TOWARD A CRITICAL THEORY OF NBIC AND ITS APPLICATIONS FOR HUMAN ENHANCEMENT

by

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I hope this paper reflects well on the degree of support I have received from these and many others.
The problem addressed in this work is how best to comprehend the nature of challenges posed by controversial technologies emerging at the convergence of biology, cognitive science and information technology at the nano-scale and their applications in human enhancement. The National Science Foundation refers to this convergence as NBIC (Nano-Bio-Info-Cogno) and it is at this juncture that this work seeks to better understand how to approach the challenges posed by NBIC and its applications in human enhancement. My claim will be that Critical Theory could provide a fresh perspective from which to problematize and critique the process by which NBIC ethics discourse is conducted and the factors that direct research aspirations. This improved understanding could be utilized toward more constructively directing the processes of research development and implementation.

This work problematizes the underlying foundations of NBIC human enhancement ethics discourse. By first completing a broad survey of NBIC human enhancement research horizons (in the areas of medicine, workplace and military) and its associated ethics literature (debates carried out between humanists and transhumanists in journal articles, books, government publications, etc.), it is then possible to posit that the mainstream debate is founded overwhelmingly in a positivist knowledge framework with under-considered political and economic drivers and that this perspective endows the discourse with a certain degree of myopia, especially regarding the discourse’s political milieu and the oppressive attributes of technology: (though, often, technology is proclaimed as emancipatory in nature). I will argue that Critical Theory may be productively applied to the discourse surrounding the ethics of NBIC in order to attain a better understanding of the powerful political and economic interests that affect the understanding of NBIC technologies in this ‘ethical’ discourse.
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Albert Einstein: "The creations of our mind shall be a blessing and not a curse to mankind."

Towards a Critical Theory of NBIC
CHAPTER 1
INTRODUCTION

1.1. Properly Framing the Problematic

A Brief Outline of the Following Sections

The object of this inquiry is a group of emerging technologies in the field of Nano-scale NBIC and, more specifically, human enhancement. The present line of inquiry will first define NBIC, Human Enhancement and Transhumanism. Then, it will broadly present the state of the art of NBIC/Human Enhancement and the horizons of its development. This will focus especially on NBIC/Human Enhancement’s relevance for medicine, the work force and the military. Following that, it will outline the structure of some of the current ethical dilemmas and debates of NBIC-Human Enhancement research. This work will identify difficulties, shortcomings and myopias in the NBIC/Human Enhancement debate and will suggest ways in which the works of authors of Critical Social Theory could be utilized to better understand NBIC/Human Enhancement.

While trying to present all sides of the issues discussed here, this work is not impartial. It takes a stance firmly against the status quo of NBIC development and regulation. This does not mean that this work is against technology in general. It is far better to treat a toothache in the 21st century than in the 18th century. What is intended in this work is to help the reader to see beyond the pro/con ethical debate to the socioeconomic and political antagonisms that are embodied by the emerging technologies examined here. Toward this end, it will argue for the need to develop a Critical Theory of NBIC.
1.2. Introducing NBIC and Human Enhancement

“We thought because we had power, we had wisdom.”
-Stephen Vincent Benét, American Author and Poet (1898-1943)

**NBIC**

The term NBIC refers here to where Neuroscience, Biotechnology, Information Technology and Cognitive science converge at the 1-100 nanometer-scale (a nanometer is one billionth of a meter and this is the scale of biological molecules such as proteins and DNA). These emerging technologies are referred to as nanotechnologies. These technologies, generally, and their application to human enhancement, more specifically, are points of significant public interest and debate. These new ‘nanotechnologies’ will have significant, observable and ubiquitous effects on the future shape of our society. For this reason, they become the object of a great deal of moral, ethical and philosophical debate. This attention is well deserved considering how these technologies “provide the opportunity fundamentally to change the human condition” (Bostrom and Savulescu 2009, 20).

NBIC is an integral part of the departure from the age of discovery into the age of mastery { (Kaku 1997, 403) cited in (Schmidt 2011, 29-41) } . This includes mastery of the human body and human mind as well as mastery over nature. With these technologies, come exponential increases in man’s power over his own destiny and evolution. With the advance of NBIC, society enters the final frontier in the dynamics of human development.

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1 Human Enhancement is defined at length in the following section.

2 Kaku states it as such: “For most of human history, we could only watch, like bystanders, the beautiful dance of Nature. But today, we are on the cusp of an epoch-making transition, from being passive observers of Nature to being active choreographers of Nature. The Age of Discovery in science is coming to a close, opening up an Age of Mastery.” (Cited in Schmidt 2011, 38)
of power relations. There is no further destination conceivable. Just as nuclear weapons represented war in its ultimate revelation\(^3\), NBIC technologies appear to be technology in its final revelation and the consequences and outcomes of these technologies will be both difficult to control and to predict.

The creators, proprietors and other advocates of these technologies exclaim the potential for benefits to society and a small minority of them aptly point out the equally great potential risks to society.

The moral, philosophical and ethical debates that address these technologies seek to answer a number of questions, including whether society should pursue these technologies, how most ethically to pursue these technologies, and how best to understand and interpret the ramifications of these technologies’ development. In chapter 3 of this work, an analysis of these debates is presented by conjugating a number of previous studies that have been conducted as analyses of the literature surrounding this topic.

What is certain is that the next one hundred years will be an era of extraordinary changes and the qualitative nature of these changes will depend on how society directs the development of these technologies. Inquiry no longer asks ‘if’ \(x, y\) and \(z\) technologies are science fiction, ‘if’ they are possible. No, the question now is whether we ‘should’ develop \(x, y\) and \(z\) technologies and what the ramifications will be when they are developed. The purpose of this work is to improve the way in which these technologies are understood in our society and to widen the scope of the current ethical discourse surrounding NBIC and human enhancement. Presently, political questions take a back seat to the ethical debate, a debate that often plays the role of a red

\(^3\) Described as such by Martin Luther King Jr. in his book *Stride toward Freedom* (King 1958, 230).
herring, precluding a comprehensive discourse on the political implications of these technologies.

In this way, the moral, ethical and philosophical debates often cloud the more important, fundamental, political questions. Namely, political questions would inquire how and toward what end will these technologies be developed and implemented? How shall one value-judge the means, ends and total societal outcomes of NBIC generally and its human enhancement applications specifically? Having made these value judgments, what entity shall be charged with (and actually capable of) governing, domestically or internationally, the means, ends and total societal outcomes of NBIC?

Most of the current philosophical, moral and ethical debate surrounding NBIC could be likened to a study of the symptoms of a disease or disorder rather than an exploration of the root causes of the disorder/disease in question. These discourses provide an analytic perspective of a problem that really requires a synoptic analysis of the whole. They present the challenges of NBIC/Human Enhancement as fundamentally ethical in nature, when they could be more completely conceptualized as political in nature. It is here that a critical theory of NBIC would contribute constructively to an understanding of these technologies and their implications for society.

Though the discourses are presented as ethical in nature, this work will demonstrate that there are ambiguities and difficulties involved in classifying the debate

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4 Necessary inquiries include: What constitutes progress and why it is necessarily good? Why do we need these things? The question that needs to be asked is: Why does one need x, y and z? Why does the public want to access internet 24 hours a day? Does one need to work 24 hours a day? Or to communicate 24 hours a day? Where is society heading and why is it worthwhile? Questions of this nature must be addressed, otherwise, the alleged ‘progress’ remains blind and irrational.

5 A synoptic analysis is provided by theoretical frameworks such as Critical Social Theory.
as ethical. Upon presenting the main framework of the debate, it will become clear that there are a number of overlooked/under-considered issues that are not addressed in the debate, especially in literature published by government and industry related actors (universities increasingly become entwined with both as government and industry are primary funding sources).

The present work is not intended to be either in favor of or against NBIC, human enhancement and or transhumanism/bioconservatism. Rather, this work is intended as a critique of the way these technologies are presently being understood. This work intends to open up to discussion these myopias in the debates surrounding NBIC/Human Enhancement from a Critical Theory perspective. This work will not apply Critical Theory to NBIC/Human Enhancement technologies, rather, it will attempt to illuminate the new areas of understanding that would be opened by the application of Critical Theory. By demonstrating the need for a Critical Theory of emerging technologies, hopefully it will be possible to develop one in the future.

1.3. Conclusion

As stated above, the current, myopic, discourse tends to address these challenges as ethical in nature. The present work presents flaws/myopias in the ethical discourse and then questions the validity of using an ethical framework for addressing these challenges posed to society by NBIC and human enhancement. This work seeks to explore the possibility of applying a different framework, Critical Social Theory (henceforth referred to simply as Critical Theory), from which to problematize NBIC and its accompanying ethics discourse (i.e. The philosophical issue regarding human nature raises the political issue regarding who owns this technology, who decides how to use it, etc.). When the analytical discourse surrounding NBIC is confined to ethics,
the problematic is framed incorrectly. The problematic is much greater than ethics. These issues reflect deeper political antagonisms that are largely ignored in the NBIC ethics discourse. The potential of NBIC and human enhancement to modify human desires and agency intrinsically is an aspect of NBIC that needs to be examined thoroughly both from a synoptic as well as an analytic perspective. From a conception of the totality of the society in which NBIC functions, a superior critique emerges that reveals the actual underlying issues that challenge society and what is actually at stake in these challenges. By asking the correct questions, one arrives at a correct, or, at least, an improved outcome (i.e. understanding of the challenges posed by NBIC to society). This work intends to demonstrate the contribution that a critical theory of NBIC could make in this respect.
CHAPTER 2

NBIC CONVERGENCE WITH HUMAN ENHANCEMENT: A FOCUS ON THE WORKPLACE, MEDICINE AND THE MILITARY

“In the Land of Mordor where the Shadows lie, One Ring to rule them all, One Ring to find them, One Ring to bring them all and in the darkness bind them, In the Land of Mordor where the Shadows lie”. -J.R.R. Tolkien, the Fellowship of the Ring

2.1. Defining Human Enhancement

Advanced industrial society has permanently modified the relationship between man and nature. Technologies are being developed that will make it possible to control and manipulate human thoughts, emotions, and intellectual capacities, as well as biological processes such as aging and athletic performance. These advances in human enhancement will have a major effect in a variety of areas. Some of the areas highlighted here include both public and private actors in medicine, the workplace and the military. In addition to human enhancement, there are a number of issues regarding the autonomy of decision-making (e.g. a technology, such as a miniature drone, that can decide by itself when to attack and kill a target without human input) that enabled these technologies.

There is a great deal of controversy regarding whether society should be interested in human enhancement technologies or if it should focus only on therapies that restore capacities to normal. This leads to controversy regarding what precisely constitutes enhancement vs. therapy, and definitions vary. Savulescu cites several definitions of human enhancement: a sociological pragmatic definition, an ideological definition, the ‘not medicine definition’, a functional definition, and a welfarist
approach—these are outlined below (Savulescu, Meulen and Kahane 2011, 557):

- **Sociological pragmatic approach:** This conception of Human Enhancement focuses on the difficulty of creating a definition that is not historically and culturally value laden: the concept of what constitutes enhancement and/or therapy will be different between different cultures and different periods in history (Savulescu, Meulen and Kahane 2011, 557).

- **Ideological definition:** The President’s Council on Bioethics takes this approach to analyzing the phenomena of Human Enhancement. This approach avoids defining ‘enhancement’ explicitly. Rather, it acknowledges that there is difficulty in defining that which constitutes enhancement and instead gives a list of technologies that count as human enhancement. Subsequently, a set of values (often controversial and certainly not neutral) is applied to analyze a series of technological advances and determine them to be morally acceptable or objectionable. Savulescu finds that this approach offers a number of value claims, but no conceptual framework for evaluating enhancement (Savulescu, Meulen and Kahane 2011, 557).

- **The ‘not medicine’ approach:** Treatment vs. Enhancement: This approach to defining human enhancement attempts to define enhancement as something that drives the human capacity in some faculty (e.g. cognition, physical endurance, etc.) beyond a statistical ‘species normal’ standard (not medicine). That which brings a particular faculty to the standard norm qualifies as a treatment (medicine) and that which brings the faculty beyond that norm qualifies as enhancement. In using this definition of treatment, Savulescu is using a normative, professional definition of disease to differentiate treatment from enhancement in this case: namely, that provided by Norman Daniels (Sabin and Daniels 1994, 5-13).

- **Functional approach:** This definition of human enhancement considers any
improvement in function, regardless of whether it is above or below a particular normative level, to be human enhancement.

- **Welfarist definition:** This definition of human enhancement is the definition preferred by Savelescu. This definition considers “any change in the biology or psychology of a person which increases the chances of leading a good life in the relevant set of circumstances” (Savulescu, Meulen and Kahane 2011, 557). In this definition, common medical treatments would count as enhancements. Of course, the Welfarist definition depends on one’s understanding of well-being. Savulescu, as a transhumanist, develops this definition of human enhancement to argue in support of development and implementation technologies.

The Welfarist approach will determine whether an enhancement is acceptable or not based on the following criteria:

- The account of well-being we employ.
- Whether the modification is expected to increase the chances of the person in question leading a good life in the circumstances likely to be obtained.
- Whether there are reasons to prefer modifications of the natural or social environment.
- Whether the modification will harm others or create or exacerbate injustice (Savulescu, Meulen and Kahane 2011, 557).

It is worth noting that Savulescu is a colleague of Nick Bostrom, another prominent transhumanist, and both are involved with think-tank organizations such as the Future of Humanity Institute at Oxford and the Institute for Ethics and Emerging Technologies (IEET). Their perspectives as transhumanists will be discussed in a later section of the work.
2.2. NBIC: The State Of The Art and Its Future

In the first issue of 2010, *Nature* magazine (the most influential scientific publication) presented projections for what would be accomplished by 2020 in a number of research fields including, but not limited to personalized medicine, search engines (e.g. the head of research at Google mentioned a program that intends to interface their internet search engine with the brain of users and operate the system by thought alone) and synthetic biology (Goldstein 2010, 26-32)). This is a good place to start for looking at the promises of NBIC and what its strongest advocates say regarding the topic.

These researchers predicted that, by 2020, nanosciences will enable therapies that repair known genetic defects (e.g. gene therapy) as well as the ability to engineer genetic enhancements. Medicine will be able to become very personalized, as one will be able to compute one’s propensity towards particular disorders from one’s own genome. From this information, one may have the option to correct particular ‘disorders’ before they make themselves manifest. In addition, it will be possible to engineer ‘nanomachines’ that can take part in medical therapies (i.e. selectively targeting cancer cells in a tumor) as well as be programmed for a myriad of other medical tasks at the cellular and molecular level (e.g. targeted and long-term drug release, etc.). Developments of new materials (i.e. self-healing materials) will revolutionize the capabilities of materials in our environment in ways we have yet to fully comprehend.

These predictions are already being realized in the first half of the decade. 2010’s future has already begun to become reality. Consider the following recent advances:
Functional Magnetic Resonance Imaging (fMRI) has been used to permit individuals to silently communicate with researchers using mental imagery to spell out their answers. By associating 27 mental images, each with a letter of the alphabet and a space, volunteers were able to spell out their answers to questions. This technology would allow people who are otherwise unable to communicate, but still conscious a way to communicate to the outside world (Sorger et al. 2012). Canadian scientists were able to use a similar technique to communicate with vegetative patients regarding their condition. For instance, one patient was able to communicate to the researchers that he was not in pain and what type of music he would like to hear (Cyranoski 2012).

Research is underway and making great strides in an effort to discover how to unglue neural circuitry and thereby regain the neural plasticity characteristic of infants, children and adolescents (hence the difficulty adults experience trying to learn a language relative to children, their neural plasticity is much decreased in these functions). An end goal of this research is to create ‘plasticity pills’ that would “enhance learning or help to wipe out traumatic memories (Bardin 2012, 24-26).” Experimentally, there has already been success in removing fear-memories from mice (Gogolla et al. 2009, 1258-1261). While the article mentions this could be dangerous to attempt in human subjects, it mentions at no point the possible nefarious uses of a technology that can remove memories. Instead, it is lauding of the possibilities of such a technology for its uses in therapy, but strangely ignores the uses to which such technology could be put by governments.

Bin He and his colleagues at the University of Minnesota were able to interface a computer to participants’ brains such that participants could pilot a helicopter (a virtual helicopter) through a three-dimensional environment using their thoughts alone (Doud et al. 2011, e26322).
• Studying a group of lucid dreamers, Dresler et al. were able to determine which hand participants were clenching during their dream. Though the hand remained unclenched in real life, it was possible to determine which hand they were lucidly dreaming of clenching (Dresler et al. 2011, 1833-1837).

• Pereira et al. were able to determine the topic that participants were pondering in their study using functional Magnetic Resonance Imaging (fMRI) to image participants’ brains. If the participants were imagining a carrot or a celery, the researchers could tell that they were imagining a ‘vegetable’ (Pereira, Detre and Botvinick 2011).

• Scientists at the Gallant Lab of UC Berkley were able to reconstruct images of the film image that participants were viewing. The participant would view a movie clip and, using fMRI imaging, the lab could roughly reconstruct the image that the viewer was watching from their brain activity alone. Some examples of their work are shown below (Nishimoto et al. 2011, 1641-1646).

Fig. 1. Using fMRI imaging, the Gallant lab was able to reconstruct images from the brain activity of viewers as they watched the video clip (shown in top row). 
Source: Gallant Lab organization Website; available from http://gallantlab.org/pictures.html; Internet; accessed 20 March 2013.
These developments have obvious implications for medicine, the workplace and the military. These new techniques will lead to the development of bionic applications (arms, hands, soldier exoskeleton attachments, novel computer/brain interfaces etc.) and they represent a step forward in the interfacing of computers and brains. The final destination is not known and difficult to predict. Below, NBIC’s applications in medicine, the workplace and in the military milieus are explored more in depth. NBIC technologies present a myriad of possibilities for the future. The possibilities explored below are a sizeable, yet an incomplete outline of the lines of development currently being pursued in the field of NBIC.

2.3. NBIC and Medicine

There exist a broad range of medical applications for NBIC technologies. Regardless of how one differentiates between the enhancement of healthy individuals or the restoration of faculties to the disabled, the applications of NBIC are wide ranging. The research endeavors listed above are motivated by their potential applications in the medical field. NBIC efforts in the medical field tend to focus on the areas of genetics, tissue engineering, regenerative medicine, nanomaterials that enhance implant therapies, nanoparticles that can be used to deliver drugs to very specific sites or for imaging purposes (i.e. to detect and treat tumors) (Verma, Domb and Kumar 2011, 157-181; Sekhon and Kamboj 2010, 612-618; Glenn and Boyce 2012, 303-316).

It will soon become affordable for the average person to have their genome decoded and recorded. This will make it possible to tailor therapies to the individual as well as to predict tendencies toward particular disorders. Society-wide genomic libraries will allow for a deeper understanding of the genetic underpinnings of disease,
psychology, athletic ability, etc. Additionally, following the sequencing of the human genome, scientists are now beginning to use a variety of nanotechnologies to unravel the proteomics of the genome and precisely how the genes are expressed (Kobeissy et al. 2013). A greater understanding of the genetic underpinnings of various conditions, combined with advancements in viral and non-viral vector methods for gene therapy will result in an ability to effectively cure the basal cause of a wide range of disorders.

NBIC technologies will find wide application in the fields of tissue engineering and regenerative medicine. Tissue engineering involves “The improvement or restoration of biological functions using the methods of engineering, biochemistry and medicine: most commonly the repair or replacement of whole tissues such as cartilage or bone (Academy of Medical Sciences, British Academy, Royal Academy of Engineering, The Royal Society 2012).” Regenerative medicine overlaps somewhat with tissue engineering as it aims to repair and/or replace damaged organs, tissues and cells. Advances in these technologies are progressing rapidly and will soon cure a broad range of disorders including everything from problems with eyesight, cardiovascular tissue injury (e.g. heart attack, lacerations, etc.) and cartilage to severed spinal cords (Tysseling-Mattiace et al. 2008; Academy of Medical Sciences, British Academy, Royal Academy of Engineering, The Royal Society 2012; Shah et al. 2010, 3293-3298; Liu et al. 2013, Verma, Domb and Kumar 2011, 157-181; Aida, Meijer and Stupp 2012, 813-817).

These breakthroughs will be achieved via a number of novel manufacturing and self-assembly processes. A number of techniques utilized in designing materials in the field of nanomedicine are given below.
It is clear how several of these technologies could be considered problematic. In this way, they overlap somewhat with workplace NBIC enhancements. In addition to its medical applications, genetic information can be used against an individual (for employment or insurance purposes). Additionally, the financial costs associated with such therapies may serve to exacerbate preexisting socio-economic disparities as well as creating a class of enhanced humans. How will the presence of ‘enhanced’ humans affect competition for employment, mating, etc.? Political considerations would include: to what degree is it acceptable to have such ‘enhancements’ be available only to those with large amounts of capital? In addition to ethical considerations, these political questions and many more will need to be addressed in the development of
these technologies in the medical field.

2.4. NBIC and the Workplace

There is a great deal of overlap between the applications of NBIC technologies in medicine and the workplace. NBIC technologies will find a great deal of applications in the workplace environments. A recent, comprehensive, study of the implications of human enhancement technologies on the workplace was published in November 2012 (Academy of Medical Sciences, British Academy, Royal Academy of Engineering, The Royal Society 2012). This study explored the effects that NBIC-Human Enhancement technologies will have on the workplace. Its findings will be summarized below. It serves as a prime example of how a government/industry report approaches the presentation of NBIC technologies. Generally, this tends to follow a consequentialist line of reasoning as will become evident below.

These changes will take the shape of cognitive enhancements, physical enhancements and collective enhancements6.

2.4.1. Cognitive Enhancements

These include two varieties of enhancements: (a) pharmacological and (b) non-pharmacological.

- **Pharmacological** enhancements would involve utilizing drugs that are used to treat psychiatric disorders to improve memory, concentration and other mental functions in healthy individuals. Self-prescription (illegally in most cases) of cognitive enhancement drugs already occurs to a great degree, especially in competitive academic

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6 Much of the following section summarizes a comprehensive report on the role of human enhancement technologies in the workplace (Academy of Medical Sciences, British Academy, Royal Academy of Engineering, The Royal Society 2012).
settings (with the use of drugs such as Ritalin and Adderall), work requiring long hours (such as fighter pilots, truck drivers and ship workers) and for recreational use. 

*Cognitive maintenance* in aging individuals is another potentially achievable goal of these programs.

Healthy individuals currently use several drugs (illegally self-prescribed) for these purposes. Some of those mentioned included:

*Methylphenidate (Ritalin)* increases the synaptic concentration of the neurotransmitters dopamine and noradrenaline by blocking their reuptake.

*Atomoxetine (Strattera)* is a relatively selective noradrenaline reuptake inhibitor. Although Ritalin has low abuse potential when prescribed correctly, its action on the dopaminergic system brings a risk of substance misuse. By not acting on dopamine, Atomoxetine is not accompanied by such risks.

*Modafinil (Provigil)* is an atypical stimulant. Its cognitive enhancing effects are likely to be due to effects on noradrenaline and possibly dopamine.

Some cognitive-enhancing drugs do not produce extreme changes in mood that usually accompany recreational use, such as a ‘high’ or ‘rush’, and do not lead to obvious physical dependence. This applies to drugs such as atomoxetine and modafinil (Academy of Medical Sciences, British Academy, Royal Academy of Engineering, The Royal Society 2012).

The degree to which use and development of drugs for these purposes will be advanced will be determined by the formal and informal norms established by industry and the national/international regulatory frameworks established by state actors.

- *Non-pharmacological* means of cognitive enhancement include methods such as cognitive training, brain stimulation and collective cognition.

Cognitive Training includes software designed to train the user’s brain for a particular desired outcome. Websites such as lumosity.com utilize specially designed computer games toward this end. With 25 million users, Lumosity has the largest
A database of human cognition in the world. It participates in the *Human Cognition Project* which has 35,000,000 participants and over 600,000,000 game plays in its database. Scientists are mining this data for insights into how to further improve human cognitive functioning using these methods.

A derivative use of the insights of cognitive training and endeavors such as the *Human Cognition Project* is the field of neuroergonomics. Neuroergonomics aims to improve the human-machine interface such as to optimize performance of operations. By better understanding the cognitive limitations of users, a machine can be designed such as to adapt itself to the cognitive limitations of a user. The machine would be able to monitor the cognitive workload of the user and make adjustments accordingly in order to maximize efficiency of the human-machine unit.

### 2.4.2. Brain Stimulation

Brain stimulation is another avenue being explored. These methods include non-invasive techniques to improve brain function. Electro-shock therapy would be an example of such a technique used to treat certain psychiatric disorders.

### 2.4.3. Collective Cognition

Collective cognition refers to the ability of different technology platforms to harness the collective efforts of many individuals toward a particular goal. A prime example of this is the use of ‘Page-rank’ algorithms by internet search engines such as Google whereby the relative importance of a webpage is determined by the connections that users make between the web-pages. As mentioned above, Google is developing technology that will interface the search engine with the brain of the individual resulting in the ability to conduct searches utilizing only the thoughts of the user. The head of
research at Google predicted that by 2020, there would be an experimental minority that will have devices implanted that will handle these search capabilities (Goldstein 2010).

Another example is the creation of Wikipedia, the free encyclopedia available in several languages that uses the expertise of thousands of volunteer contributors to make the sum of human knowledge available to the public for free. Their staff consists of no more than approximately 20 individuals in California that coordinate operations of the non-profit organization’s tool for harnessing the collective effort of thousands of contributors. Harnessing collective cognition has a variety of potential applications as noted in the diagram below.

![Diagram](image)

Fig. 3. Combining the power of social computation with conventional computation can enable small, direct, local impacts that could potentially have huge global impacts. Compute complexity describes the computing resources required to perform the analysis.

*Source*: Academy of Medical Sciences, British Academy, Royal Academy of Engineering, The Royal Society. 2012. Human Enhancement and the Future of Work: Report from a joint workshop hosted by the Academy of Medical Sciences, the British Academy, the Royal Academy of Engineering and the Royal Society. UK: The
Academy of Medical Sciences.

“We will see an evolving information ecosystem, ubiquitous in our everyday lives and delivered by mobile and pervasive computing. This offers unprecedented opportunities to harness collective cognition, and the social aspect of computing will be a key element of driving progress.” (Academy of Medical Sciences, British Academy, Royal Academy of Engineering, The Royal Society 201222) In addition to the points of ethical/moral dispute, political questions will arise over who exercises control over these information nerve-centers (i.e. for-profit private enterprises such as Facebook or Google or government agencies with their own geopolitical and economic interests).

2.4.4. Physical Enhancements

A number of already existing physical enhancements will be improved and a number of novel enhancements will be brought to the market in the near future. These will include: devices to augment and improve sensory perception (i.e. advanced hearing aids, techniques and procedures to improve vision, etc.), external technologies that will improve mobility and limb function, tissue engineering and regenerative medicine to replace and/or regenerate aging and/or damaged tissues/organs in the body, enhancements in nutritional science and finally, a variety of cosmetic enhancements.

Sensory perception enhancements will focus mainly on the areas of hearing and sight, although DARPA (Defense Advanced Research Projects Agency) is trying to develop experimental technologies that can enable an enhanced sense of smell (either as an augmentation to human smell or as an external device for use in activities such as bomb detection. Vision enhancements to maintain, restore and enhance vision will take
the form of retinal implants, night vision contact lenses, gene transfer, and the implantation of photoreceptors in the eyes.

Limb function will be restored with advanced prostheses that are controlled by nerve impulses in the limb or the brain. Limb function will be advanced beyond the normal capacity (made able to lift heavy loads, etc.) by way of bionic limbs and exoskeletons that will enhance performance of physically difficult tasks.

In the fields of tissue engineering and regenerative medicine, every organ system is being targeted for research. The ability to grow organs and other tissues outside of the body as well as to cause the body to regenerate its own tissues are the goals of these therapies. A number of successes have been accomplished in these fields and they will continue to produce remarkable results in the near future and beyond. This will branch over into cosmetic enhancements too, whereby an ability to direct aspects of physical regeneration of tissue will help individuals to appear younger and healthier.

Nutrition will also present an opportunity for enhancement in the work environment. Research sponsored by the military (see below) is seeking to develop nutritional regimes that can sustain individuals over several days and improve their performance of tasks from both a cognitive as well as physical perspective.

Physical enhancements will cross over with cognitive enhancements in other ways as well. Google intends to develop glasses that will give users real-time information about their environment. Combining GPS data, information stored in Google Maps’ Street-View and information available on the internet, the glasses will identify objects in the environment of a user. For example, if a user is in Paris, the glasses will give information about the buildings that one is passing by, naming them and offering the user additional information about the buildings (i.e. year built,
Pros and cons of human enhancement in the workplace:

Discussion around human enhancement in the workplace tends to focus on a number of pros and cons of each particular technology. These are compared and contrasted below.

- **Perceived Pros:**

  Human enhancement technologies will enable disabled people to work, make possible more productive work by those with typical capabilities (thereby shortening the working day), and permit individuals to work into old age.

- **Perceived Cons:**

  Technologies of this nature modify relationships of power between employer and employee. The employee will not have as much agency in deciding whether or not he/she would like to use the enhancement. This will especially hold true if some countries have more lax laws than others governing the use of these enhancement technologies. Those not using the technologies for human enhancement, even if these technologies proved to be dangerous, would be at a competitive disadvantage relative to those that use the technology. Economic factors will affect the implementation of these technologies as well. These technologies may serve to exacerbate existing economic inequalities. In the absence of state support for purchasing these technologies, those better able to afford expensive and sophisticated technologies will be better able to purchase these technologies and position themselves well economically. Those less able to purchase the technologies will find themselves disadvantaged in terms of employment.

  High-risk professions such as surgeons, air traffic controllers and long-distance bus drivers could be pressured by the public to use enhancement technologies on the
basis of moral obligation. There will be issues over funding as regards whether a technology is considered as enhancement or restoration. It is certain that the effect of these enhancement technologies will vary based on the particular individuals receiving them (much as drugs affect different people differently). Additionally, it is difficult to know what the long-term outcome is for a particular enhancement technology. It could enhance certain faculties while diminishing others. Anabolic steroids are a prime example of this. There are a number of physiological (acne, cardiovascular problems, development of male sexual characteristics, etc.) and psychological (i.e. aggression) side effects that come in addition to the stimulated muscle growth.

In the case of external physical enhancements, if an exoskeleton is worn in the workplace and it malfunctions during use (e.g. heavy lifting), this can have very deleterious effects on the health of the individual. Additionally, many human enhancement technologies could be vulnerable to computer viruses and thereby liable to being hijacked by external actors.

There is also the possibility that these ‘enhancement’ technologies could be abused by those controlling them. For example, if Google decides to bias the outcomes for its page ranking, it would be difficult for users to become aware of this bias. In this way, search engines such as Google would effectively be informational gatekeepers, suppressing some information and promoting other types.

The Academy of Medical Sciences (2012) of the United Kingdom listed a number of important questions that they believed necessary to address regarding implementation of NBIC-Human Enhancement technologies in the workplace. Each case should be addressed with the following questions:

- Does an individual have, or perceive they have, free choice in terms of using the enhancement?
- Who is paying, or who can afford to pay?
- Does the decision to enhance or not have an impact on the wellbeing of others (e.g. by increasing or decreasing their safety)?
- Does the enhancement significantly increase the competitiveness of the individual, the employer or the national economy?" (Academy of Medical Sciences, British Academy, Royal Academy of Engineering, The Royal Society 2012).

A final key question is: “Who should decide how enhancements should be controlled and regulated, for example government, employers or individuals?” (Academy of Medical Sciences, British Academy, Royal Academy of Engineering, The Royal Society 2012). Ultimately, as will be explained below, it may not matter who or what regulates these technologies, they will *de facto* regulate themselves the same way that nuclear technology has been impossible to effectively regulate in the international system.\(^7\) That is to say that technologies posing existential risk to humans (i.e. nuclear technologies) have proven impossible to regulate effectively. It is unlikely that NBIC (less overtly threatening to humanity) will be regulated with any more urgency than nuclear technology.

These technologies, if implemented in the population at large, will lead to the total instrumentalization of the human being. Whether this is for good or for bad is debatable and the border of the value judgment of good/bad certainly is blurred; what is certain is that these technologies will change the landscape of the workplace and the human’s relationship to work. It appears that the final result could be the complete domination of the body and mind of the individual as a means to the ends of a completely neoliberalist culture.

\(^7\) This perspective is called *technological determinism* and will be explored later in more depth.
2.5. NBIC and the Military

“Our generation has succeeded in stealing the fire of the gods and it is doomed to live with the horror of its achievement.”
(Kissinger 1954)

“Once the rockets are up, who cares where they come down? That’s not my department.” (Scientist/Satirist Tom Lehrer)

NBIC and human enhancement have wide ranging applications including Medicine, the workforce, and the military. A primary concern with NBIC is its potential for unmitigated military application. One can clearly see how the emerging technologies listed above can be used to enhance a military’s fighting ability and understanding of its soldiers. Among the first large-scale endeavors to fund military nanoscience research was the Institute for Soldier Nanotechnologies (ISN), established at MIT in 2002 as well as the Future Force Warrior (FFW) program of the U.S. Army Natick Soldier Research, Development and Engineering Center (Bennett-Woods 2008; Allhoff et al. 2009). Both of these seek to develop military uses for nanotechnology and create soldiers that are nearly impossible to kill.

The potential negative applications of such work are readily apparent and the ethical implications are a mere afterthought for many researchers and underwriters of the research. One prime example of this comes from the field of unmanned vehicles (e.g. military drones, miniature robots for reconnaissance, etc.). Twenty-five leading stakeholders in the professional trade group, the Association for Unmanned Vehicles Systems International, were interviewed about whether they saw any ethical, social or moral impacts resulting from their work. 60% of them simply replied ‘no’ (Singer 2011). These are the developers of autonomous combat systems (machines that could make the kill decision without human input). Industry has a strong tendency to value the technology only in terms of potential profits rather than in political terms of justice,
morality, etc. Unfortunately, this apathy often applies to high-level government sponsors and academics as well. Swinger found in his interviews with high-level advisors to the US Secretary of Defense that some of those most influencing the budgeting process of military technologies barely understood the technologies they were in charge of financing, much less had considered moral or ethical implications of these technologies. While giving a presentation on the military, policy, legal and ethical ramifications of the growing use of robotics at the strategy office of the US Pentagon, a senior officer asked him: “Who is thinking about all this stuff?” and Swinger replied: “Everyone thinks it’s you (Singer 2011)!”

2.6. The Emerging NBIC Military Technologies

NBIC technologies being developed for use in military applications include a wide array of applications that cover nearly anything conceivable. Research continues on ways to create human/machine interfaces such as a weaponized human that can control devices with their thoughts, wear a medicalized exoskeleton, and be cognitively as well as physically enhanced. As illustrated above, thought controlled machinery is already accomplished to some extent with regard to recent advances in bionics and the ability of the prosthetic limb to read the nerve impulses activated by the brain in order to operate the limb (Fischman 2010). Research in these fields is well funded and progressing at a steady rate. Intelligence estimates for 2025 published by the USA and Europe both include mention of the potential future effects of nanotechnology and related biotechnologies (National Intelligence Council (US) 2008, National Intelligence Council, European Union Institute for Security Studies 2010). The developments pose a number of potential risks for international security. Government agencies consider primacy in these fields to be of great importance for the technologies’ benefits (to the
exercise of government power) as well as their risks.

Altmann has summarized the potential military uses of nanotechnology that will likely find realization in the coming 5-20 years:

- Smaller, faster, and more capable electronics including computers and communication devices that are likely to be embedded in nearly all components — from uniforms, to weapons, to self-configuring networks of micro-sensors, body implants, and small robots.

- Advanced computer modeling and virtual reality-based training.

- Increasingly sophisticated software and artificial intelligence capabilities, including natural language communication, sensory perception, and autonomous decision-making.

- Materials with enhanced properties, such as reduced flammability, permeability, and weight; increased hardness, strength, electrical conductivity, and magnetism; and the ability to self-heal, and change shape or color.

- More efficient energy sources and energy storage devices.

- More efficient engines and other propulsion systems, as well as lighter, faster, more agile, and longer-range vehicles—both manned and unmanned.

- Faster-reacting and more energy dense propellants and explosives.

- Distributed sensors as small as a dust particle that could detect light, sound, seismic activity, magnetic signals, and chemical or biological agents.

- Improved heavy and light armor.

- Lighter and more effective conventional weapons, including small arms and light weapons, including guns with no metal and high density armor-piercing projectiles.

- Soldier systems (a body suit) that interact with the body or enhance its functions through biosensors; fluid collection and testing; automatic drug delivery; biochips for chemical and biological analysis; heating and cooling, wound compression, and splinting; a high strength exoskeleton for lifting and jumping; and devices for data processing and communication.

- Implanted systems for monitoring, data processing, and communication; manipulating brain function; inducing cellular stasis for improved performance and endurance; sensory and neural enhancement; and mechanical enhancement of tissues, such as muscle, bone, and tendon.
• Armed and unarmed autonomous robots and vehicles including mini- and micro-robots used for surveillance and reconnaissance; path finding; sensing of chemical and biological agents; various communications functions; and closed surgical operations within the human body.

• Bio-technical hybrids including augmented animals that have been manipulated to fulfill military tasks or animal organs (e.g., sensory organs) integrated into artificial systems and used for functions similar to those of robots.

• Very small satellites that can be swarmed.

• Advanced nuclear, chemical, and biological weapons, as well as protective applications against chemical and biological agents (Bennett-Woods 2008, 136-137).

These are changes that will alter the entire landscape of warfare and security and will give rise to a slew of new questions of ethics and how to avoid Mehta’s ‘nano-panoptic future’ as best as possible (Mehta 2002).

Private industry, universities and government agencies carry out these investigations in collaboration and funding is sourced from all of these actors. In addition to the above listed research interests, the Defense Advanced Research Projects Agency (DARPA) commissions advanced research for the Department of Defense and is currently conducting research to achieve a number of militarily useful goals including the following: drugs that can keep a soldier awake for 72 hours or more, nutraceuticals that can sustain a soldier’s dietary needs for up to five days, and brain-to-computer interfaces that can permit human-to-human and human to communication via thought alone (Parasidis 2012).

2.7. A Tarnished History of Experimental Research in the Military

Ford and Henschke point out that there exists no bioethics model that deals appropriately with human enhancement as pertains to the military (Ford and Henschke 2012). They argue that previous models dealing with medicine, research and public
health are relevant, but not sufficient frameworks for handling human enhancement in the military.

In his Connecticut Law Review article on the legal implications of NBIC technologies in the military milieu, Parasidis brings up a number of ethical issues, asking:

- “Should enhancements be a mandatory aspect of military service?
- Who determines the parameters for an acceptable risk-benefit profile?
- What remedies should be available for service members who experience adverse health effects?

Adequately addressing these concerns, particularly in the context of military hierarchy and demography, provides a socio-medical framework that facilitates sensible harmonization of national security interests with fundamental notions of human dignity and patient autonomy (Parasidis 2012).”

Parasidis sees great potential for abuse (according to established bioethical norms of experimental research) within the military. While there are a number of historical atrocities that have been committed (e.g. the Nazis’) in the way of military scientific research, Parasidis puts these questions in the historical context by examining three ethically questionable military research programs in the USA.

- Race based studies of the effects of mustard gas on US servicemen during the 1940s. These studied mustard gas’s effect on white vs. non-white soldiers, testing whether non-whites had a better tolerance to the effects of mustard gas. Soldiers that survived the experiments, in addition to grotesque acute problems associated with their exposure, also had the long-term effects of asthma, psychological problems and cancer (Parasidis 2012).
- Open air tests of nuclear bombs, intentionally irradiating servicemen with radiation as well as tests that released radioactive substances into the air in densely
populated areas. Civilians (usually elderly, prisoners and/or mentally disabled) were also, unsuspectingly, injected with radioactive substances to examine their reactions. These radiation tests carried on for 30 years during and after the Second World War with the government hiding their existence until the 1990’s when they finally admitted to carrying out at least 1,400 radiation projects (not counting the intentional releases of radioactive substances in urban areas).

- Psychotropic drugs (LSD, mescaline, etc.) were experimented with to test their potency as a way to facilitate interrogation. Early experimentation involved bringing Nazi scientists (falsifying their papers when they were wanted war criminals) to the US to utilize their expertise on the subjects of torture and brainwashing. These drugs were administered to unsuspecting civilians and servicemen without their consent, often resulting in serious side-effects.

The military justified these tests by arguing that “national security interests permit ‘a more tolerant interpretation of moral-ethical values, but not legal limits (Parasidis 2012).’” In the United States vs. Stanley, the military argued that the solution to legal liability could be found by covering up the experiments.

It does not appear that similar experiments are taking place within the military establishment today, but there remain two very controversial areas of research/activity within the military.

- Investigational and off-label use of drugs on service members. Off label use means prescribing a drug for a purpose other than those approved by the FDA. The Department of Defense has done this on several occasions, often compulsory and with very negative health consequences for those receiving the treatments. These have included an increase in the instance of amyotrophic lateral sclerosis (ALS), birth defects in the children of those exposed to the drugs as well as a litany of chronic disorders (i.e.
skin rash, cognitive difficulties, headaches, respiratory/gastrointestinal problems, respiratory problems, etc.) in those upon whom the drugs were prescribed. Investigational use of drugs involves using drugs not approved for any function by the FDA, and has taken place as well.

- The other current area of controversy comes from the application of NBIC technologies to the enhancement of soldiers. This is covered above in detail.\(^8\)

The military does not have an untarnished experimental research history. Though it appears that, presently, the military is undertaking research via less odious methods, the ends are not necessarily less odious. The ethical issues brought up by Parasidis above remain relevant in today’s research environment. The controversial elements of today’s military research are not controversial in the same way in which developments such as nuclear technology were controversial. The public is not faced with an objective threat of total annihilation; rather the military applications of NBIC technologies are much more nuanced and difficult to characterize and manage. Two important points to consider are:

- NBIC technologies can make it easier and less costly to go to war. By lowering costs and risks of war (for those possessing the NBIC technologies), will these technologies make a militarized approach to global conflict easier to propagate? Does facilitating the ease of a military approach to problem solving represent the kind of society that one would wish to create? Full implementation of NBIC capabilities will lead to a militarized police state where total surveillance prevails and privacy is a memory of the past. Nuclear weapons represented war in its final revelation of destruction, but NBIC technologies may represent war in its final revelation of dominance over the individual and powerful countries over the weak.

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\(^8\) Paraphrased from (Parasidis 2012).
• The Collingridge dilemma: the difficulty in understanding the consequences of a technology *a priori*, and containing existential threats such as nuclear technology. Hence, the nuances of NBIC will make it much harder to regulate effectively. This example is expanded upon below.

The difficulty in regulating nuclear weapons demonstrated the precedence of political and military concerns in driving the policies surrounding the nuclear sciences. It is hard to believe that the regulation of NBIC technologies relevant to military and security concerns will not be similarly difficult to regulate, not to mention fully understanding their implications for society.

Upon viewing the Trinity nuclear test (the first successful artificial nuclear reaction) in the Nevada desert, J. Robert Oppenheimer (one of the Manhattan Project’s principle architects) remarked,

> We knew the world would not be the same. A few people laughed, a few people cried, most people were silent. I remembered the line from the Hindu scripture, the Bhagavad-Gita. Vishnu is trying to persuade the Prince that he should do his duty and to impress him takes on his multi-armed form and says, "Now, I am become Death, the destroyer of worlds." I suppose we all thought that one way or another (Time Magazine Staff 1948)."

As scientists involved in nuclear weapons research began to take public stances against the initiation of a nuclear arms race, many of them were politically castrated and charged with disloyalty to the United States. Several were stripped of their security clearances during this time (e.g. Oppenheimer). A number of prominent physicists involved in the nuclear weapons development (Oppenheimer, Albert Einstein, Joseph Rotblat) joined with public figures to form organizations such as the World Academy of Art and Science that would advocate against the misuse of scientific discoveries, especially nuclear weapons. Other efforts were made in addition to these (Mainau 9

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9 Paraphrased from (Parasidis 2012).
Declaration, Pugwash Conferences on Science and World Affairs) that have also yet to successfully mitigate the threat of nuclear weapons.

Along with the best efforts of scientists, a number of government officials, many of whom had intimate involvement with the use of nuclear weapons (e.g. Robert McNamara during the Cuban Missile Crisis) have made public appeals against the continued harboring of nuclear weapons. George P. Shultz, William J. Perry, Henry A. Kissinger and Sam Nunn have long been against the use (not to be confused with deployment) of nuclear weapons (Shultz et al. 2007). Robert McNamara was Kennedy’s Secretary of Defense during the Cuban Missile Crisis. His continued advocacy for eliminating nuclear weapons has been rather poignant and straightforward, but it has likewise had little effect in stemming the maintenance and further development of nuclear arsenals worldwide (McNamara 2005).

If the compelling arguments of the designers of nuclear weapons and those in government who managed the development and use of nuclear weapons have, thus far, had so little effect in steering the ends to which nuclear technology is deployed, it does not bode well for other technologies either (e.g. NBIC).

Reagan and Gorbachev were unable to successfully conclude talks during their tenures that would lead to the end of the threat posed by nuclear weapons.

Nuclear weapons pose an existential threat to our species and yet, no solution has been found to their existence. This is in the face of opposition from the very government officials that wielded these weapons as well as the scientists that created them. NBIC technologies pose a much more insidious threat as they tend to pass below the radar of public consciousness\(^\text{10}\).

\(^\text{10}\) As explained here in section 2.7, nuclear technologies mobilized a large public and government base in support of their strict regulation and eventual
It is nearly impossible to control the ends to which a technology is employed. Though man progresses technologically, thinkers such as John Gray criticize the assumption that man’s moral progress develops commensurately with his technological development (Gray 2004). This difficulty in determining the effects of a technology’s implementation and the difficulty of controlling a technology’s uses is called the Collingridge dilemma (Collingridge 1980). This dilemma has become a basic facet of technology assessment studies. Simply looking at the failure of international nonproliferation regimes to contain nuclear technology will serve as reminder enough that there is little to be hopeful about regarding the creation and implementation of international controls over future technologies with nefarious dual uses. This bodes poorly for these new emerging technologies due to their ability to be employed in such discreet and poorly understood ways (at least by the public).

It does not require much consideration to see how these emerging technologies will alter the landscape of warfare and the power of the group that can wield such technologies against its foes. The example of a boiled frog is cited by Bennett-Woods to demonstrate society’s current dilemma: if the frog is put into hot water, it will attempt to escape immediately. If it is put in cool water that is then heated, it will proceed to adapt to the rising temperature until it is too late to escape. Given the current situation where technologies advance at a pace far more rapid than the pace of legislation to govern these technologies, society should not allow itself to become the frog that waited too long to save itself. In the present situation, NBIC technologies are developing far faster than society’s ability to understand their implications and its elimination. In spite of this, nuclear weapons continue to proliferate and menace the wellbeing of the planet and humanity. It is not likely (at least it has yet to happen thus far) that NBIC technologies will garner as much public attention as nuclear technologies and will likely prove more difficult to control than have nuclear technologies.
ability to legislate or implement regulation (Robison 2011).

The difficulty lies in how to achieve these positive ends (i.e. effective regulation) in a society where the most powerful incentives are profit and the accumulation of power and in which those with the most wealth and power are able to exert significant influence over the means of knowledge production (i.e. the discourse surrounding NBIC). In the following sections, we will examine the current framework of knowledge production in the discourses surrounding NBIC and then will offer ideas on how to better conceptualize an understanding of these challenging technologies and their applications in terms of human enhancement.
CHAPTER 3
NBIC/HUMAN ENHANCEMENT DEBATE AND THE ASSOCIATED ETHICS DISCOURSES

“The ability to manipulate matter at the atomic scale, to model life itself in our machines, and to incorporate our technology into the innermost reaches of our own bodies represents a power that should not be taken lightly (Bennett-Woods 2008).”

Certainly, such topics are worthy of a deep examination and understanding by the social sciences.

The purpose of the present work is to present NBIC technologies generally, their applications to human enhancement specifically and then to map the moral/ethical discourse pertaining to NBIC. From this, one can identify ways that a critical theory of NBIC could be applied to better understand the myriad of possibilities created by NBIC and their social, economic, ethical, moral and political implications.

In developing an understanding of the discourse surrounding NBIC, one benefits from clearly defining several aspects of the discourse. Bennett-Woods offers an insightful way of beginning to map the NBIC discourse. Namely, she begins by defining the Actors, Context and the Stakes involved. From this foundation, we can begin to further dissect the NBIC discourse and more specifically, its ethical discourse.

3.1. The Actors

An excellent way to understand these actors is to classify them roughly into three categories: Funders, Thinkers and Communicators (Bennett-Woods 2008):

Funders: These would include investors, members of parliament/congress, and corporate interests as well as private individuals that influence the development
priorities of new technologies with their purchasing power. “Their primary ethical challenge is utility and maximizing benefits. Their funding/purchasing decisions effectively determine what does or does not get done throughout the entire social order (Bennett-Woods 2008, 222).”

**Thinkers:** These include “academics and scholars from every discipline, engineers and technical experts, policy strategists, visionaries and futurists (Bennett-Woods 2008, 222). This group of actors creates and perpetuates/modifies the conceptual framework through which we understand NBIC technologies. These are the knowledge producers and their reflections on the known and unknown, their fidelity to truth and humility to acknowledge that which they do not know are their greatest ethical challenges.

**Communicators:** This includes anyone from teachers to speechwriters, reporters to marketers, advocacy groups like those listed in the section below and more. The manner in which information is communicated and the fairness (lack of bias) of that which is communicated makes communicators pivotal mediators of the tone/trajectory of social dialogue (Bennett-Woods 2008, 222). The communicators are the ones most responsible for ‘framing’ the public understanding of NBIC technologies. Cutcliffe points out that governmental bodies such as the National Nanotechnology Initiative (NNI) tend to portray these emerging technologies as unambiguously good: “The NNI envisions a future in which applications of nanotechnology will lead to a revolution in technology and industry that benefits society (Cutcliffe, Pense and Zvalaren 2012); quote from www.nano.gov". The ‘framers’ of the debate will make problems and risks to be visible or invisible, and can cast ambiguous, uncertain research agendas as ‘positive progress’ (Cutcliffe, Pense and Zvalaren 2012). It can cast a particular research program (e.g. NBIC research) as that which will make human destiny ‘manifest’.
Of course, there is a great deal of overlap between these different groups of actors. The borders are ‘porous’ and an individual or group could fit between more than one of the groups listed above (cf. (Bennett-Woods 2008)).

3.2. Context

The context in which this discussion is taking place is one of very mixed messages. Different stakeholders have divergent agendas in the discourse. The ethical aspect of the discourse surrounding NBIC is not the most dominant force therein. Rather, questions of economics and other powerful forces tend to be at the forefront of debate. Bennett-Woods finds little precedent for the kind of technology assessment that is necessary with NBIC. Debates such as that surrounding abortion, stem cell research, GMO, nuclear research and physician assisted suicide have proven poor examples for how to effectively handle technologies with controversial societal implications.

Government institutes such as DEEPEN (Deepening Ethical Engagement and Participation in Emerging Nanotechnologies) in the European Union and the National Nanotechnology Initiative (NNI) in the United States offer large amounts of funding for research into the societal implications of NBIC research. At the same time, they act as public relations bodies that communicate the goals at large of the funding institutions. NNI promises revolutionary products, improved health and economic prosperity, while leaving out some of the darker predictions by writers such as Eric Drexler. It is worth noting that the European Union invests nearly twice as much as the US into research into the implications of NBIC technologies (AZoNetwork 2008). A variety of different interest groups have sprung up, each with a different underlying ideology. Below is a chart that was produced by the Institute for Ethics and Emerging Technologies (IEET) that lists a variety of these different groups and the perspectives they advocate. One can
see from that chart the variety of perspectives present in the field.

The following table lists examples of different competing standpoints in the NBIC Human Enhancement debate and a number of organizations that lobby on behalf of those standpoints.

Table 1. Examples of different competing standpoints in the NBIC Human Enhancement debate and organizations that lobby on behalf of those standpoints

<table>
<thead>
<tr>
<th>Definitions</th>
<th>Libertarian Transhumanists</th>
<th>Technoprogressives</th>
<th>Left-wing Bioconservatives</th>
<th>Right-wing Bioconservatives</th>
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<tbody>
<tr>
<td>Exemplary Groups</td>
<td>Extropy Institute [defunct]</td>
<td>Technoprogressive list</td>
<td>Center for Genetics and Society</td>
<td>Center for Bioethics and Culture</td>
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<td></td>
<td>Institute for Ethics and Emerging Technologies</td>
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<td>Council for Responsible Genetics ETC Group</td>
<td>Center for Bioethics and Human Dignity</td>
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<td>New Atlantis magazine Futurisms Blog First Things Personhood.net</td>
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<tr>
<td>Citizenship</td>
<td>Personhood-based &quot;cyborg citizenship&quot;: All self-aware beings with desires and plans for the future should be considered citizens with a right to life.</td>
<td>Limited Human-Racism: &quot;Humanness&quot; determines citizenship, but not for embryos.</td>
<td>Limited Human-Racism: &quot;Humanness&quot; determines citizenship.</td>
<td>(Religious) Human-Racism: (Deep Ecological) Eco-centrism: Human beings have equal rights with all living things.</td>
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<td>Humanism vs. Religious Right</td>
<td>Libertarian Transhumanists</td>
<td>Technoprogressives</td>
<td>Bioconservatives</td>
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<tr>
<td>Humanism: Human beings are free to determine their own future, guided by prudent reason. There are no obvious natural or divine limits on human aspiration.</td>
<td>Opposition to (Capitalist/neoliberal, Imperialist/Patriarchal) Humanism</td>
<td>Deep Ecology/Hubris Taboo: Humanity should be restricted by divine or ecological taboos.</td>
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<table>
<thead>
<tr>
<th>Individual Liberty vs. Yuck Factor</th>
<th>Libertarian Transhumanists</th>
<th>Technoprogressives</th>
<th>Bioconservatives</th>
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</thead>
<tbody>
<tr>
<td>Individual liberty: trumps yuck factor.</td>
<td>Yuck factor: trumps individual liberty in germinal choice and biotech, but not in sexuality or abortion.</td>
<td>Yuck factor: trumps individual liberty.</td>
<td></td>
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<tr>
<th>Technological Risks</th>
<th>Libertarian Transhumanists</th>
<th>Technoprogressives</th>
<th>Bioconservatives</th>
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</thead>
<tbody>
<tr>
<td>Resignation: Technology is uncontrollable, government intervention always has bad unforeseen consequences, and risks are manageable without government.</td>
<td>Regulation: Risks are manageable with the assistance of democratic oversight and management.</td>
<td>Relinquishment: Risks are so enormous and unknowable, and regulatory institutions so flawed, that human enhancement should be banned.</td>
<td></td>
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<thead>
<tr>
<th>The Equality Challenge of Enhancement Technology</th>
<th>Libertarian Transhumanists</th>
<th>Technoprogressives</th>
<th>Bioconservatives</th>
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</thead>
<tbody>
<tr>
<td>Market Access and Legal Equality Enough: If legal equality is guaranteed and enhancement technologies are available in the market, social equality is irrelevant and government should do nothing to create a more equal society.</td>
<td>Make Enhancement Universally Accessible: Democracies should work toward social equality, and provide universal access to enhancement technologies.</td>
<td>Bans on Technologies as Part of Larger Egalitarian Program: Democracies should work toward social equality and ban enhancement technologies.</td>
<td>Tech Bans Necessary to Protect Equality: Equality can be guaranteed by banning enhancement technologies.</td>
</tr>
</tbody>
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<table>
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<tr>
<th>Procreative Liberty</th>
<th>Libertarian Transhumanists</th>
<th>Technoprogressives</th>
<th>Bioconservatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procreative Liberty, Equality and Beneficence: Trust parents to</td>
<td>Limited Procreative Liberty: Trust parents to act</td>
<td>Reproductive rights.</td>
<td>Reproductive right:</td>
</tr>
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“Table 1 – Continued”
### “Table 1 – Continued”

<table>
<thead>
<tr>
<th>Libertarian Transhumanists</th>
<th>Technoprogressives Left-wing Bioconservatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>act in kids best interests, and let them buy germinal choice in the market.</td>
<td>in kids’ best interests, stop them if they don’t, give them equal access to germinal choice technology, and encourage them to create children with the best life opportunities.</td>
</tr>
<tr>
<td><strong>Ecological Protection</strong></td>
<td><strong>Free Market Green:</strong> The market can solve all ecological problems.</td>
</tr>
<tr>
<td><strong>Structural Unemployment</strong></td>
<td><strong>The Market will Provide:</strong> If the government avoids meddling (unemployment insurance, minimum wages, etc.) all workers will find new jobs, even if at lower wages.</td>
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<td></td>
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Though these groups exist, that does not mean that they necessarily communicate among one another or resolve their conflicting viewpoints in any significant way. A more detailed analysis of the different strains present in the NBIC discourse will be given in section 3.4 below.

3.3. The Stakes

The stakes for NBIC technologies are extremely high, far-reaching and will affect all of society. With the convergence of NBIC, we are entering the final frontier in the evolution of power and departing from the ‘age of discovery’ into the ‘age of mastery.’ One can control the person in a much more overt way. This is the final
frontier in creating a ‘one-dimensional man’\textsuperscript{11}. There is no further destination conceivable (by me at least); no more effective potential tool of power and manipulation. The ability to manipulate matter at the atomic scale and to build technologies that will mimic life will have far reaching implications in the daily lives of people and should not be taken lightly.

It makes sense then that the creation of a system of NBIC technology evaluation is of great necessity and a way to effectively regulate such technologies must be sought (as yet highly unsuccessful in this and other fields). These efforts must balance the subjective and objective interests of society\textsuperscript{12}. Of course, the devil is in the details of defining what the objective and subjective interests of society actually are and many hidden interest groups are behind the groups given responsibility for defining the interests of society at large.

In the sections above, we have highlighted a number of issues of concern in the application of NBIC technologies to the fields of medicine, military and the work force. Additionally, we have illustrated some of the fundamental aspects underlying NBIC and the discussion of its implications for society. In the section below, we further explore the different aspects of the discourse surrounding NBIC technologies and we will pay particular attention to the ethical dimensions of the discourse. We will highlight weaknesses and gaps in the discourse and new ways to understand these issues.

\textsuperscript{11} This term refers to a concept presented by Herbert Marcuse in \textit{One-Dimensional Man} (Marcuse 1991). Marcuse argues that other dimensions of human existence persist but are eliminated by the forces maintaining the status quo. These status quo forces impose totalitarianism without terror. He maintains that protest and discourse are effectively co-opted by the status quo in the present advanced industrial society (regardless of whether communist or capitalist). This leads to one-dimensional thought, one-dimensional society and hence, one-dimensional (wo)men.

\textsuperscript{12} Objective interests is intended to mean existential, less value-laden interests that affect all levels of society somewhat equally and subjective interests are meant to include those which are value laden. Subjective interests are impacted by one’s position in society, one’s values, etc.
Following that, an argument will be presented for the need to develop a critical theory of nanotechnology.

3.4. Dissecting the NBIC Discourse

Positivism as a worldview remains (either explicitly or implicitly) the dominant view of the knowledge world. In general, the regulatory, industrial and political bodies that oversee funding for NBIC research and funding tend to view the world through the lens of positivism.

Positivism is a term used, in part, to describe a theory of knowledge that relies exclusively on a limited application of scientific method for the production of knowledge and the notion of scientific progress. Positivistic beliefs have played a powerful role in the modern view of science and how scientific knowledge is valued in the larger culture. For example, the belief that science is the only legitimate form of knowledge largely displaces religion and philosophy as valid sources of knowledge. Because science is self-justifying and self-validating, there is no need for the scrutiny of other less verifiable forms of human knowledge (Bentz and Shapiro 1998, paraphrased in Bennett-Woods 2008, 26 and Patenaude et al. 2011).

This belief in a single, objective, reality denies the possibility for reflective knowledge (Geuss 1981, 2). Elements of positivism permeate even the debates (ethical and otherwise) surrounding the development and implementation of NBIC technologies. An excellent demonstration of this comes from a quote made by Philip J. Bond at a workshop in December 2004:

Given nanotechnology’s extraordinary economic and societal potential, it would be unethical, in my view, to attempt to halt scientific and technological progress in nanotechnology. Nanotechnology offers the potential for improving people’s standard of living, healthcare, and nutrition; reducing or even eliminating pollution through clean production technologies; repairing existing environmental damage; feeding the world’s hungry; enabling the blind to see and the deaf to hear; eradicating diseases and offering

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13 By accepting only empirical cognitive content (derived from experience, i.e. the scientific method) as legitimate knowledge, Positivism denies the possibility for value judgments and reflection as legitimate forms of knowledge and knowledge production.
protection against harmful bacteria and viruses; and even extending the length and the quality of life through the repair or replacement of failing organs. Given this fantastic potential, how can our attempt to harness nanotechnology’s power at the earliest opportunity – to alleviate so many earthly ills – be anything other than ethical? Conversely, how can a choice to halt be anything other than unethical? (Bond 2004, 7-8)

From this quote, one can understand how the use of the words ‘ethical’ and ‘unethical’ are stripped of their normative meaning and are understood by him simply as that which is advantageous (must be done) and that which is disadvantageous (must not be done) from a neoliberal, positivist and utilitarian viewpoint. These positivists relate technology to progress and for them the only ethical question surrounding nanotechnology is that of whether or not it contributes to progress and the need to develop economically viable technologies that will pay a return on the investment in their creation. But the ‘progress’ at issue is measured in purely utilitarian/quantitative rather than qualitative terms. A qualitative understanding of progress would shift a balance more evenly between subjective and objective rationality in favor of the latter.

There is an effort by governments and private industry to achieve legitimacy for NBIC research efforts by using the legitimizing tools of ethical debate. In this way, NBIC can avoid being hampered in the same way that GMO research, stem cell research, etc. were hampered by public backlash against these research endeavors. The economic benefits and risks can be better balanced by introducing a public debate on the ethics of NBIC technologies present and future. This will help allay public fear and

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14 This trend is readily identified upon consulting the initial (2001) and subsequent National Nanotechnology Initiative reports (2010 and 2013 are the latest publications) that have been published analyzing the development of NBIC technologies. According to the 2010 report there is a marked lack of focus on societal impact and ethical implications of research outcomes and the 2013 report has little serious reference to these concerns (Roco and Bainbridge 2001; National Nanotechnology Coordination Office Staff 2010; Authoring Committee 2013). Rather, the focus of government and industry initiatives is guided by utilitarian, positivist, neoliberal and utilitarian frameworks.
distrust while at the same time allowing research to continue and develop normally (Mehta in Bennett-Woods 2008, 128). Cutcliffe cites a number of other studies as well that are consistent with this statement (Cutcliffe, Pense and Zvalaren 2012).

The normative assessment of nanotechnology tends to focus on cost-benefit analysis from an economic standpoint, but couched in a discourse that wears an ethical garb. This discourse follows a normal-distribution spectrum of ideas and perspectives, but the bulk of influential arguments (those propagated by main actors) tends to follow this course. This redirects the focus of discussion away from consideration of socio-economic, cultural, and historical contexts (Ferrari 2010, 27-52). This is in spite of the fact that NBIC technologies are directed by the forces that shape the socio-economic milieu of their development (not the other way around). NBIC technologies will “insert themselves into existing trends of privatization and monopolization which have increasingly characterized emerging technologies over the last decades (Ferrari 2010, 27-52).”

A number of authors have thoroughly analyzed the academic discourse surrounding NBIC with these points in mind. Here, we will introduce a few of these studies in an order that progresses from the most general to the most specific.

There is a great amount of debate regarding whether these emerging technologies should constitute its own field of ethical study or if simply nanotechnology-related ethical issues, while seeming to be new/unique, amount to “old ethical wine in new technological bottles (McGinn 2010).” Strictly speaking, nanotechnology on its own does not necessarily raise any qualitatively new ‘ethical issues’, depending on how one defines one’s terms (see (McGinn 2010) for qualification of this point). Like Lin, I believe nanotechnology topics which are of ethical-concern, become uniquely their own (and demand deep reflection) in the field of ‘human
enhancement,’ at the convergence of nano-science, cognitive science, biotechnology and information technology (NBIC) (Lin and Allhoff 2008). I believe this because it is here that one enters into the above-explained mastery that is previously unprecedented. It is here that one finds the distinct ethical dilemmas presented by NBIC (Sandler 2009). There are genuine ethical issues that must be explored. Several resources offer overarching insights into how these ethical points can be understood (i.e. Sandler 2009; Bennett-Woods 2008). Nevertheless, these ethical issues need to be framed politically. For this reason, I am in agreement with Ferrari that:

> questions commonly discussed in the debate, such as the legitimacy of nanoethics as an independent discipline or whether these technologies pose ontologically unique challenges, are not only distracting and uninteresting but also biased, because they eradicate from the consideration of technology more fundamental topics: socioeconomic, cultural and historical contexts. These authors therefore move from particular problems specifically connected to nanotechnologies towards drawing general conclusions on the role of technology in our society and on its contribution to development. Similarly, they have tended to highlight the weaknesses of current decision-making processes on science and technology (Ferrari 2010).

A number of approaches have been taken toward the best way to handle the societal disruptions and challenges posed by NBIC technologies. Unfortunately, there is a marked deficit in discourse surrounding the social dimensions and effects of NBIC development (as noted in the footnote above).

Scholarly works have attempted to develop taxonomy of these approaches within the discussion of NBIC and have found a number of ways to approach this (Béland et al. 2011; Patenaude et al. 2011; Sandler 2009; Cutcliffe, Pense and Zvalaren 2012). A fine taxonomy of the discourse was put forth in a 2012 assessment of the perspectives of ‘Science and Technology Studies’ scholars. This work identified five threads of debate on the topic of NBIC: Ethics, Regulation, Opportunities/Threats (including utopian/dystopian visions of the future), Public Perceptions of
Nanotechnology, Public Participation and finally the Social Construction Theory of Technology (SCOT) (Cutcliffe, Pense and Zvalaren 2012). They note that these threads of debate allow STS scholars to effectively understand the cultural, socio-political, and ethical dimensions of nanotechnology.

One exemplary SCOT study cited by Cutcliffe et al. listed a number of questions that must be answered in order to begin understand “the social constitution of an emerging nanotechnology”:

- Who is in control?
- Where can I get information that I trust?
- In what terms is the technology being introduced?
- What risks apply, with what certainty, and to whom?
- Where do the benefits fall?
- Do the risks and benefits fall to the same people? (e.g. mobile phones are popular while mobile phone masts are not)
- Who takes responsibility for resulting problems? (cited in (Cutcliffe, Pense and Zvalaren 2012)"

This is one example of a SCOT model for understanding the implications of new technologies. With it, one can begin to examine the different ways that a particular technology interacts with the society of which it is a part and product.

Cutcliffe et al. give one (among several different types) particularly good overview of the different topics of interest in the NBIC discussion. What is lacking in this analysis is an emphasis on the fact that not all of these categories are independent of one another. Really, the categories of Regulation, Opportunities/Threats, Public Perception and Public Participation rely in part on an underlying, normative ethical (mis?) understanding. For this reason, they are not entirely independent categories. Ethics stands much more by itself in this regard, yet it also depends on the social
conditions and unconscious underpinnings that make up the setting in which Ethics is considered. For this reason, the authors argue that SCOT has been helpful in understanding the interaction of the social and the subsequent development of the ‘ethics’ of NBIC (Cutcliffe, Pense and Zvalaren 2012).

3.5. Ethical Discussion Specifically

Betton-Woods describes ethics as “the story of how we, as individuals and communities, ultimately choose to unfold” (Bennett-Woods 2008, 244). As stated above, almost all the strands of discourse around NBIC have implicit or explicit ethical assumptions. As stated previously, this emphasis on ethics ignores socioeconomic and political issues of great import. As such, this emphasis on ethics creates myopia in the NBIC discourse.

There are a wide variety of sources for ethical analysis. There are government sources such as the NNI and DEEPEN, authors with viewpoints that generally fall into groups that are ‘unconditionally opposed’ to the development of NBIC technologies (humanists) and those ‘unconditionally in favor’ of the development and implementation of NBIC technologies for human enhancement (transhumanist camps) (see Table 1 for a rough outline).

3.6. The Transhumanist Perspective

“The most exciting breakthroughs of the 21st century will not occur because of technology but because of an expanding concept of what it means to be human”. –John Naisbitt (1990)

There are a number of advocacy groups that investigate NBIC technologies’ applications to human enhancement from a particular perspective. One of the most influential groups of perspectives is that of the Transhumanists. Think tanks such as the Future of Humanity Institute and the Institute for Ethics and Emerging Technologies
These researchers have a clear agenda regarding the development of NBIC and human enhancement specifically. They are open supporters of the advancement of human enhancement and are excited by the horizons of possibilities inherent in the progression of human enhancement. What is quite interesting is the way in which many of their arguments share much in common with Marxist stances on the role of technology. We will see below that Critical Theorists, much of whose thought is based solidly in Marxist theory, will offer a much more pessimistic account of technology and its merits.

Generally speaking, transhumanists such as Savulescu, Meulen and Kahane (2011, 557); Bostrom (2005); Kurzweil (2005); and Naam (2005) (prominent transhumanists) tend to invoke moral arguments related to freedom autonomy, nature and human nature to legitimize the position that the only way for human beings to escape human incompleteness is to implement the convergence of technologies on the nano scale, thus making it possible to surmount biological limitations (the fragility of being; disease and death) until the coming of the human-machine hybrid or immortal cyborg – the posthuman.” (Béland et al. 2011, 295-296)

For a specific example of a transhumanist argument, let us consider the following: Savelescu (a prominent transhumanist) argues that there are four ways in which psychology and biology of a person are determined. These he lists as:

- Nature or God
- “Experts” – philosophers, bioethicists, psychologists, scientists
- “Authorities” – Government, doctors
- By people themselves – liberty and autonomy (Savulescu, Meulen and Kahane 2011, 557)
Savulescu then goes on to explain that within the structure of a liberal state, the
city-state itself must be value ‘neutral’ as regards conception of the ‘good life (Savulescu,
Meulen and Kahane 2011).’ The state must therefore respect personal autonomy and
liberty within certain limits. Those limits he delineates as:

- Harm to others - Harm to the recipient of an enhancement
  therapy or to others would deem it unacceptable. This could
  include anything from dangerous behavioral changes to an
  unfair competitive advantage conferred by an enhancement
  therapy.

- Distributive Justice – He argues that ‘principles of justice
  should govern the distribution of enhancement therapies (cf.
  Savulescu, Meulen and Kahane 2011, 557).

He then goes on to cite John Stuart Mill’s conception of freedom in support of
people finding out for themselves what kind of life is best for them. Therefore human
enhancement therapies should be permitted and favored by governing bodies.

3.7. The Humanist Perspective

There are a number of academics ‘unconditionally against’ the development of
NBIC for human enhancement purposes. Béland et al. refer to these individuals
collectively as humanists. It is worth noting that in the IEET chart above (Table 1), they
refer to IEET as a ‘technoprogressive’ organization and define humanists differently
from Béland et al. Though the cofounder of IEET is Nick Bostrom (as noted above, a
prominent transhumanist), they consider themselves ‘technoprogressives’ as opposed to
‘libertarian transhumanists’. So one can see how the same terms can be used with
different meanings and understandings. For the purposes of this work, the terms
‘humanist’ and ‘transhumanist’ will be used in the manner that was intended by Béland
et al. For them, humanists include scholars such as Fukuyama (2002), Habermas (2003)
and Jean-Pierre Dupuy (2007). Their arguments posit that it is fundamentally not
possible ("semantically incompatible") to make an argument in favor of human enhancement based on nature, human dignity and the ‘good life’. For this reason, they oppose the development of NBIC technologies for the purposes of human enhancement, thereby dominating human nature and then nature as a whole (Béland et al. 2011, 295-307). They advocate the necessity to restrain and even to prohibit these technological advances and their implementation in society.

3.8. Ethical Categories of Argument

There exists a large discourse between these two opposing points of view broadly classified as ‘humanist’ and ‘transhumanist.’ Dupuy and Patenaude both point out the ethical debate tends to consist of ‘the same arguments always served up, and they are always answered with the same counter-arguments.’ The dominant strand in the NBIC-Human Enhancement ethics discourse (especially among government and industry sponsored publications) is a consequentialist, rational cost-benefit analysis founded in a NeoLiberal framework which adopts a largely positivist perspective on science and technology (i.e. science and technology advancement is unconditionally good). A normative ethical (mis?) understanding underlies much of this discourse and limits it in several ways (Dupuy 2007). It will be helpful to untangle the underlying normative aspects of a discourse that often seems full of preprogrammed arguments and rebuttals. Hence, it is possible to classify the general trends of moral argument (beyond simply humanist/transhumanist) within the NBIC/Human Enhancement ethics discourse as well as separate them into their most irreducible parts. By comprehending the irreducible foundations underlying arguments within the NBIC ethical debate, it will then be possible to identify the points of impasse and myopia in the debate. This will also reveal where fresh perspectives could be offered by a Critical Theory approach to
understand the debate and NBIC’s applications in human enhancement.

Several works attempt to dissect the NBIC-human enhancement ethics discourse into its most basic, irreducible constituent parts. Of these works, the most concise and overarching of these synopses is a paper by Patenaude et al. wherein his group identifies seven basic, irreducible lines of ethical argument in the discourse surrounding NBIC as well as the moral underpinnings of these ethical arguments. Their goal was to ‘inquire into the types of rationality that support the various types of moral argument in the NBIC discourse (Patenaude et al. 2011).’ They wished to determine both whether an actual dialogue was happening as well as whether it is actually possible.

Their argument follows the following structure:

- A brief overview of the threefold nature of a moral argument is given.
- Various categories of moral argument deployed by authors are inventoried.
- Finally, the background moral stances supporting the argument categories are analyzed.

These have provided a detailed anatomy of the different, irreducible, ethical arguments present in the debate as well as their moral underpinnings. These are listed and elaborated upon below. Where a weakness in the structure of Patenaude’s argument can be found, this is pointed out and expounded upon as well. In the subsequent section (Section 3.9), their framework is then applied to the NBIC/Human Enhancement debate to understand the ‘dialogue’ between humanists and transhumanists. Thereafter, some problems explained by Dupuy in the philosophical underpinnings of the ethical debate will be explored. Finally, I will outline what the perspective of Critical Theory can contribute to the debate on NBIC/Human Enhancement.
3.9. A List of the Ethical Categories into Which the Discourse Can Be Divided

Patenaude begins by arguing that “the appeals to rationality made by a moral argument are of three kinds, with each kind being specific to a different component of the argument\(^{15}\).” These include the following:

- The appeal made by the meaning of the moral utterance;
- The appeal made by the justification for the moral utterance’s moral authority;
- The appeal made by practical reason through the application of the moral utterance to a specific context (concrete case under discussion)

For the time being we will simply enumerate the categories and in the next section we will discuss in more detail how these categories are relevant to the debate between humanists and transhumanists. For Patenaude, the different categories of argument made by authors in the NBIC discourse are as follows:

\textit{Category 1) The argument based on nature and based on a metaphysical conception of human nature.}

\textit{Core Meaning: Act in accordance with nature and make sure your actions maintain harmony with nature (Patenaude et al. 2011).}

There is a theological metaphysics and a non-theological metaphysics. This category tends to be controversial as different actors within the debate have conflicting metaphysical conceptions of what constitutes human nature\(^{16}\). A number of dominant views are in disagreement over the true metaphysical nature of humans. Empiricism is an epistemological thesis about the source of knowledge. Empiricists argue that the human mind is a blank slate and that all knowledge comes from experience. Thus human nature is a product of experience and hence a product of our environment.

\(^{15}\) The following is a summary of the arguments that Patenaude \textit{et al.} put forth in their work.

\(^{16}\) The theological metaphysics tending to include a fusion of monotheistic Abrahamic faiths and Aristotle’s metaphysics. Generally speaking, these viewpoints argue that human minds are finite and God’s mind is infinite. Therefore, one can understand what is best for man by understanding that God knows best.
Romantics would argue that individuals are born inherently good, but that society is responsible for the degradation of these individuals. Theists would argue that God and religious revelation correctly explain metaphysical human nature. Some thinkers such as Chomsky argue that humans have an innate rational capacity rooted in our language faculty. Cognitive scientists such as Pinker argue that evolutionary psychological adaptations have most significantly shaped human nature (Pinker 2002). In the section below, we will consider the conflicting views of humanists and transhumanists regarding metaphysical conceptions of human nature. Biological Sciences, Social Sciences and Religion will all provide different explanations of what constitutes human nature. Dupuy correctly points out a common mistake in the NBIC literature: the tendency to conflate human nature and the human condition. This distinction will be explained in more detail in the next sections.

Category 2) The argument based on human dignity (in the Kantian sense of people as an end not a means)

Core Meaning: Act in such a way that you treat humanity ‘never merely as a means, but always at the same time as an end’ (Patenaude et al. 2011).

This point comes from Kant’s Critique of Practical Reason (Kant and Beck 1956). Humanists espouse the Kantian sense of dignity. Humans are sources of absolute value and hence: they must always be treated as ends in themselves, never as a means. Transhumanists have a completely different conception of dignity. They would argue that humans are self-interested like other animals, and hence valuable to themselves, but not intrinsically. Their conception of dignity is not bounded by a metaphysical framework. This point is one of great contention between humanists and transhumanists as we shall illustrate and explain further in the next section.

Category 3) The argument based on the good life (in the Aristotelian sense)
Core meaning: *The ethical choice consists of determining the kind of life we wish to live together as human beings* (Patenaude et al. 2011).

This is another contentious point between humanists and transhumanists who disagree over what the correct definition of the ‘good life’ is and how it best should be pursued. Humanists and transhumanists advocate conflicting visions of the ‘good life’ and these shall be explored in the following section as well.

*Category 4) The argument based on utility*

*Core Meaning:* ‘Act in such a way that your choices maximize positive consequences over negative consequences for the largest number of people.’

This is one of the main lines of argument taken in the NBIC/Human Enhancement literature. In fact, most authors consider this to be the dominant line of argument in the NBIC literature. Of course, when ethical acceptability is defined in terms of consequences, there are problems associated with the value judgment of consequences as ‘positive’ and ‘negative.’

*Category 5) The argument based on equity*

*Core Meaning:* ‘Act in such a way that people who are members of the same reference category are treated in the same way.’

There are concerns that NBIC technologies will widen economic and social disparities between nations and peoples. Many arguments explore this area of contention.

*Category 6) The argument based on autonomy*

*Core Meaning:* Act according to your individual choices.

This refers to the rights that rational individuals have to self-determination. Rational individuals should be autonomous, and rational beings will act according to the same moral law. From a Kantian perspective, freedom does not consist in being able to follow and satisfy one’s inclinations or desires. Kant, instead, advocates that freedom
consists in acting according to the moral law. In obeying the latter, humans exercise their power of rational self-determination, which is the true source of freedom. One is only free when acting according to the Moral Law, rather than self-interests. The Moral Law says act only according to the maxim of that which can be universalized.

Arguments between humanists and transhumanists diverge along this category and remain in an impasse, as we will see in the next section.

Category 7) The argument based on rights

Core Meaning: ‘Act according to your individual choices and within the limits of existing laws.’

What are rights/laws and where do they come from? When one invokes rights, these rights will be understood depending on the assumptions underpinning one’s worldview and this will be explored in the following section comparing Humanist to Transhumanist arguments. Civil rights are legislated for; natural rights are not legislated for. Whether there are any basic human rights and whether these are ultimately civil or natural depends on one’s perspective. A theistic perspective would say that God gave us the laws. Some types of naturalism would argue that we have natural rights. The difference between that which is natural and unnatural depends on the moral underpinning of the argument and what perspective it is coming from. We learn that we have natural rights to life, liberty, and the pursuit of happiness, but these terms are contested and the different standpoints rest on related but different moral frameworks.

3.10. Moral Underpinnings of the Ethical Argument Categories

These seven categories of ethical utterances are underpinned by five categories of moral understanding:

- **Stance 1: Nature and Metaphysical Human Nature (Transcendent)**
Arguments as to whether a particular technology or understanding of technology is or is not good are founded in a particular understanding of ‘nature’ and metaphysical ‘human nature.’ One’s understanding of the laws governing nature and human nature will guide actors’ use of certain arguments in the NBIC ethics discourse. Human membership in nature or in the human species is what makes it possible to demand compliance to transcendent (i.e. non-empirical) laws governing ‘nature’ and ‘human nature.’

- **Stance 2: Human Nature (a Priori Conditions for Moral Experience, Transcendental)**

This stance assumes the existence of an *a priori* set of moral laws that govern one’s pursuit of subjective and objective moral ends. This moral understanding underpins arguments of the Kantian type that aspire to maintain human dignity.

It is possible that practical questions, such as that of lying or the possibility of disposing of one’s own body as one wishes, will in fact find answers in the prescription to treat human beings as ends in themselves; but when it comes to other activities, in order to take the human being into account, we are obliged to establish a whole series of causal links among the various possible uses of nanotechnologies and the impacts of these uses on human beings (Patenaude *et al.* 2011).

For Kant, human beings are autonomous and have the ability to identify by themselves, without a transcendent authority, what these moral laws are. According to Kant, enlightenment is man’s emergence from his self-imposed tutelage. The human mind has a particular structure, but all humans can become enlightened and learn to obey the moral law. This capacity doesn’t depend upon any empirical characteristics. What is peculiar about the human capacity for autonomy is that it is our ability to be self-determined and it is not God-given. For Kant, human reason is not a limited version
of divine reason. It is different in kind from any hypothetical divine reason. Hence, we could not understand divine reason, supposing there were one. We have no evidence that there is a divine reason. Humans do not need God to bestow them morals; they can manage it on their own. Kant thinks that the mind imposes a structure on nature. Hence we can be masters of ourselves and have mastery over our natural inclinations.

- **Stance 3: The Good Life**

  Patenaude *et al.* remark that the foundations of the conception of the good life in NBIC ethics discourses are different than those that underpin an Aristotelian understanding of the good life. “What distinguishes an approach of this kind from Aristotle’s is the fact that the aim of ethics is not rooted in nature but is based rather on our human condition and the work of civilization (Patenaude *et al.* 2011).” Actors using arguments founded in a conception of the ‘good life’ aim to find points in the collective experience that could guide future choices. Of course, conflicting perspectives will often have mutually antagonistic assumptions that lead to impasses in the debate of the best ways to achieve the ‘good life’.

- **Stance 4: Value-Based Moral Evaluation**

  Utilitarian and Equity based moral arguments are founded in this stance.

  Utilitarian moral arguments used to evaluate NBIC differ from the moral theory of J.S. Mill or Jeremy Bentham (Patenaude *et al.* 2011) The utilitarian moral arguments advanced tend to reduce Utilitarianism to an ‘economic version of cost-benefit analysis.’ This is probably the most utilized moral/ethical argument both for and against NBIC technologies.

  Much like utilitarian arguments, equity based arguments find it impossible to accept something if it does not meet equity based criteria. Generally, this argument is brought to bear in discussions of ‘fair’ distribution of NBIC technologies’ positive and
negative consequences.

Both utilitarian and equity based approaches tend to require a case-by-case analysis of NBIC technologies. In this way, they attempt to be able to avoid making overarching ethical commentary and, instead, deal with the real world context of these technologies.

- **Stance 5: Moral Subjectivism**

  Unlike the other moral stances which ‘assume the existence of a dimension that transcends individuals and subsumes them, whether by means of natural law, or by the fact of membership in the human race, or in virtue of accumulated human experience through history and within institutions,’ moral subjectivism considers the subject to be the central moral authority (Patenaude et al. 2011).’ As it does not uphold some transcendent dimension guiding moral action, the only moral authority is the subject. The subject has absolute autonomy in moral evaluation and the only boundary is if the actions have a negative impact on others.

### 3.11. Understanding the Arguments

By analyzing the moral utterances in the NBIC ethics discourse from the perspective of moral epistemology and practical reason, Patenaude et al. found three different epistemological positions: the rationality of moral obligation, the rationality of a value-based evaluation and the absence of rationality. They also found irreducible conceptions of practical reason that pertain to each epistemological position. From this they identified seven categories of argument and the ‘mutually irreducible’ five moral stances that underlie them. They have made it ostensibly possible to facilitate a debate with fewer misunderstandings. One can better understand the semantics of human dignity when it is used in a Kantian vs. Libertarian sense. Patenaude et al. have
presented the different moral utterances that state the principles invoked and justification for those moral utterances’ moral authority as well as the practical reasoning that links them to a concrete situation. Patenaude et al. also concluded that the “argument based on autonomy only has moral implications when associated with the argument based on rights.” This clearly shows that place from where the multiplicity of arguments derives. Some of these arguments specify obligations to act or prohibit action (Nature, Human Nature, Dignity, the Good life) and others offer utility and equity as foundations for evaluation (Patenaude et al. 2011). As a final remark, they note that it is strange that these different stances cannot engage in meaningful dialogue with one another (they speak past one another). In the next section, we will explore this further.

3.12. The model applied to NBIC/Human Enhancement Ethics

Béland et al. then apply this taxonomy of arguments and moral stances to the NBIC/Human Enhancement Ethics debate. We wish here, to acquaint the reader with the debate in general between humanists and transhumanists such that they may better understand the ways that Critical Theory can contribute to an understanding of the NBIC ethics discourse. They begin by outlining two generally opposing viewpoints on NBIC/human enhancement: Transhumanism and Humanism. They then explore the type of arguments that are espoused by each side and where the argument reaches an impasse. In their opinion, this debate has failed to reach a meaningful outcome. They attribute this failure to a number of factors:

- The ambiguity that results from the fact that a single deployed argument (nature and human nature; dignity; the good life) can serve as the basis for both a positive and negative evaluation of the development of NBICs, because the core meaning of the argument’s moral utterance is not specified.

- The impossibility of providing these arguments with
foundations that will enable others to deem them acceptable.

- The difficulty of applying these arguments to a specific situation.

- The ineffectiveness of moral argument in a democratic society

(Béland et al. 2011).

3.12.1. The Ambiguity Based On Nature and Human Nature

The ambiguity in arguments surrounding the moral values of NBIC development for human enhancement is especially apparent in arguments based in nature, human nature, dignity and the ‘good life’. Regarding ambiguity in disputes between humanists and transhumanists that cite arguments founded in a particular conception of nature and human nature, Béland et al. note the following:

*Humanists* conceive of nature often, as coordinated in terms of a natural order. This natural order consists of laws and a particular set of purposes that can be appealed to as a criterion for distinguishing between the natural (acceptable) and unnatural (unacceptable) (cf. (Béland et al. 2011). They find the use of NBIC technologies to create human/machine cyborgs as a contradiction of the “divine and immutable order of nature (Béland et al. 2011).”

They consider human nature to be fundamentally fixed in the present and something that should only be allowed to vary within a certain range that is determined by this natural order. They fear that NBIC technologies will lead to genetic and enhancement inequalities in addition to already existing economic inequalities. Furthermore, the spread of NBIC technologies will accelerate due to the need to keep up with those that have been enhanced, thus limiting autonomy. Béland et al. point out that authors such as Fukuyama posit that human nature should be fixed in order to safeguard
democratic values such as equality and autonomy from the extremes of human plasticity as realized by the application of NBIC to human enhancement.

In a sense, transhumanists take a more Marxist approach to human nature. They consider the essence of being human to be man’s ability to change himself and form himself as he sees fit; man’s ability to overcome his limitations. For them, hybridizing humans and technology is a constitutive, essential element of human nature.

Appeals to nature and human nature, as used in moral arguments by transhumanists and humanists, lead to a dialogical impasse due to the fact that they use the same terms with different underlying assumptions as to their meanings. Until a meaningful philosophical discussion is held determining the precise meaning of these terms, thereby clarifying the ambiguity, the dialogical impasse will persist.

- Ambiguity of Arguments Justified On The Basis Of Dignity

Humanists and transhumanists often make moral arguments/prescriptions on

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17 Though they disagree in many ways, transhumanists, like Marxists believe in the essential plasticity of human nature. Marxists don’t believe human nature is fixed by biological factors alone, it is fixed by social factors and is therefore plastic. Marxists would say one must change society in order to change human beings and in order to improve the human condition. But Marxists are not alone in that belief.

18 Quoting from Béland: “John Stuart Mill in his critical essay entitled ‘Nature’ (published in the posthumous work Three Essays on Religion (Mill 1874)): “The word ‘nature’, says Mill, has two main senses: it denotes either the total system of things [both artificial and natural] and all their properties, or things the way they would be, absent all human intervention. The doctrine that recommends that human beings follow nature is absurd, because a human being cannot do otherwise. Under the second sense, the doctrine that recommends that human beings follow nature, that is, the spontaneous [natural] course of things, as a model for their own actions is irrational and immoral: irrational because every human action consists of changing the course of nature thus defined and every useful action consists of improving it; immoral because the course of things is full of events that are unanimously deemed to be odious when they result from the human will. The ambiguity of the terms ‘nature’ and ‘human nature’ creates a dialogical impasse in the debate between humanism and transhumanism because it reflects the existence of at least two contradictory justifications for maintaining that the moral utterance follows the laws of nature. So long as there is no philosophical discussion of the grounds for adopting one conception of nature over the other, the impasse will persist.”
the basis of dignity using three different core bases: a Kantian base, an autonomy base and a rights base. From an understanding of a Kantian type, one should “act in such a manner that you treat humanity, both in your own person, and in the person of any other, always the same time as an end and never simply as a means (Kant quoted in (Béland et al. 2011).” Both humanists and transhumanists consider the nature of humanity (within the person) to be an end in itself. Each side uses this argument in contradictory senses.

*Humanists* consider the hybridization of humans and technology to be an encroachment on autonomy in the Kantian sense. That is to say that this hybridization prevents humans from constituting themselves as ends. One is utilizing the technologies to enhance oneself as a means toward economic or social advancement. One must select what technologies to permit and forbid based on morally acceptable goals. In this way, it can be possible to not treat human beings as objects or means, but as ends. Technologies must be limited in as far as they make humans into means subordinated to economic, political and/or social ends.

*Transhumanists* consider technology and the free choice to evolve toward the hybridization of the human with technology to be a means toward the fulfillment of human desire and the liberation from finitude (biological limitations, death, disease, etc.). Their concept of dignity-autonomy is one without constraints, that a person can be “self-determining by virtue of their own nature (Béland et al. 2011, 298). Once again, the transhumanist argument has a Marxist tint to it. The difference is that whereas the transhumanist conception of dignity is one based in the ability of individual humans to reinvent themselves as they see fit, for Marxists, human dignity can only be collectively and socially realized. This entails the transformation of neoliberalist social relations as a result of a fundamental transformation in neoliberalist economic relations. For
transhumanists, this ability to individually create oneself would be considered the essence of being human and the right to this agency over one’s destiny (i.e. biological limitations) to be inviolable.

Where the humanists conceive of human dignity as constraint, transhumanists conceive of human dignity as empowerment. Hence, the differing concepts of dignity often serve as points of impasse in the dialogue between humanists and transhumanists. Clarifying which of the three meanings of the moral arguments listed above (Kantian, autonomy and rights) is being used helps to ameliorate the dialogical impasse related to the justification of adopting one moral argument or the other (Béland et al. 2011, 295-307).

- Ambiguity of Arguments Based On a Conception of the ‘Good Life’

Arguments of humanists and transhumanists based on the good life tend to be ambiguous because each invokes contradictory concepts of the good life. 

Humanists believe that an awareness and acceptance of finitude and death are integral to the realization of a ‘good life’. They consider that fantasies of achieving infinity and release from the finitude of human existence are forms of hubris that are ultimately destructive. They find that the advancement of NBIC technologies will lead to man’s destruction as he pursues limitless desires in order to transcend his finitude toward becoming an immortal cyborg. Humans as they currently exist would disappear. Dupuy makes a very eloquent argument in favor of the humanist perspective:

Man’s “symbolic health” lies in his ability to cope consciously and autonomously not only with the dangers of his milieu, but also with a series of profoundly intimate threats that all men face and always will face, namely pain, disease, and death. This ability is something that in traditional societies came to man from his culture, which allowed him to make sense of his mortal condition.

The sacred played a fundamental role in this. The modern world was born on the ruins of traditional symbolic systems, in which it could
see nothing but arbitrariness and irrationality. In its enterprise of
demystification, it did not understand the way these systems fixed
limits to the human condition while conferring meaning upon them.
When it replaced the sacred with reason and science, it not only lost
all sense of limits, it sacrificed the very capacity to make sense.
Medical expansion goes hand in hand with the myth according to
which the elimination of pain and disability and the indefinite deferral
of death are objectives both desirable and achievable thanks to the
indefinite development of the medical system and the progress of
technology. One cannot make sense of what one seeks only to
extirpate. If the naturally unavoidable finiteness of the human
condition is perceived as an alienation and not as a source of meaning,
do we not lose something infinitely precious in exchange for the
pursuit of a puerile dream (Dupuy 2007)?

But Transhumanists would ask on what basis does one (e.g. Dupuy) define
natural and unnatural limitations? Dupuy cites “pain, disease, and death” as ineradicable
features of the human condition. But science and technology have already radically
transformed our susceptibility to pain, disease, and death. How much pain, disease, and
death should we accept as unavoidable? Anesthetics, antibiotics, and life-saving medical
procedures have diminished our vulnerability to various debilities that were previously
considered to be unavoidable symptoms of human finitude. Is their further diminution
by future medical science also to be dismissed as a “puerile dream”? A caste system
such as existed in India for generations was considered a natural limitation on one’s
social and economic destiny. Several religious traditions also prohibit the use of certain
medical treatments (i.e. Jehovah’s Witnesses, Christian Scientists). Are social caste and
malaria natural or unnatural limitations on human flourishing? Dupuy would certainly
denounce both as unnecessary. But he does not provide a precise criterion that would
allow us to distinguish between those symptoms of human finitude that are necessary
and unavoidable and those that are unnecessary and avoidable. This comes back to the
debate on what constitutes a therapy and what constitutes enhancement. Transhumanists
argue for the abolishment of limitations imposed by biology and a progress toward the
infinite (infinite knowledge, intelligence, etc.). They consider the root of human unhappiness to be the perpetuation of a biological and human condition resembling that of our cavemen ancestors. They seek the attainment of happiness as coming from the elimination of suffering that comes from the ‘human biological condition.’

These two conceptions of the ‘good life’ are fundamentally irreconcilable and as in the above arguments, the dialogical impasse rests in the dialogical justification for the moral argument.

Béland et al. claim that from the insights above, it is clear that the dialogical impasses of the NBIC human enhancement ethics debate can be tracked down to the justifications for the moral arguments. One can see how the same concept can be applied in favor of and against the development of NBIC technologies for human enhancement purposes. Unfortunately, I am not aware of a discussion within the literature that compares the two perspectives (humanist/transhumanist) philosophically and objectively and arrives at a conclusion that one is somehow superior to the other.

3.12.2. Impossibility of Providing These Arguments with Foundations That Enable Others to Deem Them Acceptable

As a second point pursuant to those listed above, it is worth noting that the justifications for each of these arguments make it difficult if not impossible to make acceptable to those with opposing points of view. Below, we can see how this applies to each of the points below.

• Regarding Human Nature and Nature

What is important to keep in mind is that the basic assumptions of humanists and transhumanists regarding nature and the human condition make it nearly impossible to reconcile their viewpoints.
Fundamentally, the point of conflict for the understanding of human nature has to do with humanists’ assumptions being based in philosophically/religiously based laws of nature as opposed to the transhumanist assumptions which are based in a scientifically based understanding of the laws of nature. I have yet to find a source that is able to reconcile the epistemological questions of moral issues that are founded in this aspect of the debate.

- **Regarding Dignity**

As noted above, humanists espouse a Kantian conception of dignity (via the categorical imperative) whereby technologies that form humans into a means as opposed to ends should be banned and are inherently unacceptable.

To the best of my knowledge, there exists no critique of the Kantian transcendental analysis as used to critique the development of NBIC technologies. There is no text by transhumanists that explains why a libertarian conception of dignity and unlimited autonomy is superior to the Kantian transcendental analysis. To date, there is no real philosophical debate between humanists and transhumanists on the ‘rational foundations for the use of the idea of dignity in either sense’ (neither libertarian nor Kantian) (Béland *et al.* 2011).

- **Regarding the impossibility of providing a foundation for arguments based on an understanding of the ‘good life’**

There exists no debate that addresses whether a humanist sense of the ‘good life’ is somehow superior or inferior to the transhumanist conception of the ‘good life’. The crux of the argument at this point (the understanding of what constitutes the ‘good life’) is the relationship between the individual and his/her finitude. As explained above, humanists argue that man’s good life is that which is attained by accepting the finitude of his present human condition whereas transhumanists believe the good life can be
attained via the elimination of this finitude of the human condition.

While there is no grand debate that examines in depth which perspective is superior to the other, it is worth noting that at this junction there is a gross misunderstanding in the debate that mistakenly conflates ‘human nature’ with the ‘human condition’. Mistakes of this nature are a starting point from which one can start to examine the need for new ways of understanding the debate pertaining to NBIC and its human enhancement applications. It is here that one can begin to construct a segue that presents the case in favor of creating a critical theory of NBIC.

Human nature is impossible to define in a non-metaphysical way, though authors very often speak of human nature when they actually are describing the human condition.

The best explanation of this misunderstanding is made by Dupuy:

There is another major philosophical error, which mars the contributions to bioethics or nanoethics that I have read: they almost always confuse human nature and the human condition. They raise questions about the impact of technologies on human nature to which, as they probably know full well, no answer can be given, and this allows them to avoid raising the same questions with respect to the human condition… The problem no longer consists of knowing up to what point we may or may not transgress nature. The problem, rather, is that the very notion of transgression is at the point of losing all meaning. Human beings will no longer encounter anything other than a world that mirrors humanity’s own artificial creations (Dupuy 2007, 207)

This quote demonstrates the conflation in the NBIC discourse regarding the use of the terms ‘human nature’ and ‘human condition’. Béland et al. wonder how a transhumanist would give a sound philosophical rebuttal of the humanist understanding of the good life. Interestingly, the point made by Dupuy is illustrated by transhumanists

19 This is one of a number of flaws within the logical construction of arguments in the NBIC discourse. By beginning with these points of myopia in the discourse, we hope to then demonstrate to the reader the ways in which a critical theory of NBIC, specifically, would reduce myopias in the understanding and debate surrounding NBIC.
in their arguments. Where Dupuy remarks that in the future, humans will no longer encounter things that do not mirror humanity’s own creations, this will hold true of the post-humans present at that time, but transhumanists remark that it will be difficult to imagine what post-human rationality will appear like as they will have effectively banished many aspects of human finitude.

It does not appear possible to resolve the conflict between humanists and transhumanists as regards the ‘good life.’ There has been little attempt to reconcile the libertarian, technical rationality embraced by transhumanists with the metaphysical principles espoused by humanists. The justifications for each standpoint remain fundamentally incompatible, yet must, somehow, be accommodated for in order to understand the non-debate taking place. Though these justifications are indeed incompatible, there has been no debate on whether one perspective’s conception of morality, based on nature, dignity or the good life, is fundamentally superior to an opposing perspective. There is no debate concerning the rationality underlying these antagonistic perspectives and Béland et al. believe that this could serve as justification for seeing these conflicting moral perspectives as nothing more than beliefs that lie beyond the realm of rationality. This is the blackhole of the debate and it remains to be resolved.

3.12.3. Difficulties in Applying Arguments to a Specific Situation

Humanists and transhumanists disagree about how best to apply their moral arguments to specific situations. While both share the same concept of practical reason, they apply it in conflicting ways to the same situation. Humanists argue for a priori distinctions between ‘natural’ and ‘artificial’ (for arguments based on nature/human nature), ‘therapy’ and ‘enhancement’ (for arguments based on Kantian conceptions of
dignity), ‘desirable’ human limitations (to be accepted) and ‘undesirable’ human limitations (for arguments based on the good life). Transhumanists take issue with these distinctions. They would compare \textit{a priori} distinctions of this type to the distinction between a heap of sand versus a non-heap of sand. There is no point where one can say that $N$ grains of sand constitutes a heap whereas $N-1$ grains of sand constitutes a non-heap. Transhumanists find such \textit{a priori} distinctions to be very unclear and rather unhelpful. Where does one clearly differentiate between the human and the post-human? This is a difficult, if not impossible distinction to make. It would be unhelpful to discard the distinction between a heap and a non-heap of sand as this would conflate the two (heap and a non-heap) as indistinguishable. Though there may be disagreement regarding where the distinction should be made, there should be a distinction between the two one way or another. Transhumanists have no limits that would make useful \textit{a priori} distinctions such as those that humanists propose. Perhaps vague \textit{a priori} distinctions could be exchanged for more concrete, case-by-case application of moral arguments. This would strike a compromise between the two competing viewpoints.  

\textbf{3.12.4. Ineffectiveness of Moral Argument in a Democratic Society?}

We saw above Savulescu’s argument in favor of transhumanism. He cited the need for a Liberal Democratic state to remain value neutral with regard to conceptions of the good life, dignity, nature and human nature. He found that the state should leave citizens to exercise autonomy over their lives with the limit being that point at which one’s autonomy imposes on the autonomy of others. This is where the democratic concept of

\footnote{This would reduce the vagueness of making blanket, \textit{a priori}, generalizations about what constitutes, for example, ‘natural’ vs. ‘unnatural’ in a particular situation. Each technology could be analyzed in its specific, unique context. This could reduce the signal to noise ratio somewhat.}
rights comes into play. Savulescu’s point can be taken to eliminate the need for serious moral inquiry in a democratic society. If the state must remain value neutral, this can serve as a pretext for avoiding moral inquiry. One can deny theistic and other bases for argument and the democratic *modus operandi* does not necessarily tend to allow for value-based arguments. Thus, it can tend toward an analysis of NBIC from a perspective of moral subjectivism rather than some values-based framework. Additionally, democratic societies can tend to focus on the economic benefits of a particular technology and thereby confuse economic progress with an improved quality of life. This is often not the case and instead there is a tradeoff between the two (quality of life vs. economic development though as we have seen, proponents of the technology (government, industry, etc.) tend to ignore a deep examination of this tradeoff in favor of a focus on the economic benefits and a selective examination of certain NBIC applications. Béland et al. point out that the debate on the validity of moral arguments in a democratic society ‘revisits the basic assumption that positive law embodies the separation of law and morals (Béland et al. 2011).’

Having thus examined the perspectives above, it becomes possible to understand the moral and ethical debate surrounding the implementation of NBIC technologies. One can see the irreducible, fundamental, strains of argument in the debate and from that one can see the points of dialogical impasse between humanists and transhumanists. Having understood these points, we can now start to examine where there are myopias in the discourse and make value judgments regarding ways in

21 Though critical theory authors such as Herbert Marcuse would argue for the necessity for values based arguments (Marcuse 1991). That one can make value judgments means that one can state clearly what is ‘good’ and what is ‘bad’ for a society. The problem that this encounters is that this value judgment is often directed by economic rationality and interests. It becomes difficult to objectively define ‘good’ and ‘bad’.
which the discourse could be better conducted. Towards this end, we will employ some commentary from Jean Pierre Dupuy and several Critical Social Theory authors. Though not a Critical Theorist *per se*, some conceptual pitfalls that Dupuy has observed serve as a neat segue to the argument for the creation of a critical theory of NBIC.

3.13. ‘Pitfalls’ Inherent In the NBIC Ethics Discourse: The Perspective of Jean Pierre Dupuy

Among all of the literature cited for this work, one particular work by Jean Pierre Dupuy is particularly unique in its perspectives on the NBIC human enhancement ethics discourse. Dupuy enumerates a number of relevant points that make it clear that the NBIC ethics discourse is an oftentimes conceptually incoherent ethical discourse and that there are a number of unintentional philosophical contradictions that further complicate the erudition of the NBIC ethics discourse. Dupuy’s work serves as a helpful segue connecting the above points with the chapter below that introduces the ways in which a Critical Theory of NBIC would be helpful for understanding these emerging technologies. Critical Theory has a number of important tools for understanding technology in general, but the points introduced here by Dupuy can help contextualize several problematic points in the NBIC discourse. Dupuy’s points ‘set the stage’ for an introduction of Critical Theory in the following chapter.

Dupuy argues that nanoethics must focus on the grand questions of moral philosophy in order to avoid the ‘pitfalls’ of the ethical discourse as it currently stands (Dupuy 2007). He lists the following pitfalls as such: “the restriction of ethics to prudence understood as rational risk management; the reduction of ethics to cost/benefit analysis; the confusion of technique with technology and of human nature with the human condition.” These are deep flaws in the discussion of nanoethics as it currently stands.
Dupuy’s first point is very consequential and he compares this misunderstanding to a physicist that mistakes weight for mass. That ethics and prudence (prudence understood as rational risk management) should be confused so repeatedly in an ethical inquiry discourse is really quite surprising. Dupuy is right to call it misleading when such a discourse purports to be conducting an ‘ethical’ inquiry, yet contains such blatant misunderstandings.

Another major pitfall identified by Dupuy is the international political milieu in which these technologies are being developed. While there are risks such as those listed in above sections (health, privacy, environment, etc.) the chief risk according to Dupuy is that in the international system, it become incumbent upon a country to develop these technologies for fear that otherwise they may be left behind in a sort of economic and military NBIC arms race. These sort of existential conditions are not conducive to a critical inquiry on the development of NBIC technologies for human enhancement and other purposes. Economic and geopolitical strategic prudence take priority over critical ethics discourse in the international system as it now stands. In the next section, we will look at other ways in which the NBIC ethics debate is hamstrung by economic and political considerations.

According to Dupuy, economic rationality has infiltrated the ethics discourse in other subtle and insidious ways. In addition to the point above that the understanding of

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22 Dupuy illustrates the point with the shopkeeper example: “To illustrate the difference between ethics and mere prudence, Kant likes to use the example of two shopkeepers, both of whom behave honestly. The first deems it to be his duty to do so, out of respect for himself, for his customers, and for moral law. The second does so out of fear that if he started cheating his customers, he might be caught some day and lose both his reputation and his clientele. The first shopkeeper acts morally while the second is merely prudent. Yet the ways they behave, to the extent an external observer could describe them, are strictly indistinguishable (Dupuy 2007).”

23 This focus on the social and historical milieu is similar to an approach that would be advocated by a critical theorist.
ethics is limited to the analysis of risks, it is also noted by Dupuy that ethical questions tend to be evaluated within the conceptual framework of an economics-style cost-benefit analysis. He outlines this conceptual framework in the following way:

- A potential for damage exists, normatively qualified as negative;
- It is possible to assign a degree of likelihood to the occurrence of this damage, in the form of a probability.
- We are free to adopt, as a yardstick for assessing the damage, a system of individual or collective evaluations, for example the “preferences,” the satisfaction or utility functions of the population of individuals potentially affected by the damage.

When ethical problems are framed within this conceptual framework, in the same manner as economic risks are conceptualized, if one looks closely, there are a number of fallacies in examining ethical questions in this way. Namely, one speaks of “probabilities” when one is actually speaking of impossibilities. For example, when thought is given to the way that values will be conceptualized in the future, one cannot conceptualize these questions on the basis of probability. It is impossible to know how our values will be formed by the changes that will certainly be imposed by the adoption of new technologies.

In light of this, Dupuy deplores this reduction of the ontological to the epistemological. This is especially true in light of the reflexive relationship between values and the changes in these values that will be brought about by the adoption of these new technologies.

Thus it is impossible to predict the course that technology will actually take and the way it will be interpreted and understood (ethically and in terms of values) in the future. The need to account for these historical and social factors are some of the improvements to the NBIC ethical discourse that would be
accomplished by the creation of a critical theory of NBIC.
CHAPTER 4

TOWARDS A CRITICAL THEORY OF NBIC

“Does not the threat of an atomic catastrophe that could wipe out the human race also serve to protect the very forces which perpetuate this danger? The efforts to prevent such a catastrophe overshadow the search for its potential causes in contemporary industrial society. These causes remain unidentified, unexposed, unattacked by the public because they recede before the all too obvious threat from without-to the West from the East, to the East from the West. Equally obvious is the need for being prepared, for living on the brink, for facing the challenge. We submit to the peaceful production of the means of destruction, to the perfection of waste, to being educated for a defense which deforms the defenders and that which they defend” (Marcuse 1991).

4.1. Introduction to Critical Social Theory and Its Relevance to NBIC

If one adopts the perspective of Critical Theory on this debate, then ‘NBIC ethics’ is somewhat of a nonstarter. The real question to be pondered is a political one. Critical theory illuminates an understanding of NBIC and the discourse surrounding it.

Above, a framework for understanding the ethical discourse has been presented. From this outline, one can comprehend the dynamics of the NBIC ethics discourse and the way these technologies are understood by academics, government and industry actors. From this starting point we can begin to consider ways in which Critical Theory can be applied to better conceptualize the challenges of NBIC technologies.

With an understanding of the terms being used (as presented by Béland et al.), and an in-depth understanding of the dialogical impasses, one can see where the two sides talk past one another.

As Dupuy demonstrated, there is somewhat of a false clarity in the NBIC human enhancement ethics discourse. Basic terms are not applied equally between
authors (e.g. “human condition”, etc.) and these lead to a misunderstanding of the topic of discussion, even if the misunderstanding is not openly acknowledged by those conducting the discourse. A critical theory of NBIC would go farther than simply to eradicate misunderstandings of this nature. It would bring to light a number of hidden factors that affect the discourse significantly by illuminating an understanding of the subject and object of enquiry. It would be purposive and bring political questions to the surface, which are largely not discussed by academics, government and industry.

Though critical theory’s perspectives on technology are not prominent in the discussion of NBIC, they are highly relevant. Below, we will begin by introducing the social science inquiry parameters of Critical Social Theory, its goals, methods, etc. This will be applied to NBIC technologies and the ethical discourse specifically. Hopefully, it will be possible to convince the reader of the validity of applying a critical theory perspective toward a better understanding of NBIC technologies in general and the ethical discourse specifically.

4.2. Critical Social Theory

A critical theory of NBIC would theorize the subject (academic and government/industry sources) and object (NBIC technologies) of the NBIC discourse in a fresh way. It would reconceptualize and revitalize the understanding of the object and subject by considering the following: a) the societal context in which the technologies are developed, b) unconscious underpinnings of perspectives in the NBIC discourse (ideologies and false consciousness: positivism, neoliberalism, etc.) and c) instrumental reason (subjective rationality). Not only would it form an inquiry into these topics, it would do so purposively, with an intent to root out and remove underlying themes of oppression, exploitation, injustice, etc. inherent in the subjects and objects of the
discourse.

The field of critical theory is massive and encompasses a large body of literature from many generations of authors. For this reason, two authoritative definitions are cited here to illustrate the idea of a critical theory. An excellent, concise, definition of critical theory and its objectives is put forth by Bentz and Shapiro:

Critical social science and critical social theory (we will use these two terms almost interchangeably) attempt to understand, analyze, criticize, and alter social, economic, cultural, technological and psychological structures and phenomena that have features of oppression, domination, exploitation, injustice and misery. They do so with a view to changing or eliminating these structures and phenomena and expanding the scope of freedom, justice and happiness. The assumption is that this knowledge will be used in processes of social change by people to whom understanding their situation is crucial in changing it. The structures and phenomena themselves investigated can be at any level or order of magnitude from the structure of the global economy, such as an economic system that produces economic inequality or environmental destruction, to the psyche of the individual person, such as the authoritarian personality (Bentz and Shapiro 1998).

Another excellent definition of the goal of a critical theory is given by Raymond Geuss. Raymond Geuss lists the purposes of Critical Theories as the following:

- They are aimed at producing enlightenment in the agents who hold them, i.e. at enabling those agents to determine what their true interests are.

  They are inherently emancipatory, i.e. they free agents from a lid of coercion, which is at least partly self-imposed, from self-frustration of conscious human action.

- Critical theories have cognitive content, i.e. they are forms of knowledge.

- Critical theories differ epistemologically in essential ways from theories of the natural sciences. Theories in natural science are ‘objectifying’ critical theories are ‘reflective.’ Critical theory, then, is a reflective theory, which gives agents a kind of knowledge inherently productive of enlightenment and emancipation (Geuss 1981, 2).
The early goal of Critical theory was to use philosophy to open up new avenues and objects of investigation. It was desired that this way of thinking would provide more than simply a descriptive interpretation of societal phenomena; rather it was purposive and aimed to “inform political action aimed at emancipation (or at least diminishing domination and inequality) (Rush 2004, 9).” Given the effects that NBIC technologies will have on economic relations (between individuals and states) and the material and ideological realms, a critical theory approach is highly appropriate to more fully understanding NBIC technologies in general and the NBIC ethics discourse more specifically.

Presently, the NBIC ethics discourse and technology development is happening on three levels:

- There is an academic, ivory tower, dialogue between transhumanists and humanists (e.g. Bostrom, Habermas, etc.).
- Government and industry sources produce publications that are purportedly objective and not value laden (e.g. Bond 2004; Academy of Medical Sciences, British Academy, Royal Academy of Engineering, The Royal Society 2012; Authoring Committee 2013).
- The individual funders and decision makers in government and industry who often appear to be aloof to the other two levels of discourse. This aloofness was made evident in the work of Singer quoted above in section 2.5 (Singer 2011).

While there is some degree of intersection between the first two levels, it appears that there is a disconnect between the first two levels and the third. One examines the structure of the NBIC ethics discourse as explained above, but one cannot help but recall that the ethical question presupposes a political question: Where does the real power over the destiny of NBIC technology development and implementation lie
and how does one influence this power? As previously stated, it lies with the captains of industry and their partners in various first world governments. That a small group of individuals would control resources that affect the whole of society indicts the development and regulation of NBIC technologies as irrational to begin with.

Critical theory’s main goal lies in using social understanding to transform society’s consciousness of itself and thereby eventually achieve human liberation from oppressive social systems.

4.3. Critical Theory and an Understanding of the Object in Social Science Research

From a critical theory perspective, there are many aspects involved in developing an understanding of the object. The outline below presents roughly the way in which critical theory conceptualizes the ‘object’ of a social inquiry.

4.3.1. Systems Thinking

One must consider the ways in which the larger social system manifests itself through individual phenomena as well as what the phenomena add to the system. Understanding this reflexive relationship enriches our understanding of the phenomena and the system too. Critical theory would argue that when one tries to abstract parts from their context (abstract parts from the whole) a great deal of understanding of the object will be lost. For critical social theory, the whole is greater than the sum of its parts. Implicit in this idea is a critique of positivistic reasoning, which posits that the whole is no more than the sum of the parts, that individual phenomena can be understood independently of their context (the whole).
4.3.2. Historical Specificity

Critical theory would emphasize that one should understand the historical context in which NBIC technologies are developed. The historical period in which the development of NBIC technologies is taking place is the end of the 20th century and the beginning of the 21st century. Knowledge production in both the physical sciences and the social sciences comes from a long tradition of positivistic, empiricist philosophical underpinnings founded in the principles of the Enlightenment. This deeply influences the different actors (industry, government, academia, funders, etc.) involved in development as explained above in the sections 3.1 and 4.2. NBIC technologies are the latest in a long line of technological developments that have occurred in the same fashion as those experimentally developed in the past (refer to the explanation of experimental military technologies given by Parasidis). Nuclear technology and other previous controversial technologies have developed in similar manners as the NBIC technologies are developing currently. Research is conducted by collaboration between academic, government and industrial institutions. An academic discourse debates the ethical challenges to society much as before and the power brokers over the technology (i.e. funders in government and private industry) remain largely aloof (in relation to substantive success in regulating and limiting the technologies) from this academic discourse.

4.3.3. Internal Contradictions

Critical theory tends to point out internal contradictions in a phenomenon by developing the idea of “dialectic” in the sense meant by Hegel and Marx (Bentz and Shapiro 1998). An example given by Bentz and Shapiro as a paradigm of this internal contradiction, is that of Marx’s analysis of capitalism. Marx pointed out that as owners
of the means of production reduce costs by reducing the amount of money that they pay
their workers (in order to increase profits), the effective demand for goods will decline
as the workers, who make up a large part of the market, have less money to spend.
Ultimately, this means lower profits for the neoliberal owners of the means of
production. A similar internal contradiction exists in the development and
implementation of emerging technologies. These technologies are developed
supposedly for the benefit of the whole of society, though the material benefits tend to
be concentrated into the hands of a few, while many of the liabilities of these
technologies are spread upon the whole of society.

4.3.4. Immanent Critique and the Critique of Ideology

Critical theory aims to point out discrepancies between the official story
(“ideology”) and reality as it actually is. Immanent critique and a critique of ideology
are both methods that are applied toward this end. By judging an ideology on its own
terms and standards, one can see whether it lives up to its own standards or not. By
evaluating the phenomenon in this manner, one can see whether or not the standards of
the phenomenon work to serve the interests of a particular group and its position in
society. Examining NBIC technologies and the discourse surrounding them, from this
perspective, reveals a lot about the interests of those involved. The various perspectives
have their particular biases, what is probably most meaningful at this juncture is that the
final decision makers rationalized their standpoint in terms of economic and quality of
life benefits, yet they are the major economic beneficiaries, not the masses whose
interests they claim to represent.

Critical Theory, in pursuit of its stated goals (stated above by Bentz and
Shapiro and Geuss), intends to give humanity tools for its own enlightenment and
emancipation, to relieve it from the self-delusory, false consciousness of ‘pejorative ideology’ (Geuss 1981, 12). Geuss gives three ways that a ideological form of consciousness (e.g. Neoliberalism, Instrumental Rationality, Positivism, etc.) can be ideologically false:

- a form of consciousness is ideologically false in virtue of some epistemic properties of the beliefs which are its constituents;
- a form of consciousness is ideologically false in virtue of its functional properties;
- a form of consciousness is ideologically false in virtue of some of its genetic properties (Geuss 1981, 12).

In this manner, Critical Theorists critique instrumental reason and neoliberalism as being ideologically false (by the standards of a genuinely enlightened objective reason, which sees human emancipation and cultural progress as indissociable). It this connection that instrumental rationality, as co-opted by neoliberal ideology, has completely obscured.

Habermas regularly speaks of an ideology as a world-picture’ which stabilizes or Legitimizes domination or hegemony (herrschaft). It is in virtue of the fact that it supports or, justifies reprehensible social institutions, unjust social practices, relations of exploitation, hegemony, or domination that a form of consciousness is an ideology… So the term ‘ideology’ is used in a pejorative sense to criticize a form of consciousness because it incorporates beliefs, which are false, or because it functions in a reprehensible way, or because it has a tainted origin. (Geuss 1981, 15 and 21).

Critical Theory intends to liberate humanity from ideologies of this nature by making it aware of the false consciousness into which it has bought. This frees humanity from a normative ‘herrschaft’ (hegemony) that has been applied (partially by the agent itself) to its prior to the advent of the Critical Theory. Critical Theories of society will specify how agents should alter their beliefs in order to “attain their ideal of a rational, satisfying existence (Geuss 1981, 63). It is in this manner that Critical Theory propagates a particular political agenda. Critical theory remains purposive in
this sense.

Summary:

I find none of the above points to be entirely independent of one another. There is a significant amount of overlap between them, while each one somewhat maintains a singular viewpoint. While these points above will give insight into the object, in a critical social theory system of inquiry, this is not sufficient to understand the phenomena at hand. One must also understand the subject that is conducting the inquiry as well. By understanding the researcher conducting the work, for the same reasons that one wishes to study and understand the object, one comes closer to changing the consciousness of society with a purposive aim toward liberation.

4.4. Critical Theory and Understanding the Subject in Social Science Research

4.4.1. Insider Status

Contrary to the approach that positivism would take toward its object (claiming objective neutrality, abstracting the phenomena studied from their context), critical theorists accept that they are part of the social reality which they study. It is impossible to separate oneself from the norms and values of the social-historical period in which one resides. Natural science is not value neutral, nor is its pertaining discourses value neutral. The NBIC ethics/human enhancement discourse is not separated from the neoliberal ideology that permeates the fabric of society and this is reflected in the kind of ideas that gain consideration as well as the rationalizations put forth for the development of the emerging technologies (NBIC in this case).

4.4.2. Engagement

The subject conducting the research is an engaged member of the society it is
studying. Cognition is a social act and knowledge produced tends to be purposive and is never socially neutral, it generally tends to have a purpose (healing, increasing productivity, social reform, etc.). Knowledge is partisan. A researcher must be fully aware of their own partisanship in the creation of knowledge and balance their knowledge output accordingly. Throughout the NBIC ethical discourse, there is a great deal of partisanship that poses as objective and not value-laden.

Partisanship will be nearly impossible to eradicate from a knowledge production discourse. What is intended in this case is to prevent oneself from pursuing needs and interests that benefit a minority, while claiming to benefit the whole of society. This contributes to the creation of a false consciousness as explained above.

4.4.3. Cultural Specificity

The cultural, ethnic, class, gender, etc. of the researcher have an effect on the work they carry out. Different groups analyze the topic from different starting points, with different incentives to promote their particular perspective.

4.4.4. Historical Specificity

Critical theorists would say it is impossible to separate the subject from their historical roots. Their place in history will have a fundamental impact on the way they develop and espouse their particular perspective.

The researcher, by reflecting on their status as an engaged, culturally and historically specific insider, can better critically understand their role in the production of knowledge. The phenomena under scrutiny are generally systemic (in the sense meant above), historically specific, internally contradictory and affected by ideology. With these points in mind, one can critically reflect on the object and subject of
knowledge production and purposively criticize one’s own epistemological and social assumptions. One can unveil and challenge the social structures of power and domination.

4.5. Critical Theory Applied to NBIC

Above, we have reflected briefly on the main aspects of a critical theory approach to understanding the object and subject of social inquiry research. We have also explained the end goals of critical theory, namely liberating actors from oppression by helping them to fully understand their situation and their true interests. At this juncture, an attempt will be made to link and combine the different facets of critical theory explained above toward better understanding NBIC technologies and their human enhancement applications. These components of critical theory listed above will also be applied to NBIC’s associated ethics discourse. This will require illustrating the interrelated nature of Enlightenment thought, context, positivism, instrumental rationality, neoliberalism and false consciousness in understanding the NBIC ethics discourse. A critical theory of NBIC is not being applied here, rather, I am simply explaining why a critical theory of NBIC would provide tools to understand the development, implementation and discourse of NBIC.

Toward this end, one could begin by explaining some relevant aspects of the Enlightenment: positivism, instrumental reason and neoliberalism as a starting point. If one can understand the process and effects of Enlightenment thinking in producing positivism, instrumental rationality, and from there shaping neoliberalism, then one can begin to understand how neoliberalism shapes our dispositions (both conscious and unconscious), cognitive processes and the general understanding of NBIC technologies by government, industry and academia. In this way, one can begin to better unravel the
motivations and processes underlying the framing of the NBIC debate. In the next section, this line of reasoning will be explained.

4.6. The Social Context

How can a critique of the implementation of Enlightenment ideals, positivism, instrumental reason and ideology be applied to NBIC technologies and their associated human enhancement ethics discourse? This critique would begin by understanding the social context. In the case of NBIC technologies and their applications for human enhancement, we would be entreated to consider several aspects of the system in which development and implementation of these technologies as well as the ethical dialogue about the topic is taking place. Abstracting NBIC technologies from the systemic context in which they exist limits one’s understanding of the topic. The system at hand would be advanced industrial society that operates under the framework of neoliberalism, with positivism as a dominant form of knowledge production. The effects of the context make themself manifest in the dialogue surrounding the NBIC ethics discourse in a variety of ways. Namely, discussion tends to focus on the symptoms of NBIC development rather than the causes of the particular course that NBIC development will take. The very idea of a NBIC ethics discourse presumes it is possible to discuss this topic without a theory of the whole. By confining the debate to nanoethics, the kinds of questions that are asked are confined to a particular subject matter (ethics/morals) and avoid other substantive questions of a political nature. The discussion is bounded and not likely to pose the correct question, frame the problem in a complete way and therefore will propose incomplete solutions.

4.7. The Enlightenment
NBIC technologies are among the latest products in a long line of scientific and technological innovations that have, in large part, come about as a result of the philosophical movement of the Enlightenment. A deep faith in the power of reason to expel superstition and shed light on the Truth has been instrumental in shaping the consciousness of society. Within this philosophical mindset, the dominant mode of knowledge production (in both the natural sciences and social sciences) has become Logical Positivism. While this has done much to liberate humanity from the shackles of superstition, there is much that is dialectically ambiguous in the way that this type of Enlightenment thought has been applied and implemented in society. It is necessary here to explore these aspects of the Enlightenment project.

In their most well-known work, *Dialectic of Enlightenment*, Horkheimer and Adorno focus on the alienation that has resulted from the misapplication of the Enlightenment project upon society (or as Bronner would argue the reaction of counter-Enlightenment forces to the true implementation of the Enlightenment project (Bronner 2006). They believe that humans are alienated from nature by the structure of labor in both neoliberal and fascist society (i.e. advanced industrial society). *Dialectic of Enlightenment* portrays human beings as having been ‘alienated’ from the natural world and that something is badly amiss in the order of the world. Roberts puts the point as follows:

Human Beings are doing violence to Nature and ultimately to themselves. Workers spend their lives trapped in occupations they hate, creating products nobody needs and which destroy the environment they live in, engaged in futile and enervating conflicts with their families, their neighbors, other social groups, and nations. They are enslaved in orders of work and mindless hierarchies that prevent them from ever fulfilling themselves or pursuing their own ideas and creativity. They are torn out the beauty of the countryside and cut off from the inspirations of culture and art. Human value is reduced to the values of the market place: you are what you earn. The supposed "liberation" represented by the modern epoch boils down to
a change from one kind of slavery (being owned by the feudal lord) to another (being enslaved to the need to earn a wage) (Roberts 2004, 60).

Implicit in the critique of neoliberalism is a critique of positivism, instrumental rationality and other aspects of Enlightenment thinking that have led to this societal outcome. The Enlightenment project is the base upon which modern science, instrumental reason/neoliberalism and modern consciousness is constructed. The drive to demystify the world, to give rational autonomy to individuals did not progress without negative side effects. In fact, in many ways, it was misapplied and led to the social/political application of instrumental reason (the domination of subjective reason over objective reason), totalitarian outcomes such as Fascism and the variety of negative outcomes of neoliberalism. This, in turn, deprived individuals of their self-determination, commoditized workers lives and reduced purportedly objective pursuits such as the sciences to the value of the market and making them further subject to instrumental reason.

It is not intended here to categorically deny the Enlightenment project or the validity of reason. Habermas is critical of the monolithic critique of reason and the Enlightenment that is posited by Adorno and Horkheimer’s *Dialectic of Enlightenment*. He correctly points out that one cannot abandon the ideals of the Enlightenment and still hold to the idea of emancipatory politics (Whitebook 1979, 41-69). Other works in the same vein, such as that by Bronner, attempt to show that it was not Enlightenment ideals *per se* that were the cause of phenomena such as Fascism, rather it was the misapplication of Enlightenment ideals by counter-Enlightenment forces (those whose socio-economic position was threatened by the Enlightenment ideals) (Bronner 2006).

4.8. Positivism and Holism: Whether to Incorporate Context

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Where positivism poses that the whole is the sum of its parts, Critical Social Theory disagrees. In order to understand one’s own experience, one must understand society as a whole. This relates back to critical theory’s emphasis on the importance of context for understanding social phenomena. From the synoptic perspective, one can begin to fully understand the discreet phenomena that occur within the whole. For this reason, there is a declared need for a theory of society. Prolific science authors such as Nick Bostrom do not tend to theorize society. They hold more of a Positivist/Empiricist view that society is no more than the sum of the parts. Marcuse maintains that the discreet events of a system can only be correctly comprehended when considered as aspects of a synoptic essence (Rush 2004, 28). If one understands these discreet phenomena (in the way that positivism does) as independent of the essential totality to which they belong (the society, neoliberalism, etc.), one will lose part of the meaning of the discreet phenomenon (Rush 2004, 28). Only if one accounts for the essential totality can one understand the actions of the parts thereof. Marcuse does allow that it is difficult for the agents within the system to reflect on the totality of which they are a part. Nevertheless, Marcuse is a strong believer that imagination is essential to the Critical Project. It permits one to envision a better future, as well as what is possible and desirable in that future, and avoid falling into a transfigurative despair (Rush 2004, 30).

4.9. Neoliberalism in Advanced Industrial Society

The system of incentives (neoliberalism couched in advanced industrial society) in which these technologies are developed is among the factors with the greatest influence on their development, yet there is a near-silence in the discourse regarding a critique on the influence of neoliberalism in the development of NBIC and its application human enhancement. As Dupuy points out, an economic rationality of
costs and benefits permeates the ethical discourse. In addition, one does well to ask why such a discourse should be limited to a discussion of ethics and rational risk analysis when the greater problems, arguably, are political in nature. Most actors in the NBIC discourse (Government, industry, academic) treat society as if it spontaneously arose naturally and did not need to be explored or explained. This leads into the next aspect of critical theory’s understanding of the object: the historical specificity of NBIC and its ethics discourse as they exist in their social context.

As stated above, Enlightenment thought and thereby positivism, neoliberalism and instrumental rationality are among the greatest influences on the creation of NBIC and its subsequent ethics discourse. The normative elements of neoliberal society have generally not been brought about naturally; rather, they have been the result of historical development. Concepts such as private property, wage labor, etc. are not incidental results of history. They were created through social and historical processes and they play a major role in the structuring of society. Until one is able to better or completely understand the role that they play in structuring society (e.g. in structuring the whole), one struggles to fully understand the parts of that society (the whole). Many authors such as Bostrom will speak about what is desirable and undesirable, but neglect to fully investigate for whom and under what conditions. Most of these authors do not take into account the abstract social relation of neoliberalism and its effect in forming the development and implementation of NBIC and its ethics discourse.

4.10. Internal Contradictions

Internal contradictions are apparent in the NBIC discourse too. Some perspectives (government, industry, transhumanists) in the NBIC discourse will argue that human enhancements will give individuals new levels of freedom over their innate
condition, that humans will thereby be liberated from their limitations. The contradiction inherent in this perspective becomes apparent as technologies become limiting in the sense that one is almost required to adopt the new human enhancements to compete in the neoliberal marketplace. Transhumanists debate on the level of the individual. The effects upon the whole by the acts of individuals may not be rational. It may actually diminish individual liberty and freedoms. In this way, a liberating technology becomes enslaving for those whom it was intended to liberate, largely due to the ideological milieu in which the technologies are developed (neoliberal milieu).

Weapons and military technologies have similar outcomes for actors on the international arena. As Dupuy pointed out, the cycle of development will inevitably lead to an arms-race pace of development between the competing national powers. Those that do not develop the technologies will be at the mercy of those who command such powers. Though the emancipatory aspects of the new technologies are emphasized to gain funding for development and later to sell the development, one can well question how emancipatory the technologies are if their development leads to new forms of oppression (e.g. imposing human enhancement indirectly, panoptic surveillance, etc.) to new and dangerous forms of war (e.g. military robots capable of making kill decisions without human input). One may question (as asked by many Marxists) why there is such a focus on individual human enhancement and so little focus on collective social enhancement (i.e. global redistribution of wealth, etc.).

This is also not to imply that instrumental rationality is essentially bad. The critique of instrumental rationality by critical theorists is a critique of the one sided nature of instrumental rationality as it finds itself applied as a means to achieving ends. Instrumental rationality is founded in subjective reason, which is the “method-mean rationality of achieving ends, but it is not responsible for rationality of these ends
themselves” (Landmann 1976, 187, cited in Piran 1977, 19-28). The complement to subjective reason is “objective reason” which concerns itself with the quality of the ends.

Great philosophical systems, such as those of Plato and Aristotle, Scholasticism and German idealism were founded on an objective theory of reason. It is aimed at evolving a comprehensive system, or hierarchy, of all beings, including man and his aims. The degree of reasonableness of man’s life could be determined according to its harmony with this totality. Its objective structure, and not just man and his purposes, was to be the measuring rod for individual thoughts and actions (Adorno and Horkheimer 1972, 4 cited in Piran 1977).

Critical theorists have argued that, over time, subjective reason has come to completely dominate objective reason. Where man’s work used to seek to emancipate man from the vicissitudes of nature, his project now is simply mastery over nature and man. Marcuse argues that this has grave implications for the emancipation of man. This domination of subjective reason results in an inability of man to understand himself fully. In the present regime, reason becomes “no longer a means of criticizing domination and its legitimizing bases. It is unable to go beyond the existing social constraints in order to observe the present against a possible future” (Piran 1977, 23). Science and technology have granted man an expanded capacity for rationality. Nevertheless, these capacities for rationality are annulled by the irrational political systems that prevent man from being liberated from an irrational work system. Rather than emancipating man from an irrational work system, these technologies are used to create false needs and incite great desire for the fulfillment of these needs, thereby further deepening the irrationality of the system (Piran 1977, 24). NBIC technologies will increase the rationality of parts of the system to the detriment of the rationality of the whole. While transhumanists argue for the enhancement of individuals toward eliminating their finitude, they do not reflect on the consequences inflicted upon the
whole by pursuing such actions. Minor changes will not suffice: what Marcuse calls for is a revolutionary change in the system in order to produce a rational outcome for the whole. A synthesis of objective reason and subjective reason has the possibility to create the revolutionary change necessary to improve the system.

4.11. The Crisis of Regulating Technology

What are we to do with NBIC? First, one must properly define who ‘we’ is. Who is the ‘we’ that decides how to use NBIC? How are ‘we’ going to use the technology? The points made by Singer in section 2.5 clearly demonstrate that industry is apathetic to the ethical implications of NBIC technologies. Government pays lip service to a number of ethical concerns, yet generally tends to frame NBIC in rosy terms, citing benefits to the economy and quality of life. Academics (humanists and transhumanists) debate the ethical semantics of NBIC and its applications in human enhancement, but the decisions about the technology, its applications, etc. are driven by commercial, corporate, military, etc. interests. In light of the examples given in the section above (2.7), including nuclear technology, it becomes difficult to argue with technological determinists, who believe there is no way to effectively regulate or prevent certain technology applications.

Even the regulation of the introduction of new artifacts into the environment (i.e. fragrances in cosmetics, etc.) is deeply flawed (Robison 2011). Toxic artifacts are ubiquitous in the environment and, though their effects may be well known (or, on the contrary, extremely difficult to quantify and qualify), it may be nearly impossible to implement regulation that would successfully regulate them. These include toxins present in plastics that are now being found to increase autoimmune response, leading to increased instances of allergy, asthma and various other autoimmune disorders in the
population. As these toxins are fat soluble, they will remain in the population for the foreseeable future. What will become of the new nano artifacts that will be created for various uses in the future?

Be confining the debate to ethics, it is possible to prevent a discussion of the politics of NBIC. The political question is: who owns or controls the technology and how it is used? To what extent can a nanoethics debate actually effect how those who own the technology actually utilize it? In the case of NBIC, it will clearly be used for military and commercial purposes (i.e. profitable purposes as defined by a neoliberalist logic). This point also draws one to examine previous nefarious technologies and the alienated relationship between those that created the technology and those that control the technology. Neoliberalism is a system of relations between those that labor and those that own their work. Scientists are alienated from the NBIC technologies they produce. The end of alienation would be where one can control the products of one’s labor. This is not possible in the present neoliberal relation wherein those that create the technology ultimately have no say about how the technology is put to use by end-users.

The point is not to reject science outright. The point of critique of these topics is to elucidate what the choices are in this scenario. That is to say that we need to know what this technology is capable of and how it ought to be used before letting it be controlled by vested commercial interests. As demonstrated above, ideology tends to shroud the full range of choices that are available to us in dealing with technology. While this technology can be extremely helpful in ameliorating health problems and other such positive uses, it can also aggravate exploitation. It can be capitalized upon in the same way that advertisers have capitalized upon the insights of psychoanalysis except that this is a directly invasive technology: no need for advertising if you can
directly manipulate people’s brains and bodies. The leading investors in technosciences that converge at the nanoscale are military related and private industrial interests. This will lead to the production of a certain kind of technoscience that is not democratic in the sense meant by Feenberg (2010).

In the final analysis, one can consider the strategic implications of NBIC technologies and their various applications, including human enhancement, to be akin to the strategic implications of control over petroleum resources. When Churchill oversaw the transition of the British Navy over from coal powered to an oil powered force, the British Navy consolidated its mastery over the seas. As access to oil became the deciding factor in determining a nation’s military strength in the first decades of the 20th century, oil was the key to geopolitical mastery. In the 21st century, the key to geopolitical mastery will be a nation’s access and ownership of emerging technologies such as those technologies at the nano-scale in Neuro science, Biotechnology, Information Technology and Cognitive science (NBIC) explained above. A silent arms race is underway between the great powers to develop new capabilities as rapidly as possible, granting the victor primacy in these new forms of warfare, espionage, medicine, etc. NBIC technologies at the nanoscale will be major tools of geopolitical mastery in the foreseeable future. These will be new tools for the exercise of power in the international system.

The crisis in 2008 forced people to talk about neoliberalism as a system. One cannot pretend that it does not exist or that the neoliberal economy does not determine social relationships. A number of public military research projects such as those carried out at the US Army Research Labs (Micro Autonomous Systems and Technology) show the collaborative effort of the military, industry and universities in working towards creating controversial technologies (US Army 2013). At what point will the universities
have such a strong economic interest that dissent will cease to arise even within academia? With these collaborations, many techniques will be developed, but who will dictate the kind of technologies to which these techniques will be applied? As we noted in the section on NBIC use in the military (section 2.5), funders in the military and industry do not necessarily pay much attention to questions of this nature, in spite of the magnitude of their importance. It is not clear that parliamentary democracy is capable of preventing neoliberalists from doing whatever they please. In the USA especially (the leader in these technologies), lobbying groups are able to exert their will (in a manner akin to the Gilded Age) upon the public office holders:

In the technological determinist view, emerging technologies will materialize anyhow, independent of what people think, deliberate or decide. The problem of how to act under conditions of ignorance is thus ‘solved’ by denying human agency. Technological determinism might be justified by appealing to a transcendent technological reason, unfolding/materializing itself like a Hegelian idea. Actually, transcendent reason tends to be replaced by immanent strategic games, an equally unyielding, superhuman international competition: if we don’t do it, our competitors will, so the new technology will happen anyway. Human agency is not completely denied, but delegated to the strategic games that actors continue to play, and depend on (Swierstra and Rip 2007).

I am torn between agreeing with technological determinists and vigorously disagreeing with them. Dupuy pointed out that technologies such as nuclear technologies (and NBIC) can only develop in a system that has a whole crew of bureaucrats working tirelessly to hide the true implications of their work using dissimulation and lies. The sections above spoke about the dark history of experimental research in the military and the inability of high-level politicians and scientists to affect the implementation of nuclear weapons in a meaningful way. As they explain the situation, human actors will have no real agency over the application of the technologies described here.
I agree that there is limited ability of academics and civilians to exercise agency over the way in which technologies are developed and deployed, but I disapprove of the sort of transfigurative despair to which a perspective of technological determinism can lead. It is not helpful to assume that humans have absolutely no agency over the development of technology. Dupuy mentions a Talmudic story in which the prophet Jeremiah created a golem that could speak. Immediately, the golem asks Jeremiah if Jeremiah is aware of the confusion he will have created. Namely, people will no longer know if a person they see walking in the street is a creation of God or a creation of Jeremiah. When Jeremiah asks how he might remedy the situation, the golem replies that he must unmake him in the same way that he made him. The moral of the story is not that we should renounce the search for perfect knowledge, but rather that, upon achieving the perfect knowledge, “we should abstain from acting upon it (Dupuy 2007).” I agree, but I retain my doubts that the lowest common denominator of man would not act upon a particular inclination if he had the ability to do so within his power.
CHAPTER 5
A PATH FOR THE FUTURE

This work has presented a basic history and outline of the development of NBIC technologies and their applications in human enhancement. These applications in human enhancement have been explained in as far as they pertain to the medical field, the military and the workplace. A brief synopsis of the discourse surrounding NBIC has been explained and a more in depth analysis given to the ethical discourse and its various points of contention between humanists and transhumanists. Following this, a number of points have been made about how NBIC technologies and the ethical discourse surrounding them are affected by context (Enlightenment thought, neoliberalism, positivism, instrumental reason) and ideology (False consciousness).

Those on both sides (pro and con) of the NBIC debate tend not to ask the hardest questions. For those in favor of the development of NBIC technologies, their idea of human enhancement is subordinated to a neoliberal regime of possibility (e.g. the effects of context). Those against NBIC (namely humanists) worry about being controlled, manipulated, monitored, etc., yet they are already controlled, manipulated, monitored, etc. in ways they may be currently ignorant of\(^\text{24}\). If one is for the progress of NBIC, one must better understand what is actually at stake in supporting it. The potentialities unleashed cannot be simply subsumed in the neoliberal horizon of possibilities. This point is demonstrated in the quotes from Bond and Swinger (sections 2.5 and 3.4). Bond’s argument in favor of NBIC cited economic benefits first, among

\(^{24}\) They would most likely concede this point, but would argue that NBIC technologies are tantamount to complete control, even of the consciousness of humanity.
his list of potential benefits to society. Swinger noted that many technology company executives saw no ethical challenges inherent in their work and that many Pentagon officers had never considered the ethical ramifications of the technologies they sponsor. Their perspectives are limited by the neoliberal/security horizon of possibilities. On the other side, those who are bioconservatives (humanists) have not fully considered the context of NBIC development as well. One can put pressure on both the bioconservatives and the transhumanists from a critical theory perspective. More importantly, one may understand to what degree an NBIC ethics discourse matters (or does not matter) when there are so many fait accomplis that will decide the course of the technology’s future with or without the input of those upon whom the technology will be imposed (Habermas 2003).

In light of the many points made by a critical theory perspective of NBIC, one wonders what the ways are in which one can imagine a new kind of society liberated from the domination that will be introduced by the implementation of these technologies. Cognizant of the influence of context (neoliberalism, advanced industrial society), false consciousness, a deep, democratic reflection is needed by society as a whole to determine the kind of future that is being created and whether it is at all desirable. New, panoptic, omnipotent and dystopian powers will be granted to the holders of these technologies and the enforcement of laws over the regulation of these technologies will prove no easier than has been the enforcement of international norms and laws regarding technologies such as nuclear weapons. Human liberation from these contemporary phenomena (emerging technologies and systems of power) continues to become a more and more distant destination. As was asked earlier, can a liberal democratic society exercise power external to the influence of powerful military-industrial lobbies? There are not great deals of positive precedents for this
unfortunately.

The ideals of the Enlightenment remain equally relevant today as when they first came about. One sees parallels between the issues at hand in the 18\textsuperscript{th} century and those of the 21\textsuperscript{st} century, where poverty remains rampant, human rights are generally neglected and freedom of opinion is perpetually challenged. The Enlightenment discourse has much to offer the world today as it continues to face hegemony, establishmentarianism, traditionalism and authoritarianism. “Enlightenment was always a movement of protest against the exercise of, arbitrary power, the force of custom and ingrained prejudices, and the justification of social misery” (Bronner 2006, 7). Bronner advocates that the left should study the Enlightenment well in order to avoid that it should “constantly find itself intellectually reinventing the wheel” (Bronner 2006, 7). “There is hardly a single ideal of the left that does not derive from the Enlightenment” (Bronner 2006, 60):

Rationality is not an absolute, unchanging factor, but relative to the respective historical movement. Historical development and changing reality expose rationality to be still irrational: reason becomes nonsense. Contemporary rationality is also disavowed by the fact that it wants to perpetuate the status quo. It calls theories that contradict the existing universe irrational, while they are the rational ones precisely because they refuse to cooperate with madness (Landmann 1976, 195 cited in Piran 1977, 24).

If one wishes to avoid the dystopian aspects of the development and implementation of NBIC technologies, it will be necessary to imagine new future potentialities with more rational political and economic systems whereby man can achieve liberation rather than remain in a cycle of domination.

Though the original works of critical theory were written in the years of Germany’s Weimar republic, this work has attempted to reveal the variety of ways in
which critical theory remains relevant to contemporary social science inquiry and to understanding social phenomena.
REFERENCES


