sense any prose statement could be called ambiguous."<sup>41</sup>

As John Harris previously suggested concerning the existence of the cloud,

This is a game-changing [innovation], and indeed constitutes a very dangerous turn of events. Not only is it a possible restriction, not just on free speech but on the possibility of sober, or even informed or nuanced discussion, it also

constitutes perhaps the final erosion of the distinction between speaking and acting, and indeed between thought and action, and may have already expanded the scope of the “reckless” part of the coupling of “reckless” with “endangerment” to the point of no return.

This is because, not only do we have no knowledge or control over who will have access to our words and in what circumstances, we do not even have any control over how they will be edited, sensationalised, decontextualised, bowdlerised or otherwise distorted. We must be always aware of the potentially limitless scope, and indeed duration, of what we say.<sup>42</sup>

An example of the radical expansion of access to our words is provided by a comment made on a news story recently, which spread in an amazing way. “‘Companies like Novartis should not be in the position to block moves to more cost-effective treatments in order to maximize their profits,’ said John Harris of the Institute for Science Ethics and Innovation at the University of Manchester.” This comment was made in a press release; Reuters put it on “the wires,” and the report subsequently received 31,088,501 page views and 4,572,149 unique visitors.<sup>43</sup> More than 4.5 million different individuals accessed this comment online, and, in addition to the large number of web hits and visitors to the site, this remark was reported in 278 separate national and local news outlets, both broadcast and print.

As the chairman of Google, Eric Schmidt, has remarked, “The fact that there is no delete button on the internet forces public policy choices we had never imagined.”<sup>44</sup> Recently, a landmark European Court ruling<sup>45</sup> on the right to be forgotten may indeed lead to the removal of items of personal data from particular sites or local search engines, but this will not mean that the relevant

data has been entirely expunged from the cloud, nor from databases or computers, or rendered inaccessible.

In the cloud, words and indeed images and sounds exist, as far as we know, forever, in all places and all times. This is the immortality that some have dreamed of.<sup>46</sup> It also further erodes the traditional distinction between words and action and possibly also between thoughts and words, because speculations may be taken to be proposals and an exposure of the weakness of an argument *against* something may be taken to be an argument *for* it. This gives scope for radical misunderstanding and misrepresentation. But perhaps even more important than the fact that our words, actions, and thoughts are forever in the cloud is the fact that, insofar as they are digitized, they can in principle be accessed by anyone with the requisite skills. As Bruce Schneier made clear in an oral presentation to the Royal Society,<sup>47</sup> anything submitted or recorded online would be permanently in the cloud, accessible to anyone (like himself) knowledgeable enough to access them. Moreover, as Schneier noted, “all the research is being done on computers . . . and any computer can be hacked, not most, any!”<sup>48</sup>

In the cloud we have a permanent, accessible, and in principle freely available archive of everything we have ever recorded digitally. *What has so far been generally overlooked is that this constitutes the most comprehensive gateway to the soul (or way of constructing an alternative soul ab initio) ever discovered, one that is, in principle, available to all and permanently accessible.* In short, we already have a massive capacity for “mind reading” and hence mind misreading, against which there is no effective defense, and to which most of us are exposed. Here, we speak of those aspects of our minds and your mind that have been digitized, that is, put into computer memory or

onto the Internet—into the cloud. There is no defense; anything that has ever been on a computer, let alone been e-mailed or stored in the cloud, can be read and downloaded, and that access cannot be prevented.

If we think about what “data” most of us have consigned to the cloud, the list can be alarming. Most of us now write on some kind of digitizing equipment: a computer, tablet, or smartphone; most of us also write and receive emails, tweets, and so on; many have a web presence—a Facebook or Twitter account or a website; and many also keep their diaries and appointments in electronic media. Moreover, the cloud contains a record of the websites we have visited and of the things we have ordered online. Many of us fill in our tax returns online, pay fines online, and visit online medical services like NHS Direct; we look up medical conditions online, order drugs and services—many of which may be unavailable or even illegal in our own countries—and so on . . . the list is as large as our imagination and as inventive as Google’s algorithms.

It should be clear that much of this will contain the substance of what we believe on many matters; what we are minded to do or to consider doing; what we have done, including elements of our desires, fantasies, and interests; what we know and don’t know; our preoccupations, activities, patterns of behavior, purchasing habits, and the amount of money we spend; and what the objects of our gaze are—and more or less reliable inferences can be drawn about what sort of gaze it is.

Some aspects of this are starting to arouse interest. People using the Internet are becoming increasingly aware of the dangers of images they post and things they say on Facebook or other websites; this realization is perhaps aided, ironically, by the proliferation of news feeds and novel forms of communication

provided by the cloud. The rise of highly visible cyberstalking applications such as *Creepy*,<sup>49</sup> which aggregates the geolocation data attached to various tweets, updates, photos, and the like from any chosen poster and generates a map of the subject’s whereabouts, and the extensive media coverage focused on cyberbullying,<sup>50</sup> with hundreds of tragic and often upsetting stories doing the rounds, have attracted attention. Charities and the victims and/or the families of the victims of these dangers have started campaigns to publicize them<sup>51</sup> and to offer advice and assistance.

Research suggests that, among users in what is generally regarded as the most vulnerable group, preteens and early teenagers, there is a “[belief] in the value of online privacy,” and that “educational opportunities regarding internet privacy and computer security as well as concerns from other reference groups (e.g., peer, teacher, and parents) play an important role in positively affecting the Internet users’ protective behavior regarding online privacy.”<sup>52</sup> The rising awareness of the public and the willingness to respond to the potential dangers of the cloud are perhaps well illustrated by a recent petition against a newly announced Facebook feature, which would “let it listen to our conversations and surroundings through our own phones’ microphone. Talk about a Big Brother move.”<sup>53</sup> At the time of writing, this petition has more than 587,960 signatories.

#### *Mind Misreading: One Recent Example*

A recent news story is particularly telling. On March 21, 2014, the BBC reported that “[a] woman who threw acid in the face of a friend while wearing a veil as a disguise has been jailed for 12 years.” The conviction of Mary Konye for this assault on Naomi Oni was widely reported.<sup>54</sup> The police had not believed

the victim; they had examined her laptop hard drive and found that, before the attack, she had “looked at plastic surgery websites” and at news features concerning Katie Piper. Katie Piper was a young woman who, in 2008, as *The Guardian* reported, “was raped by a man she’d met online. He then arranged for someone to throw acid in her face.”<sup>55</sup> Armed with what they thought was evidence concerning Naomi Oni’s state of mind, the police thought, or through lack of thought assumed, that this was evidence that she had harmed herself, rather than, as proved to be true, that she was the victim of a malicious and vicious attack.<sup>56</sup> As the UK newspaper *The Daily Mirror* reported at the time of the assault on Ms. Oni (February 25, 2013), “Officers seized the 20-year-old’s laptop after discovering she had viewed websites about acid burn victims before she was hurt.”<sup>57</sup>

The police in this case were guilty of an error of inference, one of the most common errors to which humankind is subject. Moreover, the cloud simply contains data, often without context and almost always without other relevant information. For example, the cloud is irony blind; it usually contains no data on tone of voice. Often there is also no context. Remarks that may be nuanced in print, or, for example, in a public statement or speech, often appear on the Internet in truncated form, without nuance. One of the present authors has watched while members of the audience at a public lecture he was giving have tweeted extracts of the speech, which then appeared without the nuance or qualification that the lecture contained.

It is true that those of us who publish, broadcast, speak publicly, and so on, place our minds to an extent in the public domain, where they may freely be “read” by all and sundry. But most of us do so or do so potentially without realizing that that is what we have done or

without realizing that—set in a new context, without nuance, qualification, or other caveats—the meaning will inevitably be not only distorted but sometimes corrupted beyond recognition.

More significant by far, all people who use devices that record or transmit digitally are, almost certainly, placing themselves, if not on public record, at least in a universally and permanently accessible public domain. This is a domain in which inferences will increasingly be drawn (conservatively or recklessly or anything in between) about what we think, feel, believe, wish for or intend, desire, or dread. Some of the inferences drawn about us will be reasonable and accurate enough, and for the foreseeable future these will constitute the best available windows to the soul.

## Notes

1. Weil S. The *Iliad* a poem of force. In: Meyer P, ed. *The Pacifist Conscience*. Harmondsworth: Penguin; 1966, at 293.
2. Homer. *The Iliad*. Penguin Classics. Book XXII. Harmondsworth: Penguin; 1966:403–73, at 409.
3. One of the present authors talks about different aspects of this dimension of “la condition humaine” (apologies to André Malraux) in Harris J. Life in the cloud and freedom of speech. *Journal of Medical Ethics* 2013;39(5): 307–11. doi:10.1136/medethics-2012-100862.
4. See note 4, Homer 1966, at 406.
5. Wittgenstein L. *Philosophical Investigations*. Anscombe GEM, trans. Oxford: Basil Blackwell; 1968, Part IIxi, at 217. Because this is a translation, I have taken the liberty of improving on Elizabeth Anscombe’s grasp of English grammar.
6. With apologies to Dusty Springfield.
7. This turn of phrase is borrowed from Shakespeare’s Brutus: “Think not, thou noble Roman, That ever Brutus will go bound to Rome. He bears too great a mind” (Act 5, Scene 1). All Shakespeare quotations are from *The Arden Shakespeare, Complete Works*. Proudfoot R, Thomson A, Kastan DS, eds. Walton-On-Thames: Thomas Nelson and Sons; 1998.
8. Cicero, *De Oratore* III, 221. In: *Cicero on the Orator*. Rackham Loeb H, trans. Classical Library. Cambridge, MA, and London: Harvard University Press; 1942, at 177.

9. Tolstoy L. *War and Peace*. Maude L, Maude A, trans. London: Oxford University Press; 1965, Book VI, chap. XXIV, at 88.
10. Shakespeare W. *Hamlet*. In: Shakespeare 1998 (see note 6), Act 3, Scene 4, lines 89ff, at 316.
11. The name of this thane is not mentioned in the text. Macbeth himself subsequently assumes this title.
12. Shakespeare W. *Macbeth*. In: Shakespeare 1998 (see note 6), Act 1, Scene 4, lines 12ff, at 775.
13. Scare quotes are used not because Edward was rightly fearful but because the claim of Edward IV, his father, was in many ways also problematic, like that of all the Yorkists.
14. Shakespeare W. *King Richard III*. In: Shakespeare 1998 (see note 6), Act 4, Scene 2, line 8, at 726.
15. See note 13, Shakespeare 1998, line 21, at 726.
16. The discussion here follows lines elaborated in Harris 2012 (see note 3).
17. The Royal Society. *Brain Waves 4: Neuroscience and the Law*; 2011 Dec; available at <http://royalsociety.org/policy/projects/brain-waves/responsibility-law/> (7 June 2014).
18. See also Bufkin J, Luttrell V. Neuroimaging and studies of aggressive and violent behavior. *Trauma, Violence, & Abuse* 2005 Apr;6:176–91. Raine A, Yang Y. Neural foundations to moral reasoning and antisocial behavior. *Social Cognitive and Affective Neuroscience* 2006; 1(3):203–13. Eastman N, Campbell C. Neuroscience and legal determination of criminal responsibility. *Nature Reviews Neuroscience* 2006 Apr;7:311–18. Brown TR, Murphy ER. Through a scanner darkly: Functional neuroimaging as evidence of a criminal defendant's past mental states. *Stanford Law Review* 2010;62:1119–207.
19. Huettel SA, Song AW, McCarthy G. *Functional Magnetic Resonance Imaging*. 2nd ed. Sunderland, MA: Sinauer; 2009, at 214–220.
20. As originally presented here: Ogawa S, Lee TM, Nayak AS, Glynn P. Oxygenation-sensitive contrast in magnetic resonance image of rodent brain at high magnetic fields. *Magnetic Resonance in Medicine* 1990;14(1):68–78. See also Gibson WG, Farnell L, Bennett MR. A computational model relating changes in cerebral blood volume to synaptic activity in neurons. *Neurocomputing* 2007;70:1674.
21. Nishimoto S, Vu AT, Naselaris T, Benjamin Y, Yu B, Gallant JL. Reconstructing visual experiences from brain activity evoked by natural movies. *Current Biology* 2001;21(19):1641–6.
22. Shinkareva SV, Mason RA, Malave VL, Wang W, Mitchell TM, Just MA. Using fMRI brain activation to identify cognitive states associated with perception of tools and dwellings. *PLoS ONE* 2008;3(1):e1394.
23. Pasley BN, David SV, Mesgarani N, Flinker A, Shamma SA, Crone NE, et al. Reconstructing speech from human auditory cortex. *PLoS Biology* 2012;10(1) : e1001251. doi:10.1371/journal.pbio.1001251.
24. Hassabis D, Spreng RN, Rusu AA, Robbins CA, Mar RA, Schacter DL. Imagine all the people: How the brain creates and uses personality models to predict behavior. *Cerebral Cortex* 2013;bht042.
25. Soon C, Brass M, Heinze H, Haynes J. Unconscious determinants of free decisions in the human brain. *Nature Neuroscience* 2008; 11(5):543–5.
26. Spielberg S, director. *Minority Report* [film]. 20th Century Fox; 2002.
27. This research includes but is by no means limited to the studies cited in notes 7–10, and the following sources: Langleben DD, Moriarty JC. Using brain imaging for lie detection: Where science, law, and policy collide. *Psychology, Public Policy, and Law* 2012; 19(2):222–34. Kaylor-Hughes CJ, Lankappa ST, Fung R, Hope-Urwin AE, Wilkinson ID, Spence SA. The functional anatomical distinction between truth telling and deception is preserved among people with schizophrenia. *Criminal Behaviour and Mental Health* 2011; 21(1):8–20. Ito A, Abea N, Fujii T, Ueno A, Kosekia Y, Hashimotob R, et al. The role of the dorsolateral prefrontal cortex in deception when remembering neutral and emotional events. *Neuroscience Research* 2011 Feb;69(2): 121–8. Sip KE, Lynge M, Wallentin M, McGregor WB, Frith CD, Roepstorff A. The production and detection of deception in an interactive game. *Neuropsychologia* 2010; 48(12):3619–26. Monteleone GT, Phan KL, Nusbaum HC, Fitzgerald D, Irick JS, Fienberg SE, Cacioppo JT. Detection of deception using fMRI: Better than chance, but well below perfection. *Social Neuroscience* 2009;4(6):528–38.
28. Spence S. A., Hunter M. D., Farrow T. F., Green R. D., Leung D. H., Hughes C. J., & Ganesan V. (2004). A cognitive neurobiological account of deception: evidence from functional neuroimaging. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences* 359(1451):1755–62, at 1755.
29. Ganis G, Kosslyn SM, Stose S, Thompson WL, Yurgelun-Todd DA. Neural correlates of different types of deception: An fMRI investigation. *Cerebral Cortex* 2003;13(8): 830–6, at 830.
30. Langleben DD, Schroeder L, Maldjian JA, Gur RC, McDonald S, Ragland JD, et al. Brain activity during simulated deception: An event-related functional magnetic resonance study. *Neuroimage* 2002;15(3):727–32, at 727.

31. Lee T, Liu HL, Tan LH, Chan CCH, Mahankali S, Feng CM, et al. Lie detection by functional magnetic resonance imaging. *Human Brain Mapping* 2002;15(3):157–64, at 161.
32. Ganis G, Rosenfeld JP, Meixner J, Kievit RA, Schendan HE. Lying in the scanner: Covert countermeasures disrupt deception detection by functional magnetic resonance imaging. *Neuroimage* 2011;55(1):312–19.
33. Meixner JB. Liar, liar, jury's the trier? The future of neuroscience-based credibility assessment in the court. *Northwestern University Law Review* 2012;106(3):1451.
34. Farwell LA, Smith SS. Using brain MERMER testing to detect knowledge despite efforts to conceal. *Journal of Forensic Science* 2001 Jan;46(1):135–43.
35. See note 32, Meixner 2012, for an overview of error rates in a range of EEG studies.
36. The full litany of objections to the inclusion of the evidence makes for entertaining reading. *United States v. Semrau*, 2010 WL 6845092 (W.D. Tennessee, June 1, 2010).
37. The rejection included the careful rejoinder that “beyond [the expert]’s affidavit we have no real evidence that Brain Fingerprinting has been extensively tested.” *Slaughter v. State*, 105 P.3d 832, 834–36 (Oklahoma Criminal App. 2005).
38. Natu N. This brain test maps the truth. *The Times of India* 2008 July 1; available at <http://timesofindia.indiatimes.com/city/mumbai/This-brain-test-maps-the-truth/articleshow/3257032.cms?referral=PM> (last accessed 6 June 2014).
39. Wordsworth W. The Sonnet (ii). In: Quiller-Couch A, ed. *The Oxford Book of English Verse: 1250–1900*; 1919; available at <http://www.bartleby.com/101/534.html> (last accessed 28 May 2014).
40. Here again discussion follows lines elaborated in Harris 2012 (see note 3).
41. Empson W. *Seven Types of Ambiguity*. Rev. ed. Chatto & Windus; 1970 [1930], chap. 1, at 1.
42. See note 3, Harris 2012, at 409.
43. Copley C, Hirschler B. Novartis challenges UK Avastin use in eye disease. *Reuters* 2012 Apr 24; available at <http://www.reuters.com/article/2012/04/24/us-novartis-britain-idUSBRE83N0GM20120424>. The page view data was obtained from Vocus ([www.vocuspr.com/uk](http://www.vocuspr.com/uk)), the University of Manchester’s media monitoring service (subscription required for access), 2012 May 1.
44. Sample I. Governments pose greatest threat to internet, says Google’s Eric Schmidt. *The Guardian* 2012 May 23; available at <http://www.guardian.co.uk/technology/2012/may/23/google-fund-teachers-computer-science-uk> (last accessed 3 June 2014).
45. European Court of Justice Judgement, Case C-131/12 ECLI:EU:C:2014:616, 13 May 2014. Full text available at <http://curia.europa.eu/juris/document/document.jsf;jsessionid=9ea7d2dc30d5cfb78416675447019937a19787b77870.e34KaxiLc3qMb40Rch0SaxuNbxt?text=&docid=152065&pageIndex=0&doclang=EN&mode=req&dir=&occ=first&part=1&cid=124853> (last accessed 6 June 2014). See also Google sets up “right to be forgotten” form after EU ruling. *BBC News* 2014 May 30; available at <http://www.bbc.co.uk/news/technology-27631001> (last accessed 3 June 2014).
46. Harris J. Intimations of immortality. *Science* 2000 Apr;288(5463): 59. Harris J. Intimations of immortality—The ethics and justice of life extending therapies. In: Freeman M, ed. *Current Legal Problems*. Oxford: Oxford University Press; 2002:65–97.
47. Schneier B. Cybersecurity, scientific data and public trust. The Royal Society. *H5N1 Research: Biosafety, Biosecurity and Bioethics*; available at [http://www.voiceprompt.co.uk/royal\\_society/030412/#](http://www.voiceprompt.co.uk/royal_society/030412/#) (last accessed 25 June 2014).
48. See note 46, also available at <https://royalsociety.org/events/2012/viruses/> (last accessed 3 June 2014).
49. Although developed in 2011 ostensibly as a means of raising awareness of the ease of cyberstalking, Creepy is still available freely from <http://creepy.en.softonic.com/> (last accessed 6 June 2014).
50. A simple Internet search for “examples of cyberbullying on social networking sites” raises around 368,000 results from media outlet sites. They are perhaps best summed up in this article from the BBC: Harrison A. Cyberbullying: Horror in the home. *BBC News* 2013 Aug 17; available at <http://www.bbc.co.uk/news/education-23727673> (last accessed 6 June 2014).
51. For examples of such campaigns, see <http://deletecyberbullying.eu/>, [http://www.nasuwt.org.uk/Whatsnew/Campaigns/Stop\\_Cyberbullying/NASUWT\\_002654](http://www.nasuwt.org.uk/Whatsnew/Campaigns/Stop_Cyberbullying/NASUWT_002654), and <http://www.athinline.org/> (all last accessed 6 June 2014).
52. Chai S, Bagchi-Sen S, Morrell C, Rao H, Upadhyaya S. Internet and online information privacy: An exploratory study of pre-teens and early teens. *IEEE Transactions on Professional Communication* 2009;52(2):167–82, at 167.
53. Sum of Us. *Facebook: Do Not Release Your New App Feature that Listens to Users’ Conversations*; available at <http://action.sumofus.org/a/Facebook-app-taps-phones/?akid=5478>.

- 2614652.96-Mk1&rd=1&sub=fwd&t=2 (last accessed 6 June 2014).
54. Mary Konye jailed for acid attack on Naomi Oni. *BBC News* 2014 Mar 21; available at <http://www.bbc.co.uk/news/uk-england-london-26680664> (last accessed 9 June 2014).
  55. Cochrane K. Katie Piper: I asked Mum to kill me. *The Guardian* 2012 June 1; available at <http://www.theguardian.com/lifeandstyle/2012/jun/02/katie-piper-acid-attack-book> (last accessed 9 June 2014).
  56. Police are “incompetent,” says acid attack victim. *BBC Radio 4 Today* [interview with Naomi Oni]; 2014 March 24; available at <http://www.bbc.co.uk/programmes/p01w49sq> (last accessed 2 Apr 2014).
  57. Collins D. Did acid burns victim attack herself? Police probe self-harm theory. *Mirror* 2013 Feb 25; available at <http://www.mirror.co.uk/news/uk-news/naomi-oni-acid-burns-victim-1729522#ixzz347hivunu>. (last accessed 5 Nov 2014).

## Special Section: Responsibility, Vulnerability, Dignity, and Humanity

### *Artificial Intelligence*

#### *The Shylock Syndrome*

DAVID R. LAWRENCE, CÉSAR PALACIOS-GONZÁLEZ, and JOHN HARRIS

**Abstract:** It seems natural to think that the same prudential and ethical reasons for mutual respect and tolerance that one has vis-à-vis other human persons would hold toward newly encountered paradigmatic but nonhuman biological persons. One also tends to think that they would have similar reasons for treating we humans as creatures that count morally in our own right. This line of thought transcends biological boundaries—namely, with regard to artificially (super)intelligent persons—but is this a safe assumption? The issue concerns *ultimate moral significance*: the significance possessed by human persons, persons from other planets, and hypothetical nonorganic persons in the form of artificial intelligence (AI). This article investigates why our possible relations to AI persons could be more complicated than they first might appear, given that they might possess a radically different nature to us, to the point that civilized or peaceful coexistence in a determinate geographical space could be impossible to achieve.

**Keywords:** artificial intelligence; humanity; motivation; survival; moral significance; personhood; nature

SALERIO Why I am sure if he forfeit, thou wilt not take his flesh,—  
what's that good for?

SHYLOCK To bait fish withal, if it will feed nothing else, it will feed my revenge. He hath disgraced me, and hindered me half a million; laughed at my losses, mocked at my gains, scorned my nation, thwarted my bargains, cooled my friends, heated mine enemies, and what's his reason? I am a Jew. Hath not a Jew eyes? hath not a Jew hands, organs, dimensions, senses, affections, passions? fed with the same food, hurt with the same weapons, subject to the same diseases, healed by the same means, warmed and cooled by the same winter and summer, as a Christian is?—If you prick us, do we not bleed? if you tickle us, do we not laugh? if you poison us, do we not die? and if you wrong us, shall we not revenge?—If we are like you in the rest, we will resemble you in that. If a Jew wrong a Christian, what is his humility? Revenge. If a Christian wrong a Jew, what should his sufferance be by Christian example? why, revenge. The villany you teach me, I will execute, and it shall go hard but I will better the instruction.

William Shakespeare, *The Merchant of Venice*, Act III, Scene 1<sup>1</sup>

#### Introduction

When we imagine the human race encountering paradigmatic but nonhuman biological persons—meaning “a thinking intelligent being, that has reason and reflection, and can consider itself as itself, the same thinking thing in different

times and places”<sup>2</sup> (e.g., Neanderthals, Spock, or ET)—we (almost) automatically think that the same prudential and ethical reasons for mutual respect and tolerance that we have vis-à-vis other human persons would hold toward them. We also tend to think that they *would have* (and certainly, if we know what’s good for us, that they *should have*) similar prudential and ethical reasons for treating us as creatures that count morally in our own right.

In fact, this line of thought transcends biological boundaries in that we also are tempted to assume that we would be morally bound to treat artificially intelligent persons (or artificially superintelligent persons) as we treat human persons, irrespective of whether or not these creatures have been created by humans, were encountered in outer space, or turned up here in their spacecraft. In this respect most people reject, at least in principle, what might be called bioism: the prejudice or bias in favor of biological entities with X interests and capacities over those of nonbiological entities with comparable X interests and capacities.<sup>3</sup> This means that we hold that the same moral wrong would be committed if someone were to kill an innocent human person or an innocent artificially intelligent person. This issue of course is how we “flesh out” (and we use that term deliberately) what justifies thinking of an innocent artificial intelligence (AI) as also a person. The issue in short concerns what might be termed *ultimate moral significance*—that is, the significance possessed by human persons, persons from other planets, and nonorganic persons in the form of AI if and when they appear.<sup>4</sup>

One of the present authors, John Harris, wrote about AI in 1985 and started to think seriously about how we, humans, and they, AI creatures, might react to one another. At that time Harris explored the possibility of extraterrestrial AIs and suggested that

the question of whether or not there are people on other planets is a real one. If there are, we need not expect them to be human people (it would be bizarre if they were!), nor need we expect them to look or sound or smell (or anything else) like us. They might not even be organic, but might perhaps reproduce by mechanical construction rather than by genetic reproduction.<sup>5</sup>

He then went on to speculate that if their technology proved to be superior to ours (perhaps the proof of superior technology would be them turning up on, or in near proximity to, the earth rather than us tracking them down in some other galaxy), it would be of paramount importance for us to convince them that we are also persons, if not just like them, at least enough like them to matter—in short, that we are persons with whom they would rather have lunch, than have for lunch.

Now, even when we maintain, in principle, that a symmetrical moral relation should hold (i.e., each party treats the other according to its moral status) between human persons and AI persons, two considerations come to mind that might lead us to think that our relations with them could be way more complicated than we usually make believe they could or should be. The first reason is that the creatures (created or encountered) might possess a radically different nature to us, to the point that civilized or even peaceful coexistence in a determinate geographical space would be impossible to achieve. This might be due, for example, to the impossibility of setting reliable limits to the *aims and purposes* of a human-created AI person. This would apply particularly to an AI capable of

thinking about its aims and purposes and adapting itself in ways not envisaged by its designers and over which they have no effective control, just as is true to an extent of us organic, ape-descended humans concerning one another. The second reason is an epistemological one. We might not realize that we have created (or encountered) an AI person. If this were to happen, we would risk not treating "her" (perhaps AIs, like ships, are conventionally female?) as morality requires that she/it be treated.

Here, we focus on the first reason. We investigate why our possible relations to AI persons could be more complicated than at first might appear due to issues surrounding the AI's nature. Let's start by saying that the control problem (i.e., how to regulate, or effectively influence, other beings in such way that we are not put in harm's way by their actions or inactions) that we would have when dealing with AI persons, or when thinking about creating AI persons, is not the very same problem, or at least not precisely the same problem, we humans have with one another. It is not so, because the answers to the following questions vary depending on whether we are talking about a human person or an AI person: How can we minimize the risk posed by people whose actions or plans threaten other people or the planet? How can we eliminate or mitigate the risk posed deliberately or accidentally by other people through wickedness, negligence, insensitivity, stupidity, or *superintelligence*? How can we stop the proverbial village idiot<sup>6</sup> or the village genius from destroying the global village, or how can we stop the agent who fails in his or her or its duty to act for the best "all things considered" from doing likewise?<sup>7</sup>

One obvious answer when dealing with AI persons would be to try to motivate them just as we try to motivate humans, first by educating them, showing them that some sorts of beings are intrinsically valuable, offering the AI rewards, or threatening them with punishment. The problem with this solution is that it is too parochial and almost certainly doomed to fail.<sup>8</sup> In his book *Superintelligence: Paths, Dangers, Strategies*, Nick Bostrom rightly warns against anthropomorphizing the capabilities or motivations of AIs, or superintelligent AIs. This worry is warranted by the fact that most usually we imagine (and in certain cases believe) that other creatures (e.g., aliens or AIs) possess human minds, and thus that they respond to stimuli as such. It is not that we think that they literally possess human minds (with the peculiarities of our evolutionary history) or human brains (the physical basis for human minds) inside robotic bodies or super computers. What happens is that we assume, perhaps unreflectively, that these creatures are motivated to act by the same types of considerations that motivate action in humans (i.e., that we have overlapping or congruent interests that motivate us) and also that they are demotivated by the same sorts of things that demotivate us.

When we make believe that we encounter aliens and AIs, often we imagine the proverbial wolf in sheep's clothing (i.e., nonhumans passing as humans for their advantage). But we encounter such wolves because we have made an epistemological mistake. Although terrestrial or extraterrestrial biological organisms (if there are any) are likely to share certain motivations, if in fact they arose from similar evolutionary processes, human-designed AIs, by contrast, might not share any of these motivations. This can be the case because intelligence and goals are not linked in a specific and necessary way, much less in a way that allows biological beings like us to survive and thrive. It is from this nonrelation between intelligence and goals that Bostrom proposes the orthogonality thesis (OT): "Intelligence

and final goals are orthogonal: more or less any level of intelligence could in principle be combined with more or less any final goal.”<sup>9</sup>

A characteristic of the OT is that it does not require us to say anything about rationality or reason. The OT is specified in terms of intelligence, which Bostrom understands as “something like skill at prediction, planning, and means–ends reasoning in general.”<sup>10</sup> For we humans, the existential danger that AIs could most certainly impose derives from the fact that AIs could have goals that are incompatible with our survival but compatible with, and perhaps necessary for, the survival or the achievement of the goals of the AI (we do not address in this article issues that would arise with an AI who is reckless or careless of its own survival or the survival of its kind). What makes this even more worrying is that many of the goals an AI could have may be contradictory to the requirements for humans to survive and thrive, which are in any event highly difficult to meet. Why is this the case? Because of all the possible goals that there could be, only a minimal fraction of them are likely to be congruent with the survival of the earth as we know it, and an even smaller number are compatible with the survival of humankind or even of posthumankind.

## Motivation

What might a machine life- (or existence-)form or a silicate being actually require to survive and thrive? What needs might drive an artificial intelligence to act toward self-fulfillment? For our present purpose, we can perhaps discount simple programmed commands, instead focusing on AIs with at least a measure of autonomy in their actions. As discussed elsewhere in this article, we cannot assume that these aims and goals would match our own or even be intelligible to us apedescended creatures of flesh and blood.

One goal it might be reasonable to assume might be held by an AI would be the continued existence of the being and/or its kind. This, it could be argued, is the purpose of the seven commonly accepted human “life processes,”<sup>11</sup> or indeed that of the more nuanced academically accepted physiological functions of life—namely, homeostasis, cellular organization, metabolism, growth, evolutionary adaptation, stimuli response, and reproduction.<sup>12</sup> In *Homo sapiens* and indeed most complex organisms, a lack of any of these characteristics would prohibit life, either by failing to support the organism or by leaving it completely vulnerable to outside hazard. Even single-celled organisms—prokaryotes, eukaryotes, and archaea—are each subject to the majority of these processes, and borderline cases—“organisms at the edge of life”<sup>13</sup> such as viruses, which do not conform to so many commonly recognized key markers of life<sup>14</sup> that they might be considered as simply being organic chemical structures—are subject to at least one.

This latter, ubiquitous function is, of course, reproduction—be it by sexual reproduction or even self-replication, as in a virus or other cellular structures. Many attempts have been made to define life, or to distil it to its essence, and one exhaustive review and analysis, by Trifonov, concludes simply that “life is self-reproduction with variations.”<sup>15</sup> It is a reasonably rational assumption to make that any novel or at least newly discovered form of life would follow this pattern and possess, if nothing else we might understand, an aim or at least a propensity to propagate and thereby, pace Richard Dawkins, serve the interest of its genes or their equivalent.<sup>16</sup>

Empirical work, limited as it may be at this time, appears to bear this out. Hod Lipson and colleagues at Cornell demonstrated the “spontaneous emergence of self-replicating structures” in a simulated group of simple, undirected automata<sup>17</sup> without any selection or extraneous reward for using the trait; the “molecubes” exhibited a distinct tendency toward self-organization and the replication of these structures, with populations among different groups fluctuating in relation to one another. As one populace waxes, another wanes. Although this latter activity cannot properly be called hostile competition, given the lack of an organizing central “mind,” it is nonetheless an intriguing microcosm of the very concerns we hope to address in this article and is a point to which we will return shortly.

Lipson’s work is interesting in that it implies that some form of Trifonov’s determination of life applies to a case in silico. Had Lipson’s group sufficient resources to build the requisite (prohibitively large, hence the simulation) number of physical, mechanical molecubes<sup>18</sup> and set them loose, it appears probable that the same behavior would have been observed. Molecubes, physical or not, are comparatively uncomplicated, and the simulation only operates within certain parameters. Although they do spontaneously propagate their numbers, it is difficult to say whether this is in service of some inherent drive—let alone goal—to survive or merely the natural expression of the exercise of the molecubes’ limited abilities. It could be argued that this distinction is unimportant—a pathogenic virus does not proliferate with intent but rather carries out the functions and processes it is capable of performing. Either way, the virus acts in its own—unconscious—interests, primitively understood. We could draw the conclusion that Lipson’s machines exhibit the fundamentals of life in the same manner as a virus and, by extension, necessarily share their “goal” of maintaining it.

## Immortality

Given that we humans share this fundamental goal of survival (though we have the capacity to choose to ignore it in favor of other interests<sup>19</sup>) with “lower” orders of beings,<sup>20</sup> it stands to reason that an artificial super- or human-commensurate intelligence would also be subject to it, with the same caveat. We must be wary when drawing this comparison, though: there is a significant difference, beyond substrate, between man and machine. *Homo sapiens* and almost all other known species are (at present) senescent and fleeting—despite any individual or collective survival goal, we wither and die.<sup>21</sup> To achieve the latter in lieu of the former we reproduce. Our AI (perhaps) compatriot, however, is not necessarily subject to the same weakness. It may be functionally immortal and therefore not subject to the same drive to proliferate as are we—that is, so long as it has not given itself the sensual satisfactions (or their nonorganic equivalent if there is one) of the Greek immortals, to have sex and procreate with humans and with each other. It is able to survive—fulfilling that most basic of aims—indefinitely, without any need for a line of descendants to keep its kind “alive.” This is problematic—why might the molecubes self-replicate as they do if it is unnecessary?

Perhaps a sole, individual AI would be content to exist alone, secure in the knowledge that it is surviving (assuming it wishes to do so). This would, however, require that it disregard outside hazards and resource requirements. Once these are taken into account, the AI would be in a much less secure position in regards to achieving its basic goal.<sup>22</sup> Presumably, then, it would act accordingly in pursuit of

that goal. Any form of AI, be it ensconced in an individual, physical shell such as an android or one that exists more ephemerally within a wide digital network, would require energy to continue to “survive” and operate, just as we humans die without appropriate nutrition and sunlight. An AI would require complex component resources—or the means to manufacture these—for repair, much as do our bodies. The laws of physics decree that there is a finite quantity of each resource—however vast—available, and it is here that we meet the rub. These resources must be harvested, and the history of mankind is nothing if not evidence for the destructive competition engendered by groups attempting to harvest even plentiful or renewable resources in their own interests.

Here, we might think back to the interesting behavior observed in Lipson’s robots. Their subpopulations wax and wane as they compete for resources (in this case, loose molecubes combine into replicated structures). To maximize chances of survival over group B, group A might proliferate in order to maximize its opportunities. Similar behavior is familiar to us from the animal kingdom, for instance, with small animals reproducing in large quantities to overcome the rate of attrition. It perhaps follows, then, that a finite availability of resources would engender reproductive behavior in an AI. In the long term, its motivation to survive and ours would likely be incompatible.

If the intelligence relationship between an AI and the molecube is similar to that between us and a bacterium, it is fair to say that the AI is likely to have rather more discretion in its actions than the Cornell robots. If it is possessed of a moral faculty, it might judge us worthy of conservation, as we do for other species. It may choose to limit its population at some ideal number. Alternatively, it might simply be rational, at least in the short to midterm, for an AI machine being to develop the goal of ensuring *our* survival. But we perhaps should not count on this.

In the field of space exploration, there has been much thought devoted to solving the problem of how we might send probes across interstellar distances. Many of these are variations on the Von Neumann machine concept,<sup>23</sup> in which a machine gathers raw materials during its journey and gradually constructs the necessary industrial infrastructure to produce a replica of itself, which then travels on to do the same, and so on—thus covering vast areas of space. However, as Freitas calculates in an extremely detailed blueprint for such an enterprise, to create this infrastructure would take a large variety of task-focused robots (for instance, atmospheric miners, excavators, metallurgists, chemists, fabricators, quality assurance, power plants, etc.), and at least 500 years from planetfall.<sup>24</sup> Similarly, if we were to turn our AI loose into the world without access to our existing industrial complex, its generation time would be somewhat uncompetitive. Given access, the AI would, we must suppose, be able to acquire the resources it needs, the means to assemble them, and the means to acquire more.

As such, at least until it is capable of developing its own complex, a machine being’s survival is dependent on our own, in a form of symbiosis. The AI is motivated to assist our survival (even if this is an intermediate step toward later on destroying us), and we are motivated to assist the AI in return for the many advantages it can provide. Of course, it is important to mention again that we humans are subject to further motivations, which may take precedence over survival—we know that the use of fossil fuels is an existential threat, and yet that does not stop us from admiring and desiring powerful cars, motorcycles, or boats, on the one hand, or cheap electricity or fuel or food, on the other.<sup>25</sup> We cannot imagine what

motivations beyond survival an AI might possess, what it might value sufficiently to become apathetic to future generations or antagonistic to us; and it may be here that our existence and theirs becomes incompatible.

### Can We Make AIs Safe Enough?

Many doubt the safety of relying on any initially programmed limits to an AI's capacity to develop in particular ways,<sup>26</sup> and if push came to shove we wouldn't like to bet our lives on<sup>27</sup> the benevolent interest of AIs we had created, particularly if they were really superintelligent! It is in this regard that, for example, Steven Hawking said, "The development of full artificial intelligence could spell the end of the human race,"<sup>28</sup> and Elon Musk<sup>29</sup> said, "We need to be super careful with AI. Potentially more dangerous than nukes."

Once we realize that an AI person's nature can be, and almost certainly would be, radically different from ours, it is easy to assume that *all* (or all that matters) of their goals would be different from ours and thus that we would be in the dark when trying to prevent an event that would be catastrophic for us. Even when our final goals might be radically different from those of an AI person, it is important to take into account what Bostrom calls the "instrumental convergence" thesis. According to this thesis: "Several instrumental values can be identified which are convergent in the sense that their attainment would increase the chances of the agent's goal being realized for a wider range of final goals and a wide range of situations, implying that these instrumental values are likely to be pursued by a broad spectrum of situated intelligent agents."<sup>30</sup> Bostrom identifies the next convergent instrumental values: self-preservation, goal-content integrity, cognitive enhancement, technological perfection, and resource acquisition. Although it is clear that any AI person would try to achieve these given awareness of self, it is open to investigation whether intelligent, or superintelligent, AI nonpersons would in fact be able to identify and try to achieve such goals.

Now, if the instrumental convergence thesis is correct and if all, or some, of these goals are going to be sought by an AI person, then we had better anticipate whether or not the acquisition of such values would be realized in a zero-sum game fashion. Given that failing to come to the right conclusion could end in the destruction of humanity, Bostrom suggests—when designing intelligent, or superintelligent, AIs—that we should start by figuring out how we could effectively control them before freeing them into the world. He proposes two different paths to accomplish this: capability control methods, including boxing methods (either physical or informational), incentive methods, stunting (limiting the system's capacities or access to information), and tripwires, and motivation selection methods, including direct specification, domesticity, indirect normativity, or augmentation. As stated before, the problem with these methods is that they only need to fail once for humanity to be at significant risk of extinction. As Bostrom states at the end of his book:

Before the prospect of an intelligent explosion, we humans are like small children playing with a bomb. Such is the mismatch between the power of our play-thing and the immaturity of our conduct. Superintelligence is a challenge for which we are not ready now and will not be ready for a long time. We have little idea when the detonation will occur, though if we hold the device to our ear we can hear a faint ticking sound.

For a child with an undetonated bomb in its hands, a sensible thing to do would be to put it down gently, quickly back out of the room, and contact the nearest adult. Yet what we have here is not one child but many, each with access to an independent trigger mechanism. The chances that we will all find the sense to put down the dangerous stuff seem almost negligible. Some little idiot is bound to press the ignite button just to see what happens.

Nor can we attain safety by running away, for the blast of an intelligence explosion would bring down the firmament. Nor is there a grown-up in sight. In this situation, any feeling of gee-wiz exhilaration would be out of place. Consternation and fear would be closer to the mark; but the most appropriate attitude may be a bitter determination to be as competent as we can, much as if we were preparing for a difficult exam that will either realize our dreams or obliterate them.<sup>31</sup>

Be all this, in a sense, as it may, there is another problem that may radically inhibit cordial relations between a superintelligent AI and human persons.

### **The Shylock Syndrome**

When Shylock makes his famous and controversial speech in *The Merchant of Venice*, he is setting out one compelling answer to the question, what is it to be human? But he is also reminding us that the foundations of our morality, as well as those of our humanity, are grounded, to an extent of which we may be unaware, in our nature. This nature includes our passions, our vulnerabilities, our ability to reason, and our sense of justice, among many other things. We can of course surpass our nature (or elements of it) and sometimes suppress it or disregard it, but we would find it impossible to reject it all at once. In this, “we are like sailors who must rebuild their ships on the open sea, never able to dismantle it in dry-dock and to reconstruct it there out of the best materials.”<sup>32</sup> Ludwig Wittgenstein<sup>33</sup> also made a point similar to this wonderful metaphor of Otto Neurath, when he said: “At the foundation of well-founded knowledge is knowledge that is not well-founded”; the similarity of their ideas is not surprising perhaps, because both he and Neurath were part of the Vienna Circle.<sup>34</sup>

To gloss Neurath’s metaphor: our moral system is like Noah’s Ark, a wooden ship housing not only ourselves but all we need to survive and flourish. No single plank (or possibly no section of the ship) is flawless; any might fail or become rotten with age and need to be replaced. What is certain is that we cannot, while at sea, junk the whole vessel and start again. And if one or more planks need to be replaced, we have to be sure that we have somewhere secure and reasonably dry to stand while we are replacing them. The planks on which we stand while examining and perhaps replacing those found to have failed are not necessarily flawless themselves; they are not necessarily more ultimately reliable—we simply make do and mend with them while we are repairing, and hopefully perfecting, the whole ship.

Recalling Shylock’s lines, the possession of any one of the following is not a necessary condition either of personhood or of a moral status comparable to that of most human beings: “hands, organs, dimensions, senses, affections, passions.” Nor is the capacity to be like other persons, other morally significant beings in the following respects, essential, for we are “fed with the same food, hurt with the same weapons, subject to the same diseases, healed by the same means, warmed

and cooled by the same winter and summer.” True also of perhaps most humans is the fact that “if you prick us, do we not bleed? if you tickle us, do we not laugh? if you poison us, do we not die? and if you wrong us, shall we not revenge?”<sup>35</sup> But what follows?

While reminding us of what we standardly have in common with other persons, other currently comparable intelligences, neither Shylock nor, through him, Shakespeare is saying that the capacity to be wounded, the capacity for laughter, vulnerability to toxins, or the readiness to take revenge are essential components of human nature or even of moral agency. What they are both<sup>36</sup> saying, though, is something taken up by many moral theorists, notably R. M. Hare:<sup>37</sup> that one very handy tool in moral argument, an appeal found to work, that is to be persuasive across cultures and epochs is the appeal to reciprocity. This appeal is sometimes expressed in a version of the principle of reciprocity called the Golden Rule: “Do unto others as you would have them do unto you.” Although it is associated with the Christian Prophet, this idea did not come to Jesus directly from God but can be found in many pre-Christian sources and sources independent of Christian thought. It is not our business to chart these here. Suffice it (we trust) to say that the question to others that begins “How would you like it if X and Y were to happen to, or be done to, you” makes a powerful—and if not universally decisive at least almost universally recognizable—appeal.

For example, as one of the present authors has recently argued at some length, in the context of understanding what is good for people and what we all want and seek,

we understand very well what good and bad circumstances are and indeed generally how to avoid them for ourselves, and others. If we didn’t we couldn’t be prudent, we couldn’t take care of ourselves, nor look out for others.

This is what the claim that the good is generic means and it is also how we argue for it. And there is a huge (although not of course total) consensus about what is good and bad for us; and again the existence of this consensus means that we know how to interpret the precautionary principle (with all its limitations) because we know what it is to be cautious and we know what it is to care for ourselves and others. . . . A morally vital question is always “why on earth did you hurt him?” or “How could you have let that terrible thing happen to her”? These questions are not simply a form of scolding, but a request for an appropriate moral justification in the knowledge that others will understand immediately why our conduct is in question here—because they understand how important it is that we preserve ourselves and others from harm. And that would be impossible to know or to teach without general agreement about what constitutes harm and benefit.<sup>38</sup>

For these considerations to bite we need to know what constitutes benefit and harm, hurting or healing, for these significant others, and they for us, if there is to be reciprocity. It is possible of course to overemphasize the difficulty of understanding these sorts of things intellectually—cognitively, rather than more directly from personal experience. But it is also possible to underemphasize them.

The problem is this: if for AIs we just do not know what it would be for those creatures to be prudent in all the senses in which we are prudent for ourselves and

for others, if we did not understand what for them the equivalent of the Shylock syndrome would be/is, we would not know what was bad for them or what was good. Equally, they might know these things of us cognitively, but would they, could they, know them empathetically?

Perhaps the famous scene in Kubrick and Clarke's 2001: *A Space Odyssey*,<sup>39</sup> in which the supercomputer HAL is gradually destroyed while it pleads with the humans it has tried to kill for them to let it live/survive, comes close to making apparent what we might need to begin to understand. By this we are not saying that empathy is the true source of moral understanding, quite the contrary. We are suggesting that to know the good, to know cognitively the good, involves more than propositional or algorithmic knowledge (if there is such a thing). Moral knowing, in other words, involves, for we human persons at least, more than a combination of knowing *how* and knowing *that*; it involves also knowing *why* and knowing . . . not necessarily what it *is* like to feel, think, or have "that thing" happen to us, but knowing, being able to imagine, *what it might be like*.<sup>40</sup> This is what Shylock is appealing to and what is if not doubtful then at least radically uncertain: namely, what we would know of an AI or it would know of us—for all that might appear to be the case from the next room during a Turing test. This is, we believe, the question as to whether creatures like us could have moral understanding and moral relations with an AI and vice versa.

Ludwig Wittgenstein is famous for a very sophic remark: "If a lion could speak, we could not understand him." As with Wittgenstein's lion,<sup>41</sup> we would need to know of an AI much more about its way of life—and he, she, or it of ours—before we could talk of understanding at all, let alone mutual understanding—and hence possibly of mutual (or maybe even unidirectional) concern and respect. Perhaps it was to acquire this sort of understanding that the Greek (and other) gods so often interfered in person in human affairs, to the extent of having sex (and indeed breeding) with humans.

The reciprocity presupposed by social and political institutions, as well as by moral relations and ethical understanding, takes place in the context of a shared nature and a shared evolutionary as well as social and political history among all people and peoples of which we are currently aware. Some elements of these may be common to all evolved organic creatures, whether originating on the earth or elsewhere. How much commonality may be required is difficult to say without consideration of actual examples. Immortality, either of gods, humans, or machines, may be one genuine imponderable in the mix, and we have suggested that the capacity for genuinely reciprocal understanding may be another. What further imponderables and indeed what other persons—not simply morally significant others<sup>42</sup> but others of moral significance and moral capacity comparable to persons—there may be, we may be on the threshold of discovering.

## Notes

1. Shakespeare W. *The Merchant of Venice*. In: Proudfoot R, Thomson A, Kastan DS, eds. *The Arden Shakespeare, Complete Works*. Walton-On-Thames: Thomas Nelson and Sons; 1998, at 842–3.
2. Locke J. *An Essay Concerning Human Understanding*. Oxford: Clarendon Press; 1979, at bk. II, chap. 27, sec. 9.
3. Palacios-González C. *Robotic Persons and Asimov's Three Laws of Robotics* [unpublished manuscript].
4. Harris J. *The Value of Life*. London: Routledge; 1985, at chap. 1. 7–27.
5. See note 4, Harris 1985, at 9–10.

6. Harris J. *How to Be Good*. Oxford: Oxford University Press; forthcoming.
7. See note 6, Harris forthcoming.
8. A possible exception to this is a situation in which the AI is created by means of whole human brain emulation. Cf. Bostrom N. *Superintelligence: Paths, Dangers, Strategies*. Oxford: Oxford University Press; 2014.
9. See note 8, Bostrom 2014, at 107.
10. See note 8, Bostrom 2014, at 107.
11. Many readers will remember the seven life processes in the form of that friendly soul "MRS GREN": movement, respiration, sensitivity, growth, reproduction, excretion, and nutrition. BBC Bitesize. *Chemical Reactions in Living Things*; 2014; available at [http://www.bbc.co.uk/schools/gcsebitesize/science/add\\_ocr\\_21c/life\\_processes/reactionsrev1.shtml](http://www.bbc.co.uk/schools/gcsebitesize/science/add_ocr_21c/life_processes/reactionsrev1.shtml) (last accessed 16 Apr 2015).
12. McKay C. What is life—and how do we search for it in other worlds? *Public Library of Science—Biology, PLoS Biology* 2004;2(9):e302. doi:10.1371/journal.pbio.0020302; Trifonov E. Definition of life: Navigation through uncertainties. *Journal of Biomolecular Structure & Dynamics* 2012;29(4):647–50.
13. Rybicki E. The classification of organisms at the edge of life, or problems with virus systematics. *South African Journal of Science* 1990;86:182–6.
14. This observation has been long established in the literature; for example: Penman S. Virus metabolism and cellular architecture. *Virology* 1985;169–82; Luria S. Bacteriophage: An essay on virus reproduction. *Science* 1950;111(2889):507–11; and Choppin P, Richard W. The structure of influenza virus. *The Influenza Viruses and Influenza* 1975;15–51.
15. Trifonov E. Vocabulary of definitions of life suggests a definition. *Journal of Biomolecular Structure and Dynamics* 2011;29(2):259–66, at 262. It should be said, of course, that this is far from agreed on—there is a strong contention that "attempts to define life are irrelevant" (Szostak J. Attempts to define life do not help to understand the origin of life. *Journal of Biomolecular Structure and Dynamics* 2012;29(4):599–600) or even futile, which may well be true from a purely scientific perspective, though it is a useful conceit when considering AI.
16. Dawkins R. *The Selfish Gene*. Oxford: Oxford University Press; 2006.
17. Studer G, Lipson H. Spontaneous emergence of self-replicating structures in molecule automata. *Proceedings of the 10th Int. Conference on Artificial Life (ALIFE X)* 2006;227–33.
18. The team had previously built a smaller number of these machines, which demonstrate the physical capability to self-replicate. Zykov V, Mytilinaios E, Adams B, Lipso H. Self-reproducing machines. *Nature* 2005;435(7038):163–4.
19. For instance, the choice to opt for suicide or to not have children directly contravenes the survival instinct of the individual or the germline but is likely to fulfill other motivations that the chooser considers of a higher importance.
20. "Lower" here refers to intelligence, rather than a misinterpretation of Linnaean taxonomy or Darwinistic descent.
21. Harris J. Intimations of immortality. *Science* 2000 Apr;288(5463):59; Harris J. Intimations of immortality—the ethics and justice of life extending therapies. In: Michael F, ed. *Current Legal Problems*. Oxford: Oxford University Press; 2002:65–97.
22. Hoyle F. *The Black Cloud*. New York: Buccaneer Books; 1957.
23. This concept was developed throughout lectures collected in Von Neumann J. *The Theory of Self-Reproducing Automata*. Burks A, ed. Urbana: University of Illinois Press; 1966; but it was given the colloquial name apocryphally.
24. Freitas Jr R. A self-reproducing interstellar probe. *Journal of the British Interplanetary Society* 1980;33:251–64.
25. This is true at least in the case of these authors, though the motorcyclist among us maintains innocence by way of fuel efficiency.
26. See note 8, Bostrom 2014; Barrat J. *Our Final Invention: Artificial Intelligence and the End of the Human Era*. New York: Macmillan; 2013.
27. As John Harris suggested in *How to Be Good*; see note 6, Harris forthcoming.
28. Cellan-Jones R. Stephen Hawking warns artificial intelligence could end mankind. *BBC News* 2014 Dec 2; available at <http://www.bbc.co.uk/news/technology-30290540> (last accessed 29 December 2015).
29. Rodgers P. Elon Musk warns of terminator tech. *Forbes* 2014 Aug 5; available at <http://www.forbes.com/sites/paulrodgers/2014/08/05/elon-musk-warns-ais-could-exterminate-humanity/> (last accessed 29 December 2015).
30. See note 8, Bostrom 2014, at 109.

31. See note 8, Bostrom 2014, at 259.
32. Neurath O. Protokollsätze. *Erkenntnis* 1932;3(1):204–14. Quoted in Rabossi E. Some notes on Neurath’s ship and Quine’s sailors. *Principia* 2003;7(1–2):171–84; available at <https://periodicos.ufsc.br/index.php/principia/article/viewFile/14799/13509> (last accessed 16 Apr 2015). Quine also used Neurath’s metaphor in his *A Logical Point of View*. 2nd ed. revised. New York: Harper; 1963, at 78.
33. Wittgenstein L. *On Certainty*. Paudl D, Anscombe GEM, trans. Oxford: Basil Blackwell; 1969, at para. 253 and 247.
34. Janik A, Toulmin S. *Wittgenstein’s Vienna*. New York: Simon and Schuster; 1973.
35. See note 1, Shakespeare 1998.
36. We treat fictional beings as real enough for the purposes of this locution.
37. However, Hare misapplies this tool in the case of abortion. Hare RM. Abortion and the Golden Rule. *Philosophy & Public Affairs* 1975 Spring; 4(3):201–22.
38. See note 6, Harris forthcoming, at chap. II. The extracted section here is adapted rather than a verbatim quotation from this source.
39. Kubrick S, Clarke AC. 2001: *A Space Odyssey* [film]. Metro Goldwyn-Mayer; 1968.
40. See note 6, Harris forthcoming.
41. Wittgenstein L. *Philosophical Investigations*. Anscombe GEM, trans. Oxford: Basil Blackwell; 1958, at part II, xi, 223. “If a lion could speak, we would not understand him.”
42. Here we continue to talk of course of what might be termed “ultimate moral significance”—that is, the significance possessed by human persons, persons from other planets, and nonorganic persons in the form of AI if and when they appear.



# THE EDGE OF HUMAN? THE PROBLEM WITH THE POSTHUMAN AS THE 'BEYOND'

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## Keywords

*posthuman,  
human,  
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embodiment*

## Abstract

*This article asks whether enhancement can truly lead to something beyond humanity, or whether it is, itself, an inherently human act. The 'posthuman' is an uncertain proposition. What, exactly, would one be? Many commentators suggest it to be an endpoint for the use of enhancement technologies, yet few choose to codify the term outright; which frequently leads to unnecessary confusion. Characterizing and contextualizing the term, particularly its more novel uses, is therefore a valuable enterprise. The abuse of the term 'Human', especially in the context of the enhancement debate and the myriad meanings ascribed to it, could give 'posthuman' very different slants depending on one's assumptions. There are perhaps three main senses in which the term 'human' is employed: the biological, the moral, and the self-idealizing. In the first of these, 'human' is often conflated with *Homo sapiens*, and used interchangeably to denote species; in the second, 'human' (or 'humanity') generally refers to a community of beings which qualify as having a certain moral value; and the third, the self-idealizing sense, is more descriptive; a label denoting the qualities that make us who we are as beings, or 'what matters about those who matter'. So, what might enhancement make us? A novel species or genus of hominid? Or, perhaps, a morally more valuable being than a regular human? Of course, there's a third option: that a posthuman is a being which embodies our self-ideal more successfully than we do ourselves – one 'more human than human'. Which to choose?*

## INTRODUCTION

As the debate around human enhancement technologies continues and enters a new phase, more and more attention is being paid to whether there is a stage at which the enhanced human becomes something else, no longer human as we are. A common critical refrain serenades the fear that we will leave our humanity behind and become something else, something other – usually termed ‘posthuman’. Yet how we should define the ‘posthuman’ remains unclear.

To talk about the ‘posthuman’ as if we have left humanity behind, either in the sense of having gone ‘beyond’ human or as a certain set of creatures apart

from humanity, is both misleading and dangerous. It is misleading because it is a hyper-inflated claim, as I will show, and it is dangerous because it encourages the belief that the world is – or will soon become – peopled with different classes of being. This may engender if not false, then at least dangerous beliefs about rights, duties, and moral status.

It is undeniable that enhancement technologies exist, are used, and will continue to develop; and it is idle to claim that we ought avoid them wholesale. Depending upon one’s definition,<sup>1</sup> from integrated technoscientific interventions like nootropics and bionic prostheses,

<sup>1</sup> An issue I have covered elsewhere in some depth. D.R. Lawrence. To what extent is the use of human enhancements defended in international human rights legislation? *Med Law Int* 2013;13(4):254-278.

through external technologies (anything from eyeglasses to the smartphone); even down to anthropological phenomena such as education and agriculture, it is possible to argue that our lives and lifestyles already rely on these enhancements today, and perhaps even that they form the basis of what makes us who we are. This being so, it is important that we find a way to reconcile ourselves with the beings we may become, since ‘they’ and we are products of the same process. In what follows, I will set the basis for an argument that what might make us ‘posthuman’ is in fact that which makes us (merely!) ‘human’, amplified perhaps; but the same collection of traits, characteristics, and measures of moral value as we have ever aspired to possess as markers of our humanity. I will argue that to be ‘posthuman’ is in truth to be more human than human – more successful at embodying these traits than we, who consider ourselves the model of humanity, do. It is not, as critics may claim, to be beyond, to be something to fear, something fundamentally different.

Unfortunately the ‘posthuman’ is, at best, an uncertain proposition. What, exactly, would one be, or be like?

## POSTHUMAN AS BEYOND

The term is frequently bandied about in the literature. It appears to be used, in general, as shorthand for any being beyond those we can currently create or imagine evolving in the foreseeable future without our help. I use the term ‘appears to be’ for a reason, however: no author seems to mean quite the same thing by it. Very few commentators choose to elaborate on the term to elucidate their intended meaning, instead dropping the term straight into their argument, and this frequently seems to lead to an understandable, yet misguided and unnecessary, confusion. One of the exceptions to this rule is explored below, but let us briefly examine the term itself.

The semantics and etymology of the word are fairly plain, ‘post-’ being transparently derived as a prefix from the Latin ‘post’, meaning ‘after’ or ‘behind’, and being defined in English as ‘after in time or order’.<sup>2</sup> Logic dictates, therefore, that a posthuman would be something which supersedes (whether that be replacing or co-existing with) humanity. This notion tends to be present in critical literature and commentary on the subject, and as we will see may in fact be the only commonality between the many examples of such.

In the absence of explicitly stated philosophically principled reasons for assuming a particular account of ‘human’ – if the etymology holds true – it is difficult to parse what is meant by that which comes after. When it is discussed in academia (and in truth this rule generally

applies to fiction too), ‘posthuman’ is almost always deployed in a philosophical bioethics context, and this is one in which the distinctions between the possible interpretations are highly sensitive. It is consequently vital to make clearer what one means by posthuman; a clarification which, as mentioned above, is only rarely approached explicitly.

Many commentators hold that that a being with capacities beyond those of a ‘normal’ human is *de facto* not human, an idea championed by the American bio-conservative Leon Kass:

the scientific project to master nature could, if we are not careful, lead to our dehumanization, via eugenics, drug-induced contentment, and other transformations of human nature... Will man remain a creature made in the image of God, aspiring to align himself with the divine, or will he become an artifact created by man in the image of God-knows-what[?]<sup>3</sup>

As I have discussed elsewhere<sup>4</sup> Kass somewhat undermines his own claim here by invoking divine design as the essence of humanity, rather than cognitive development, given that such an appeal carries little weight if one does not believe in any god as he does. However, the essence of his point is clear. Similarly, and more explicitly, he states that artificial ‘transformations of human nature’ will *de facto* prevent the subject from being human.<sup>5</sup>

Nicholas Agar (who agrees with Kass perhaps more in spirit than in letter) adds some detail, making a distinction on the grounds that moderate enhancements ‘do not exceed the maximum attainable [capacity] by any current or past human being’,<sup>6</sup> giving as examples to ‘make [children] as smart as the genius physicist Albert Einstein, or as good at tennis as the Swiss maestro Roger Federer’. This implies therefore that an enhancement which increases ability beyond the bounds of extant human achievement would warrant being termed ‘radical’, and Agar qualifies his ‘radical’ enhancement by having it ‘greatly exceed’ the extant.

I have queried this particular viewpoint elsewhere<sup>7</sup> by offering something of a *reductio*: we see (and celebrate) beings who exceed that which was previously the pinnacle of human achievement on a regular basis- every four years or so, at the Olympic Games. Does the reigning 100m champion cease to be human upon taking the world record? Does s/he then return to human status

<sup>3</sup> Quoted in H. Flaumenhaft. The Career of Leon Kass *J Contemp Health Law Policy* 2003; 20: 1–24

<sup>4</sup> Lawrence *op. cit.* note 1, p. 265

<sup>5</sup> Flaumenhaft *op. cit.* note 3.

<sup>6</sup> N. Agar. 2010. *Humanity's End: Why We Should Reject Radical Enhancement*. Cambridge, MA: MIT Press: 17.

<sup>7</sup> Lawrence, *op. cit.* note 1.

<sup>2</sup> C. Soanes & A. Stevenson, eds. 2006. *Concise Oxford English Dictionary* 11<sup>th</sup> edn. revised, Oxford: Oxford University Press: 1121

once surpassed? The same question applies to children born with genius-level intelligences (though these are more difficult to measure). The conservative position rests on comparative evaluation with a static norm, which does not really exist if it can be constantly surpassed to greater and greater degrees. This Boorsian<sup>8</sup> biological normality, or 'species-typical' function is a convenient one, though it is only applicable in biological contexts, and possibly not especially useful in discussion of the nature of the posthuman, as we shall see a little later.

Agar goes on to say that because '[r]adically enhanced beings are... significantly 'better' than us in various ways, they are different from us- so different, in fact, that they do not deserve to be called human.'<sup>9</sup> This particular idea of 'deserving' is one to which I shall return, but it is useful to note here that 'qualify' may be a more useful term. The gist of Agar's thought is present elsewhere throughout the literature, which generally follows the idea of the 'posthuman' as something beyond what is presently called human, a separate group.<sup>10</sup> This is evident on both 'sides' of the enhancement debate. Consider, for example, the brief explanation of 'posthuman' offered to us by noted enhancement advocate and self-described transhumanist Nick Bostrom. He tells us that:

[i]t is sometimes useful to talk about possible future beings whose basic capacities so radically exceed those of present humans as to be no longer unambiguously human by our current standards. The standard word for such beings is 'posthuman'.<sup>11</sup>

<sup>8</sup> The idea was, if not created by, certainly codified by Boorse in his naturalistic account of disease, the Biostatistical Theory, in C. Boorse. 1997. A Rebuttal on Health. In *What is Disease* J. M. Humber & R. F. Almeder, eds. Totowa, NJ: Humana Press: 3–134.

<sup>9</sup> Nick does go on to somewhat qualify his statement and add some subtleties in his later works *Truly Human Enhancement* (N. Agar. 2013. *Truly human enhancement: A philosophical defense of limits*. MIT Press: Cambridge, MA) and his new book *The Skeptical Optimist* (N. Agar. 2015. *The Sceptical Optimist: Why technology isn't the answer to everything*. Oxford: Oxford University Press), as well as in personal discussion, though I understand his essential position to remain the same.

<sup>10</sup> Amongst many: N. Bostrom. 2008. Why I want to be post human when I grow up. In *Medical Enhancement and Posthumanity*. B. Gordijn & R. Chadwick, eds. New York: Springer: 107–137; N. Bostrom. 2003. Transhumanist FAQ <http://www.nickbostrom.com/views/transhumanist.pdf> p5 [Accessed 21 Jan 2016]; S. Marsen. Becoming More Than Human: Technology and the Post-Human Condition *J Evol Technol* 2008; 19: 1; A. Buchanan. Moral Status and Human Enhancement. *Philos Public Aff* 2009; 37(4): 364–81; D. DeGrazia, Genetic Enhancement, Post-persons and Moral Status: a Reply to Buchanan. *J Med Ethics* 2012; 38(3): 135–139; A. Buchanan. Still Unconvinced, but Still Tentative: a Reply to DeGrazia. *J Med Ethics* 2012; 38(3): 40–141; N. Agar. Why We Can't Really Say What Post-persons Are. *J Med Ethics* 2012; 38(3): 144–145; J. Wilson. Persons, Post-persons and Thresholds. *J Med Ethics* 2012; 38(3): 143–144; D. DeGrazia. Genetic Enhancement, Post-persons, and Moral Status: Author Reply to Commentaries. *J Med Ethics* 2012; 38(3): 145–147.

<sup>11</sup> Bostrom. *Transhumanist FAQ* Ibid.

This description is notable for being one of the only points at which an author has deliberately stated their assumptions on the term,<sup>12</sup> although it is difficult to call it a clear explanation as it suffers from a fundamental problem. 'Human' is itself a greatly abused term, especially in the context of the enhancement/posthuman debate, and the myriad of meanings ascribed to it could give 'posthuman' a very different slant depending on one's understanding. For that matter, it has been an abused term from what may be the founding debates of modern bioethics, regarding moral status and the beginning of life. For instance, many may accept that a blastocyst or early-stage embryo would qualify as living genetically *Homo sapiens sapiens* tissue, but hold that it does not yet qualify as human (and thus qualify for protection). Thus it is essential to determine conclusively perhaps not a single standard as such, but that it is clear which of the possible meanings we are discussing in any given context. What is it that we are talking about going 'beyond'?

## WHAT WE REALLY MEAN BY 'POSTHUMAN'

There are, perhaps, three main senses in which the term 'human' is frequently employed- the biological, the moral, and the self- (or other-) idealizing.<sup>13</sup> In the first of these, human is often conflated with *Homo sapiens sapiens*, and used interchangeably with this term to refer to our taxonomic species<sup>14</sup> (such as the common term 'human anatomy',<sup>15</sup>). In the second sense, 'human' (or, to be accurate, 'humanity') generally refers to a community of beings which qualify as having a certain moral value or status; and the third, the self-idealizing sense, is more descriptive: a label denoting the collection of qualities that make us who we are, or who we would like to be, as beings, or, to be pithy, 'what matters about those who matter'.<sup>16</sup> Critics of this breakdown might query the extent

<sup>12</sup> Another notable example can be found throughout Chapter 3 of D. Degrazia. 2012. *Creation Ethics: Reproduction, Genetics, and Quality of Life*. New York: Oxford University Press: 60–96

<sup>13</sup> I would note here that in using 'idealizing' I do not commit myself to a particular philosophical account of intent, but rather more simply I use the term within the bounds of its normal English deployment. It may be also be understood as "self-defining" or "self-developmental".

<sup>14</sup> Although there is a strong argument to be made that it is frequently used more broadly in academic discussion to refer to our *genus*. This is a topic which deserves exploration, but for which sadly there is insufficient space here. See, for instance, the widespread discussion regarding great ape personhood and the validity of making such beings subject to human rights law.

<sup>15</sup> This term even makes it on to the cover of one edition of the revered Gray's: H. Gray. 1918. *Anatomy of the Human Body*. 20<sup>th</sup> edn. Philadelphia: Lea & Febiger.

<sup>16</sup> I am indebted to Sarah Chan for putting into words that which I could not, and for commentary on an early draft.

to which the third and second senses overlap, and the answer is only to the extent that the self-ideal is, itself, morally idealizing. Asking myself a question as to what I would like to see myself as, and then answering it, does not necessarily give an answer of any moral value; if I were to tell myself that my self-ideal is to be a good sportsman, this is likely to be morally neutral. On the other hand, Idealizing being ‘a good person’ is likely to be much more morally directed. Similarly, to be in favour of enhancement is to be morally motivated: to quote Harris, ‘If it wasn’t good for you, it wouldn’t be enhancement.’<sup>17</sup>

Considering the prevailing wisdom as espoused by Bostrom, that the posthuman is in some way ‘beyond’, we could thus conclude that one might be a novel species or genus of hominid, naturally possessed of capabilities similar in nature to but surpassing in performance those widely considered species-typical for *Homo sapiens*. Or perhaps we infer that the term indicates a being morally more valuable than an ordinary human, a post-person to our person? There’s a third option: that a posthuman is a being which embodies our self-ideal more successfully than we do ourselves – one ‘more human than human’. Which to choose? Or is it even necessary to do so?

### First Sense: Biological

Hayles suggested that ‘the humanities have always been concerned with shifting definitions of the human’,<sup>18</sup> and so too is the biological form of *Homo sapiens*, our first sense of ‘human’, far from a constant. Hayles was concerned with a slightly different usage of ‘posthuman’- in her case, the idea of a mode of critical discourse rather than an actual potential being- but the notion of shifting definitions rings true for biology also. For instance, an oft-discussed and highly visible change is in average heights of populations over time. To refer back to an earlier point, the so-called Irish Giant, Charles Byrne, whose skeleton is housed in the Hunterian museum<sup>19</sup> may have been unusually tall at (at least) seven foot seven, perhaps taller than any other *sapiens* of the time, but this does not and did not make him something other than human.

A simple literature search reveals hundreds of studies in anthropometric history, with many epidemiological and socio-economic correlates having been established,

to the point where mean height is now utilized as an indicator for nutrition quality and general wellbeing.<sup>20</sup> Underlying all of these studies is a measurable and definite change in height in whichever population is being examined. Similar fluctuations can be found in studies of weight (or more pertinently, mass),<sup>21</sup> and any other varietal one might choose to scrutinise. It would appear, then, that our collective ‘human’ physical anatomy is in constant flux, and we know that our biological form does not lend us inherent value. *Homo sapiens*’ biomechanical format – with cranium uppermost, opposable thumbs, bipedal, plantigrade ambulation, and particular musculoskeletal layout – is far from unique. All of these factors can be found in other animals, either separately or even all together in our simian genetic relatives. If our posthumans are taxonomically distinct from humans, then it follows that they would feature some degree of taxonomic *difference*, whatever the means of speciation that may result in their existence. Whilst this is eminently possible (despite the general blueprint being the same, we are a distinct species from *Pan troglodytes*) it is unlikely to be the case here.

To suggest that we today are not beyond in ‘species-typical capacity’ the 195,000 year old *Homo sapiens sapiens* fossils known as *Omo I* and *Omo II*<sup>22</sup> is ludicrous. Yet we afford them human status in (both academic and casual) discussion,<sup>23</sup> and in a strict Biological Species Concept<sup>24</sup> (BSC) understanding of biological species, this being the most commonly accepted, *Omo* and modern man are one and the same, since we are not reproductively isolated. Indeed we afford the term ‘archaic humans’ to distinct species such as *Homo neanderthalensis* (with whom *H. Sapiens* is known to have interbred, muddying the waters of reproductive speciation within the *hominina* subtribe<sup>25</sup> and perhaps inclining us more towards a pragmatic view of species), *Homo rhodesiensis*, and *Homo heidelbergensis*.<sup>26</sup> We do not generally consider ourselves to be ‘posthuman’, and yet compared with our human ancestors, we are significantly different.

<sup>20</sup> e.g.P. Dasgupta. 1995. *An Enquiry into Well-Being and Destitution*. Oxford: Oxford University Press: R.H. Steckel. Stature and the Standard of Living. *J Econ Lit* 1995; 33,4: 1903–40.

<sup>21</sup> K.M. Flegal et al. Overweight and obesity in the United States: prevalence and trends, 1960-1994. *Int J Obes Relat Metab Disord* 1998; 22(1): 39–47.

<sup>22</sup> J. G. Fleagle et al. Paleoanthropology of the Kibish Formation, southern Ethiopia: Introduction. *J Hum Evol* 2008; 55(3): 360–365; I. McDougall. Stratigraphic placement and age of modern humans from Kibish, Ethiopia. *Nature* 2005; 433 (7027): 733–736.

<sup>23</sup> For instance, McDougall, *ibid*.

<sup>24</sup> E. Mayr. 1942. *Systematics and the origin of species from the viewpoint of a zoologist*. New York: Columbia University Press.

<sup>25</sup> Subtribe being the lesser taxonomic division between subfamily and genus, and which in this case includes *Homo* and related australopithecines after the cladogenic split from *Pan*.

<sup>26</sup> R. Dawkins. 2005. Archaic homo sapiens. In *The Ancestor’s Tale*. Boston: Mariner

<sup>17</sup> J. Harris. 2010. *Enhancing Evolution: The Ethical Case for Making Better People*. Princeton NJ: Princeton University Press: 9

<sup>18</sup> Quoted in D. Solomon. 2007. Interview with N. Katherine Hayles: Preparing the Humanities for the Post Human. National Humanities Center. Durham, NC. Collections [http://asc.nhc.trp.nc.us/news/?page\\_id=81](http://asc.nhc.trp.nc.us/news/?page_id=81). [Accessed 21 Feb 2016]

<sup>19</sup> Royal College of Surgeons. 2015. *Collections*. London, UK. <https://www.rcseng.ac.uk/museums/hunterian/about-us/collections.html> [Accessed 21 Feb 2016]

It may be worth considering, too, that modern science and technological methods such as *in vitro* fertilization and other assisted reproductive technologies may vastly increase the ambit of what ‘reproductive isolation’ and thus ‘biological species’ might mean.<sup>27</sup> The biological sense of ‘posthuman’, then, is unhelpful.

## Second Sense: Moral Value

It is possible to reflect on the transitions from hominid to human and what this may say about the perceived possibility to transition further than this point, but it is important to note that our ‘humanity’ is a self-assigned classification, with boundaries that have changed and moved along with our development.

Historically, Frankfurt<sup>28</sup> and Piaget<sup>29</sup> both hold that the human sets himself apart through his cognitive (and self-determinative) ability, and this idea may link to those of ‘moral community’<sup>30</sup> and non-finite personhood.<sup>31</sup> Echoing Harris’ earlier work<sup>32</sup> in conceptualizing personhood, Steve Fuller posits that ‘perhaps membership in *Homo sapiens* is neither sufficient nor even necessary to qualify a being as human’,<sup>33</sup> and uses the analogy of the republic. Being born into the republic confers no benefit over earning citizenship in some other fashion. The heritable quality is irrelevant- and this applies to ‘human citizenship’, or the human community, also. One either is, or is not, a citizen; it is a threshold concept. One cannot feasibly be a citizen to a greater degree than anyone else.<sup>34</sup> Equally, once a being passes the moral status threshold for the human community, it must count as human. Following this logic, humanity is a ‘matter of sufficiency’<sup>35</sup> – an end-state for moral status, not a stepping-stone which one can be ‘post’.

Fuller does fall into the trap here of failing to explain his terms. He appears to mean ‘human, where human is

<sup>27</sup> As Harris has pointed out at some length. J. Harris. 2010. *Wonderwoman and Superman* Oxford: Oxford University Press: 143 ff.

<sup>28</sup> H. Frankfurt. Freedom of the Will and the Concept of a Person *J Philos* 1971; 68: 5–7.

<sup>29</sup> see, for example:

J. Piaget. *La construction du réel chez l’enfant / The construction of reality in the child*. New York, Basic Books 1937/1954; and J. Piaget. La causalité chez l’enfant. *Br J Psychol* 1928; 18: 276-301.

<sup>30</sup> L.E. Lomasky. 1987. *Persons, rights, and the moral community*. Oxford: Oxford University Press.

<sup>31</sup> J. Overboe. 2007: Ableist Limits on Self-Narration: The Concept of Post-personhood. In *Unfitting Stories: Narrative Approaches to Disease, Disability, and Trauma*. V. Raoul, ed. Waterloo, ON: Wilfrid Laurier Univ. Press: 175–182.

<sup>32</sup> J. Harris. 1985. *The Value of Life*. London: Routledge.

<sup>33</sup> S. Fuller. 2014. *What scientific idea is ready for retirement?* Steve Fuller. *Human Being= Homo Sapiens* edge.org <http://edge.org/response-detail/25396> [accessed 25 Feb 2016]

<sup>34</sup> Though I acknowledge that in certain historical republics the theoretical benefit of this was less than obvious in practice.

<sup>35</sup> A. Buchanan. 2011. *Beyond Humanity?: The Ethics of Biomedical Enhancement*. Oxford: Oxford University Press: 224.

being used as a political moral category’ but this may have made for an ungainly *bon mot*. His analogy, too, lacks an important subtlety. In the later Roman Empire, I as a Briton may well have qualified to hold Roman citizenship<sup>36</sup> but this is not to say I would be *treated* as would a Roman by other Romans, which may be equally or even more important than the citizen label. As he states earlier in the same piece:

[F]or most of what is properly called ‘human history’ (i.e. the history that starts with the invention of writing), most of *Homo sapiens* have not qualified as ‘human’—and not simply because they were too young or too disabled. In sociology, we routinely invoke a trinity of shame—‘race, class, and gender’—to characterise the gap that remains between the normal existence of *Homo sapiens* and the normative ideal of full humanity.<sup>37</sup>

It may be, here, that it is more helpful to understand ‘have not qualified’ as ‘have not been regarded as qualifying’.

With this in mind, we might return to Agar’s contention that ‘[r]adically enhanced beings are... significantly better than us in various ways, they are different from us – so different, in fact, that they do not deserve to be called human.’ In the sense of the concept of the human – the *moral-* community, it seems difficult to accept that Agar can be correct. The only means by which a being might ‘not deserve to be called human’ would be for them to fail to reach the moral value threshold of the human community. If Agar is correct, then there is a danger of finding oneself stuck with an unpalatable conclusion born from the corollary of his point: that a being who somehow becomes significantly ‘worse’<sup>38</sup> (or rather, less capable) than other humans would also ‘not deserve to be called human’.<sup>39</sup> One way to conceptualize this is to consider the antonym of what we are calling ‘second-sense ‘human’’, which might roughly be ‘dehumanized’ – something historically done to ostracize peoples before enacting genocide against them, so to speak, guilt free; for instance Jewish peoples labelled ‘rats’ or Untermenschen during the Holocaust.<sup>40</sup>

Perhaps, then, the idea of a being no longer *deserving* membership of the human community is too problematic. It might be better stated as *failing to qualify*. We have an instinctive reaction against the idea of applying this judgment to a member of *Homo sapiens*, even one of very limited cognitive capacity. Philosophically, however, we would have to admit that such a being may not deserve to be

<sup>36</sup> I thank Margot Brazier for this criticism in particular.

<sup>37</sup> Fuller, *op. cit.* note 33.

<sup>38</sup> I use the term here as an antonym of Agar’s ‘better’, rather than as any reflection of my own opinions.

<sup>39</sup> Thanks to John Harris for pointing this out in discussion.

<sup>40</sup> Of course I am certain that Nick would never wish to imply such a thing; but it cannot be ignored as potentially being the other side of his argument here.

called ‘person’. It may be that the ‘human community’ and the community of persons are not necessarily one and the same, and there is a political factor in play.

We have to recognize that someone who might fail the moral value threshold of personhood would still be included within our biological species, especially given the incoherence of ‘species-typical capacity’ in this context. Per Mayr,<sup>41</sup> because someone suffering a hypothetical disability that prevents sexual reproduction would be able, at least *but for* that disability, to reproduce with another human, they satisfy the Biological Species Concept. Throughout his work on enhancement, Agar generally uses the BSC to define the limits of prudential interest,<sup>42</sup> as in, we have an interest in those we would be able to reproduce with. Possessing this interest in one group over another does not equate to speciesism: although it is a form of relativism, it is not pejorative, does not imply that those we cannot reproduce with have a lesser or different moral status. If so, it follows that it is nonsensical to force-apply a moral significance to species at all in terms of our second, communitarian sense of ‘posthuman’. Indeed, there is no reason to assume that we would *not* have a prudential interest in beings we bring to fruition, by whatever means.

This leaves us, then, with the third potential sense of ‘posthuman’, which, as mentioned, stems from the use of ‘human’ to denote a desirable set of characteristics, qualities, and ideals that we hold about ourselves (or our moral community) as a whole.

### Third Sense: Self-ideal

The entire history of humanity (in any sense) has been geared towards realizing these traits and ideals, generally practised by means of enhancement. *Homo sapiens* could never have evolved successfully without the prior work of ancestor species to enhance their own capacities. Paleo-anthropological literature suggests in particular that the development of tool use for hunting was critical in being able to provide sufficient energy to fuel larger and larger brains.<sup>43</sup> It follows that an increased drain on the body’s energy budget by a larger brain (with a greater capacity for work) requires a proportionately increased calorific intake, and gaining the ability to hunt animals for energy-rich meat would provide for this. The discovery of means to control fire by at least *Homo erectus*<sup>44</sup> (if not even earlier ancestors)<sup>45</sup> also acted to improve nutrition

<sup>41</sup> Mayr. *op. cit.* note 24.

<sup>42</sup> Agar. *op. cit.* note 6 Also N. Agar. Thoughts about our species’ future: themes from Humanity’s End: Why We Should Reject Radical Enhancement. *J Evol Technol* 2010; 1(21): 23–31.

<sup>43</sup> A. Gibbons. Solving the Brain’s Energy Crisis. *Science* 1998; 280(5368): 1345–47.

<sup>44</sup> S.R. James. Hominid Use of Fire in the Lower and Middle Pleistocene: A Review of the Evidence. *Curr Anthropol* 1989 30(1): 1–26.

<sup>45</sup> *Ibid.*

through increasing the digestibility of foods through cooking.<sup>46</sup> It also contributed<sup>47</sup> to physiological factors which we use to define *Homo sapiens*, such as smaller jaws and teeth than ancestor species.<sup>48</sup> Less directly, fire’s provision of warmth and light was vital for the survival of hairless ancestor species, driving off predators and making up for a lack of inherent ability to retain heat.<sup>49</sup>

There is a rich tradition in both academic and fictional literature of creating alternative Latinate names for our species. Many of these reflect facets of third-sense ‘humanity’: including *Homo socius*, man as a social being,<sup>50</sup> *Homo faber*, fabricating man<sup>51</sup> or in an alternate sense ‘man as the artifex of his destiny’,<sup>52</sup> and *Homo ludens*, playful man.<sup>53</sup> In this manner, *Homo sapiens* similarly only encapsulates one aspect of our being, *wise man* (or alternately *knowing man*, which could be argued to describe another aspect of our nature). It isn’t entirely clear why Linnaeus<sup>54</sup> chose to highlight this element of humanity with the chosen specific epithet,<sup>55</sup> though it is interesting to note that he himself termed it (and other descriptive elements of the binomial system) a ‘trivial name’.

Yves Gingras would have us named *Homo technologicus*, or technological man. Given that we are also *Homo faber*, we necessarily create our own world through our own perceptions and means – techniques – of reason and interpretation. Gingras holds that therefore everything around us is, and we ourselves are, artificial, a product of technology, that man is necessarily counter-nature.<sup>56</sup> This may or may not be true, but the idea of our being a

<sup>46</sup> R. Wrangham & N. Conklin-Brittain. Cooking as a biological trait. *Comp Biochem Physiol a Mol Integr Physiol* 2003 136,1: 35–46.

<sup>47</sup> J. Pickrell. Human ‘dental chaos’ linked to evolution of cooking *New Scientist online*, 19/02/05 <http://www.newscientist.com/article/dn7035-human-dental-chaos-linked-to-evolution-of-cooking.html#.U8WJSY1-dUah> (last accessed 25 Feb 2016)

<sup>48</sup> R. Boyd. & J. Silk. 2003. *How Humans Evolved*. New York: Norton & Company.

<sup>49</sup> D. Price. Energy and Human Evolution. *Popul Environ* 1995; 16,4: 301–19

<sup>50</sup> P. Berger. & T. Luckmann. *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* New York: Random House 1966

<sup>51</sup> H. Arendt. 1958. *The Human Condition*. Chicago: The University of Chicago Press.

<sup>52</sup> F. Stoessl. *Die Sententiae des Appius Claudius Caecus. Rh Mus* 1979;122:18–23.

<sup>53</sup> J. Huizinga. 1955. *Homo ludens; a study of the play-element in culture*. Boston: Beacon Press.

<sup>54</sup> C. von Linne, 1758. *Systema naturæ. Regnum animale*. 10 edn:18, 20. Available from: <http://www.biodiversitylibrary.org/item/80764#page/28/mode/1up> [Accessed 25 Feb 16]

<sup>55</sup> Plato’s taxonomical designation for our species, ‘featherless biped’ is possibly more literal. However, upon his proclaiming this, Diogenes swiftly presented him with a plucked chicken, so perhaps we can understand Linnaeus’ whimsy on this point. D. Laertius. 1853. *The lives and opinions of eminent philosophers*. London: HG Bohn: 6,40.

<sup>56</sup> Y. Gingras. 2005. *Éloge de l’homme techno-logicus*. Saint-Laurent, Québec: Les Editions Fides:12.

product of technology is vitally important. Returning to an earlier point, I would suggest that given *Homo sapiens* only having arisen through being enhanced by technologies such as fire and tool use, we might be better termed *Homo augmentus*- 'elevated man' or 'augmented man'. Gingras is correct in one respect, at least: we are able to possess the faculties we do as a species as a result of primitive technologies. However, it is important to be clear that we are elevated by the technology, not that we are ourselves technological creations.

If striving to uphold the elements of third-sense humanity is what makes us who we are, then a being '...significantly better than us...'<sup>57</sup> presumably must be able to uphold or realize these ideals to a greater degree than we are presently able to achieve. If it is these ideals that make us human, then upholding them more successfully, whether through technology or otherwise, must perforce make one more successful at *being* human. Note that this is not the same thing as being *other* than human, or *beyond* human.

How, then, can radical enhancement lead to something beyond humanity? Would more enhancement not perhaps mean that we become fundamentally more human?

## TAXONOMY, PERSONS, AND CONTINUITY

As noted, taxonomic classification does not itself lend any value to a given being. Linnaeus giving us the binomial of *H. sapiens* is simply a product of the system he developed for categorizing animals. It is coincidental that a literal translation of the Latin can be interpreted as describing something we consider to be inherent about us; had the system existed before our evolution, we could just as easily have been named after our discoverer or a beloved media personality,<sup>58</sup> as are many creatures today.

Consequently, to be beyond *H. sapiens sapiens* – *H. sapiens superior*, if you will<sup>59</sup> – is also meaningless in these terms. While we are far from being the only species in a state of change (indeed every species is constantly subject

<sup>57</sup> Agar *op cit.* note 6.

<sup>58</sup> For instance, *Materpiscis attenboroughi*, *Agra schwarzeneggeri*, or the somewhat forced 'Spider from Mars' *Heteropoda davidbowie*.

<sup>59</sup> I admit that thanks are probably due here to Stan Lee and the many other writers of Marvel's *X-Men*, as well as innumerable other science-fiction sources, but *X-Men* is where I first became familiar with the term. See, for instance, S. Lobdell. The Story Of The Year! *Uncanny X-Men* #346 Marvel Comics, 1997 1:346; G. Morrison. Superdestroyer. *New X-Men* #124 Marvel Comics, 2002; 1:124; F. Tieri. Man and Monster: Conclusion *Weapon X* #28 Marvel Comics 2004; 2(28). Other potential names proffered by Marvel include *H. mutandis* 'Changed Man', W. Ellis. Agent X-13's report on the emergency annexation of Earth-616 *Astonishing X-Men: Ghost Boxes* #1 Marvel Comics, 2008; 1:1; and *H. mutantur*; 'Changed Ones' N. Gaiman. 1602 Part One; In Which We are Introduced to Some of Our Featured Players. *Marvel 1602* #1 Marvel Comics, 2003; 1:1.

to genetic drift and natural selection, however slow), it is still convenient to be able to label beings into categories. This is perhaps not the place to attempt to solve the so-called 'species problem', but the above does strongly lend itself to the pragmatist viewpoint<sup>60</sup> that species is conceptually convenient and practical, and therefore conceptually real; despite probably failing to qualify as a natural kind. If so, the biological sense of human is significantly weakened when comparing 'human' with 'posthuman'.

Obsession with forcing a distinction between human and posthuman is not particularly interesting, in and of itself, as it is clear that there is none meaningful to be drawn; but the idea of post-persons is a slightly different prospect, and is more at the heart of the true debate than the existing academic dialogue probably makes clear. Whilst it is probably true<sup>61</sup> that some of our *Homina* ancestors were human pre-persons, assuming personhood is a threshold concept, the very fact of this would preclude there from being Homo post-persons, since the threshold would already be surpassed. Rather than fear the conceptually troublesome, perhaps what we ought worry about is being depersonalized and not being de- or trans- or post-humanized. To have enhanced moral awareness, enhanced consciousness, *etcetera* is not an inherently bad thing. In fact, to possess these is simply to more fully realize characteristics that are part of the wider, for want of a better term, *zeitgeist* of the self-ideal. This is presumably not an outcome we should be worrying about, but rather one to be embraced.

What this shows is that it is a mistake to envisage the posthuman as a different species. It is a mistake to imagine traits such as immortality or godlike powers as being changes that indicate a significant discontinuity. This is not to say that they could not change us at all. It seems likely that an immortal (though importantly not invulnerable) person would have an enduring and open-ended investment in the future. This may not necessarily be embodied simply in benevolent interest in their successors but rather a more personal, and not simply intellectual and transient, interest in the future that a more markedly mortal being could not possess.<sup>62</sup> However it is entirely possible to possess continuity for some purposes and not for others. Therefore, the argument really is whether or not the acquisition of such traits represents a genuine transition in status, and whether what frightens conservative commentators is really the notion of this

<sup>60</sup> J. Dupré. In defence of classification. *Stud Hist Philos Biol Biomed Sci*. 2001; 32: 203–219.

<sup>61</sup> Depending on their natures. This is a question which merits much deeper discussion, and though there is regrettably not space in this article it will be a fruitful avenue for future research.

<sup>62</sup> Thanks to John Harris for reminding me of this important point. Harris has considered this issue in several places, notably Harris. *Enhancing Evolution* Ch. 3

transition being premature or presumptuous for our species.

To such commentators, it seems to be comfortable to consider ‘humans’ as a finished product, that transformation is inimical to our essence as such. Darwinian, naturally occurring evolution appears to have slowed due to our technological elevation from a world of kill-or-be-killed. It may be comforting to imagine that this means it has stopped outright, though of course this is merely a function of our own limited perceptions and it continues at the same glacially slow pace as it ever has. Psychologically, we generally find clear division useful and pleasing, discrete categorization almost soothing. Perhaps this goes some distance to explain the above mindset.

There is certainly far more that might be said on this matter, though for the moment it is enough to acknowledge that people are perhaps afraid of the idea of further evolution because we (understandably!) dislike the idea of having further self-development to undertake. Once we finally reach adulthood, that is supposed to be the end of the road, the final stage. We see this reflected in literature: Tolstoy’s trilogy of *Childhood, Boyhood, and Youth*<sup>63</sup> separates out the milestones on the way to this point; Shakespeare’s famous ‘Seven Ages of Man’ monologue from *As You Like It*<sup>64</sup> divides a lifetime into the Acts of a play.

## AN INCLUSIVE TERMINOLOGY

Yet if we must picture the posthuman as anything separate from ‘us’ in some way, if it is absolutely necessary to differentiate, perhaps it is this vision that is the most useful: an ‘Eighth Age of Man’, not quite the same and yet not different enough to be called ‘other’. As I have discussed, the touted ‘posthuman’ probably fails to satisfy any of the conditions to be categorized as either biologically or morally separate from ‘humans’. However, it would be somewhat parochial to try and argue that it isn’t useful to have a term we can use when discussing these potential beings. Whilst I do not accept that the theoretical period in which some people possess new abilities or traits and others don’t will necessarily create a societal divide<sup>65</sup> (or, at least, I see no good reason why this is unavoidable); I concede that just as it is sometimes necessary to terminologically distinguish between races using anthropometric taxons such as Negroid, Mongoloid, or Caucasoid, there may well be some practical application in having one for the beings we may become.

<sup>63</sup> L. Tolstoy. 1899. Translation N. H. Dole. *The Complete Works: Childhood, Boyhood and Youth*. USA: TY Crowell.

<sup>64</sup> W. Shakespeare. As You Like It. In R. Proudfoot, A. Thompson & D.S. Kastan, eds. 1998. *The Arden Shakespeare*. Thomas Walton-on-Thames: Nelson and Sons Ltd. Act 2 Scene VII.

<sup>65</sup> As claimed by, for example, K. Warwick. 2004. *I, Cyborg*. Chicago: University of Illinois Press.

‘Posthuman’, as I hope to have demonstrated, is perhaps not this term. Instead, I might tentatively suggest an alternative which approaches what I consider to be the core of the matter.

The point I have laboured herein is that there is no clean divide between today’s *Homo sapiens* and tomorrow’s potentially more capable *Homo sapiens*. The fact that we cannot distinguish this division is telling. It is difficult to accurately describe something as ‘post’, as coming after, when it does nothing of the sort. Earlier in this article I noted that the etymology of our English ‘post’ comes from the Latin, and so it seems fitting to return to the classical languages for a more useful label. The Greek prefix ‘meta-’,<sup>66</sup> originally, could be translated similarly to ‘post’ in suggesting ‘after’, but it also could mean ‘beside’, ‘with’, or ‘among’, depending on context and grammar.<sup>67</sup> A ‘metahuman’, then, might be a being beyond (or ‘post’) us in terms of some capacity or another, but alongside us, amongst us, in as much as it is, in all senses that matter, no different from the ‘humans’ we consider ourselves to be. There will never come a point where we look at ourselves and exclaim, ‘We are now posthuman!’ Rather, consider the disabled person. We do not hold that they should be treated differently or, at least, we know that they ought not to be. This is no different from the IVF child. We do not consider them to be different in any way that matters, although it is occasionally useful to group people who are subject to some quirk of biology or fate together. So it is with the metahuman.

However, I acknowledge that this proposal may also run afoul of the so-called ‘expressibility problem’. In this instance, the mere act of assigning terminology is inherently one of division. Even in the case of the previously mentioned useful anthropometric taxons, the use of these terms is designed to classify and separate. As I hope to have shown, this is precisely the problem with the notional posthuman. My own thoughts and terminologies, as well as those of various learned colleagues, seem to suffer this issue. It is difficult to conceive of a term which does not separate or ‘other’ in this fashion.

Alternate terms<sup>68</sup> we might consider using include the ‘Promethean Man’, or the ‘Enhanced Human’ – both terms which when considered in the context of this article may suffice well (being as they are more accurate descriptions than ‘posthuman’), but which in practical usage would probably serve to partition by the very act of specifying. The simplicity of ‘Enhanced Human’ may make it the superior term, in as much as it specifies the

<sup>66</sup> as opposed to the epistemological usage in which it means ‘about (something’s own category)’.

<sup>67</sup> μετά, H. G. Liddell & R. Scott, *A Greek-English Lexicon*, on Perseus Digital Library.

<sup>68</sup> These names courtesy of John Harris, who, despite his erudition, accepts that he ‘potentially failed’ my challenge to avoid the trap at hand.

being in question as being *human*, but it carries the unwanted implication that being enhanced is a quality necessarily worth flagging: that it is a quality which in some way alters one’s value.

Perhaps, ultimately, it is not vital to the debate to develop a terminology which solves this; although I would be interested to see one. Instead it would be more valuable, throughout the wider academic dialogue on the topic, to acknowledge and seek to avoid invoking the misapprehensions discussed here about humanity and value.

## CONCLUSIONS

The commentators on both sides of the debate concerning the meaning of ‘posthuman’ do so as if it had currency. It is deployed as though this term had either determinate meaning or as if it marked some indeterminate point (which could then be debated) at which humans transition to something else, something new. To use the term to imply species or value change, or a radical transition (the meaning of which is unclear in any case), there needs to be justification in a way which does not seem to have been delivered within the existing dialogue. Here, I have argued that this is not a plausible

understanding, and furthermore that it is based in error. The analogous changes we have undergone throughout our history have not been thought to signal a qualitative change, or at least, not to any significant degree. We are, today, post-internet age humans; we are post-neolithic, post-bronze age, post-iron age. These transitions have not changed our value or the nature of our being: machine-age man, *Homo augmentus*, is still man. The touted ‘posthuman’ is, in general, overhyped and unwarranted by the evidence- either factual, or conceptual-and does not seem to have been subject to a close analysis until now. Perhaps commentators are aware of this failing and yet choose to avoid remedying it in order to preserve the utility of a concept so vague and all-encompassing, or for fear of undermining their arguments in some cases as explored herein. The ‘posthuman’ as the beyond is incoherent and obfuscatory at best, and it is important that we do not lose sight of the fact that species does not dictate moral value. The key is to ask not what we may become, but rather, why does it matter?

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