

Arming Science

The Development of the Genomic Gaze

Terry McCall

In his book *Declaration of a Heretic* Jeremy Rifkin compares the development of genetic science (the splitting of the DNA nucleus) with that of atomic science (splitting of the atom)¹. As the development of atomic science led immediately to the development of the atom bomb, Rifkin wonders if we can “doubt for a moment that the other great scientific breakthrough of our time will soon be used in a comparable manner, posing a similar threat to our very existence as a species.”² But genetic science, and its derivatives such as bioinformatics, distinguish themselves from atomic knowledge in two ways that are central to our understanding of the effect it has on modern science, the target and the complexity of the science. Atomic energy was not only developed for use against a foreign population in the context of the Second World War, but remains even today as a prohibitively complex science. In contrast, the entire human species falls under the gaze of genetic science, so although it may not be equally applied, it is universal in its scope. Genetic science is far more open to widespread use due to its relative simplicity, to the point that it is now being developed at the undergraduate level in science faculties.³ Where as the impact atomic energy had on society is viewed as restricted by its prohibitive complexity, the

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“unique power and elegant simplicity”⁴ of genetic science makes its potential impact on contemporary society seemingly limitless.

“[The Industrial saga] was a singular moment in world history characterized by brawn and speed.”⁵ It saw the creation of the railroads, telegraph then telephone, airplane, automobile, and it reflected “time zones and posted speeds which heralded a new quickened pace of life.”⁶ The Industrial era establishes a real, meaningful concept of time, it is the first instance where time is really used as an organizing concept for society. Time and distance, when used together to organize society, create a society of transversal, and speed or velocity emerge as the functional unit of measurement, or the functional unit of human existence. As new technologies accelerated life in the industrial era, transgressing established conventions organizing the relationship between time and distance, the presence of velocity as a stable measurement for society remained. As Heidegger argues, “technology is...no mere means. Technology is a way of revealing.”⁷ The primary mode of organizing information in the dominant technology becomes the dominant way of organizing society, and in the industrial era, this is through the combination of pre-industrial measures of distance and new measures of time, into velocity. Velocity, it can be argued, was not the primary measure of existence in the pre-industrial society, instead there existed a society based on physical geography, a society of distance. Industrial society moves from the exclusively physical geography into a geography of time and distance combined as the increasing speed of life collapses the hegemonic power of distance, forcing in considerations of time.

Once again, society is moving toward a similar shift in organizational form, but now it is not the addition of a new vector into the organization of time and space, but the removal of all velocity from society at the hand of a completed science of the gene. This will not be a return to a pre-industrial society organized once again around physical problems of distance, and not the realization of a static society devoid of change, but a society of stasis. While the appearance of continuity and the linear progression of time remain, any unplanned change from the current condition is protected against and strictly policed. Bioinformatics and genetic science, by seeking to read the future of the individual in the gene, halts velocity prior even to the moment of conception. Life is accelerated throughout the industrial era until the point where it no longer has velocity. This is the genetic or bioinformatics era. When all information that is deemed to be important within a society, such as the potential for disease, criminality, education, mood or behaviour⁸ is either pre-determined or known before

birth, the individuals potential for velocity, or potential energy, has already been exhausted. There is nothing left to do but live within the confines of what has been set forth. Little to no deviation is possible, as potential for unexpected action will be policed out in the waging of peace on the domestic society.

This possible future is explored in *Minority Report*, where a society able to prove criminality before the event of the crime moves to a policy of preemptive arrest and punishment.⁹ Ideologically our society has been primed for this through the trial and militaristic prosecution of Saddam Hussein in the most recent Iraq War¹⁰, but it is also being made scientifically possible (on the general level of potential transgression, not individual transgression, but it would appear that the general level is far more insidious and threatening than the individual as fewer qualifications are required for conviction) by genetic science and the mapping of the human genome. This future is being drawn closer by developments such as the completion of the haplotype map, the mapping of “genetic differences between.. the world’s ethnic groups.”¹¹ Genetic science allows for *Minority Report* Style preemptive policing, but applied genetic science must strike at a point much earlier before the actual event of transgression, it must begin with the potential transgression.

Minority Report explores how a new perspective can fundamentally alter the organization of society. Heidegger comments that technology is no mere means, but it is a way of revealing.¹² In *Minority Report* we can see how technology functions in this way. Truth is not revealed through the actions of individuals, instead truth, criminality or innocence, is revealed through a unique ability to predetermine the actions of individuals, a new way of seeing.¹³ From this perspective technology is not a means through which the negative impact of criminal action can be avoided, but it is the framing of reality within a technology that privileges a certain type of information in order to produce the truth of individual innocence or guilt without relying on the physical act for confirmation.

The future *Minority Report* presents has already been realized to a much lesser extent in the U.S., and threatens with the aid of biotechnology to be fully realized and expanded upon. Joan Hawkins presents one example:

Journalist Ted Rall reported on the terrifying case of 2 teenaged girls from Queens who have been arrested — one for rebelling against parental authority and the other for an essay she wrote as part of a school assignment. According to reliable news sources, ‘the FBI says both girls are an imminent threat to the

security of the United States based upon evidence that they plan to become suicide bombers.' The feds admit that they have no hard evidence to back their suspicions. Nothing. Just an essay written for a school assignment and parental claims that one girl was defiant of authority. 'There are doubts about these claims, and no evidence has been found that... a plot was in the works,' one Bush administration official admitted to the [*New York Times*]. 'The arrests took place after authorities decided it would be better to lock up the girls than wait and see if they decided to become terrorists.'¹⁴

Minority Report is the application of this conclusion, if we can tell who is going to, or is likely to commit a crime before they actually take action, why not stop them then? And if we can use genetics to determine before birth who the world would be better off without, why not take action then, before any criminality has the chance to express itself. Genetic science moves the point of transgression away from the realized action to the potential action, and creates the possibility to locate the potential action prior to birth, or with the use of the parents genes, prior even to conception. This is already taking place in the form of Genetic councilors, who police potential parents for a sign that their child might be a burden to them, and to the state.¹⁵

In *Minority Report* a new perspective, vision through a technology allowing future criminality to be opened to the present, is coupled with the police function, the identification and arrest of those deemed criminal by this new mechanism of revealing. Thus, seeing is interwoven with targeting, on the basis of criminality, a "changing patterning of perception and embodiment" that functions to arm vision.¹⁶

Jordan Crandall describes how this tracking process functions:

A viewing-agency moves over its object of target, scanning its line of action, extracting data. This data is processed, stored, and made searchable and analyzable for ever-narrowing strategic margins... while it scans for data in the past or present, the tracking mode is always oriented toward the future.¹⁷

The development and expansion of genomic mapping, from the basic map of the human genome to subsequent haplotype maps, is run through with the demands of this tracking function, with this desire to see through to the future. In the attempting to acquire a complete knowledge of the human genome, ideally represented in a single database, there is the overt desire to create a new form of vision. The ability to see the human existence through the framework of the genetic

code. Through genomics, “anthropocentric, linear seeing is displaced into networks, and a new kind of visual/compositional logic arises.”¹⁸ The way in which we view health, disease, reproduction, medicine, and the form of human life becomes subsumed to the logic of genetic vision, in a move that sees our identity intrinsically tied to our genetic composition.¹⁹

This new genetic vision is in no way freed of interests of the militaristic targeting function described in *Armed Vision* and demonstrated in *Minority Report*. Subsuming our visual orientation to the genetic lens is closely connected with the domesticization and corporealization of warfare technology and the military logic.²⁰ Genetic science, however, does not adopt this aggressive and overtly militaristic language of domination and destruction, instead choosing to embed itself in the utopian language of medical science. This enables genetic scientists and doctors pushing the frontiers of genetic medicine to disguise the implementation of tracking and targeting functions as emancipatory developments freeing patients from undue suffering. This definition of this undue suffering ranges from crippling diseases like pretzel disease²¹ that cause immense physical suffering, to the grey zones of ADD and memory problems,²² to the obviously suspect area of under developed, or less superior, intelligence capabilities and muscle structures. The latter is most commonly framed as genetic enhancement, but potentially defined in terms of reducing negative effects of competitive disadvantage.²³ But tracking, targeting, and subsequent destruction of the oppositional entity, are not restricted to the realm of overt militaristic action, or aggressive Nazi styled social eugenics, these are merely the most visually offensive forms of these processes. Instead these functions are forms of the act of engagement with the subject. Instead of being understood as a strictly military firing mechanism, “a trigger is not a specific object, so much as it is a metaphor for an activation center between perception, technology, and the pacings of the body.”²⁴

With genetic medicine this activation center is primarily the site of developing genetic medicine practices, including the already very developed practice of genetic counseling.²⁵ Specifically in genetic counseling we can see the way in which the genetic perspective produces a primarily genetic identity for the parents, which connects them to a network of genetic knowledge. “Past activity, present actuality and future inclination are interwoven,”²⁶ integrated with databases to produce a potentiality, the probable genetic form of the child. This tracking and targeting information is used to determine the potential for deviance, termed as predisposition to inherited genetic disease, which the child possesses. Where “the trajectory of a targeted plane is tracked

in order to calculate its future position for interception,"²⁷ the predicted genetic trajectory of the child is calculated in order to justify abortion arguing the prevention of physical suffering of the child. Effectively, this is the definition of the 'illegal gene' and the punishment of the transgression it represents.

While there are instances of horrible disease that make the practice of genetic counseling appear justifiable, genetic science is not so blunt a weapon as to be limited to obliteration of the entire body, or abortion, and so is not so easily accepted or rejected. In place of total rejection specific deviant traits can be targeted, as demonstrated in the 'Eighth Day Clinic' in *Gattaca*, enabling the eugenic goal of social homogenization through the redirection of the child's genetic vector, altering the individual's development trajectory from premature death by heart disease to a health life, with out resorting to termination. While *Gattaca* otherwise makes a conscious effort to present a perfectly multicultural future (with the notable exception of anyone of Arab descent), traces of the more threatening aspects of this non-confrontational, enabling eugenics²⁸ are revealed when the African-American doctor at the clinic Eighth Day Clinic notes that the parents have chosen fair skin as a desirable trait. The complete science of genetics is accompanied by a complete, though less easily observed, ideology mediating the application of the science.

In *Homefront* and *Trigger* Crandal establishes the intimate connection between data, surveillance, and targeting, the function he terms "seeing-aiming-firing," which relates closely to Eugene Thacker's article on Bioinformatics. Through Thacker's article we might rewrite data = surveillance = targeting²⁹ as bioinformatics = genetic testing = genetic medicine. But there is an important distinction between Crandall's observation of military surveillance and Thacker's bioinformatics, as Crandall is forced to retain the images and symbolic representations of the body. These become largely absent in the genetic sciences, as there is such a great level of abstraction that to a certain extent, the processing and collection of information for bioinformatics databanks is dissociated from the effect it has on the body.³⁰ What bioinformatics deal with, then, is not the body through its genetic structure, but the just the genome. This objectification of data which largely removes problems of the subjectivity associated with a body, when combined with Crandall's militarized surveillance, creates a much more powerful basis for the application of genomic eugenics. The bioinformatic gaze does not lose the militaristic elements of Crandall's surveillance, it is the collusion of the militaristic and scientific gaze, mediated and refocused by the interests of the private firms that are conducting the research and

implementing the real applications of bioinformatic data in genetic medicine. This is not only the profit motives mediating *Fossil's* exploration of the social structuring of bioinformatics but the potential for synergizing bioinformatics with brand ideology. One creates the image of the ideal human form and the will to achieve it, the other creates the biological potential to actualize this ideal. These two operate together to establish the genetic regulation of allowable life through the desire for ideal life.

One recent development in bioinformatics and genetic science is the publication of the Haploypote Map, a new map of the human genome that "organizes the book of life encoded in DNA into paragraphs...that make it exponentially easier to spot genetic mutations...and how humans evolved in different parts of the world."³¹ This is a concrete example of the practices that are enabled by the dissociation of genetic information from the body as theorized by Thacker. The level of abstraction from any recognizable form of the body or sense of life allows the rationalization of racial profiling similar to the exposure of Sickle Cell Anemia, but on a far deeper level of human existence.³² Once dissociated from the body genetic information lacks the same subjectivity that offers a level of protection to an entity simply by virtue of it being recognized as a body, it can be theorized simply as an object for science to know and to manipulate. The pharmaceutical industry is already employing this body-gene separation. Through new practices testing of the impact of new pharmaceuticals targeting the disease at a genetic level is done by introducing the drug into individual molecular samples of each human tissue and measuring both response to the drug and potential side effects on a genetic level.³³ This fits in with Thacker's removal of body from genomics in a way that turns the subjective body into the objective molecular make-up; this does it by further removing any traces of the body from the research process, separating the scientific analysis of response to drugs on a molecular level from the body that these molecules combine to form.

Velocity of the body is not completely removed by eugenic genetics alone, but must be combined with developments in bioinformatics, and computational biophysics, in order to realize the potential for the creation of an engineered stasis. Again, a society in stasis is differentiated from a static society in that life continues but no unplanned or unengineered change can take place. Crandall describes how vectors of time and space are layered so that our experience of reality is fundamentally altered.³⁴ Changes in what is to come may only arise from changes in what and how we experience in the present as the future becomes contained, and its velocity exhausted, within the present.

This potential is no longer the realm of science fiction; it is being realized in the form of IBM's new supercomputer Blue Gene/L. The Kollman-Duan equation modeling segments of the protein folding process, which was first calculated in 1998 on a 10 teraflop supercomputer over the span of over two months, has been calculated by Blue Gene/L in less than a week. This was done with the computer operating at a capacity of 136.8 teraflops, just over one third of the supercomputers expected final top speed of 360 teraflops.³⁵ In creating the potential for knowledge of how DNA forms and interacts with protein, the eugenic moment can be relocated prior to the individual, and prior to that individual's moment of velocity. When we know what the egg and sperm will combine to produce without having to combine them, the eugenic requirements are no longer applied to an existent entity (the fetus in the earliest stages) but to a *potential* entity. This turns eugenics from social planning, guidelines from which society flows, to social engineering, where society is produced. There is no velocity in the resultant being, only authorized action, pre-approved movement, not progress of the individual, but the fulfillment of an engineered role. The potential energy of the individual is never converted into the kinetic energy of velocity, the individual is used up in the stage of potential.

It is important to note that where "Scientists and engineers became our new authorities on almost everything that mattered"³⁶ in the industrial era, now this authority is threatening to be totalized. Baudrillard's examination of the Iraq war gives an account of the political will to total power³⁷ which converges with Liess' account of the acceptance of the authority of the scientist, and now the genetic scientist empowered by biotechnology, as acquiescence to the technological imperative.³⁸ This is particularly important when we look at the scale of implications associated with biotech industry, which can be done in comparison to the chemistry and physics revolutions that preceded the current dominance of biology. Rifkin describes how in these previous phases "We peered into the micro world of atoms and electrons and rewrote the book of nature with the discoveries of quantum mechanics and relativity theory."³⁹ Genome mapping and bioinformatics technologies promises to perform a similar social rewriting; social theories that will be the biological equivalent of quantum mechanics will be produced in the language of bioinformatics. Liess notes that this new rewriting will be on a qualitatively different level than previous periods of chemistry and physics dominance, as where these alter the rules and structure of the world we interact with.⁴⁰ When biology and genetics modify our very being at the level of the genome through genetic enhancement, the nature of life and the body have the potential to be fundamentally altered.

The developments in methods of harvesting both plant and animal life provide a view into the future application of genetics to the human body, as both are far more advanced in the field due to lack of social restraints on research. In the case of animals the sacred barrier of cloning life was breached in the mid-90's with the production of Dolly the cloned sheep in Scotland.⁴¹ Both plant and animal life have been altered by a challenging on the genomic level to produce capital, as energy, as food supply, as a source for organs and drugs, that has changed the way in which they function as standing reserve for human consumption.⁴² The imposition of genetic modification of plant and animal life for commercial purposes by private corporations holds particular importance to any study of the progression of human genetic research and consequences, as in being viewed as standing reserve both have been fundamentally altered. This has had immense social consequences, particularly in the area of privatized forms of plant life, which has seen the vast majority of plant life privatized and regulated through the patenting of seeds based on knowledge of their genetic composition, creating the possibility of 'illegal seeds'. As private biotech firms begin to patent the knowledge of the human genome, it would be wise to consider what consequences the regulation of plant and animal life on a genetic level has already had on society. The biotechnology revolution in agriculture not only exposes the extent to which engineering of a life form is possible, but the extent to which this process can be dictated by the demands and desires of corporate entities. As corporate involvement in biotechnology grows the resulting loss of accountability to the general population will remove any claims to legitimacy. This is already beginning with the patenting of genomic information, as it did with the patenting of seeds.

It might be argued, in order to justify such patenting movements, that human life is in some way different, more sacred, than plant or animal life, and so gene patents would result in genetic regulation being used in the same way that seed patents and animal engineering have been. This argument faces two problems. Its location within the confines of the philosophy of biology precludes it from any meaningful engagement with recent developments in biotechnology, which have dissociated the gene from the body. By dealing with data, not bodies or life forms, biotechnology has sidestepped or bypassed altogether arguments founded solely on the sanctity of life.⁴³ Again, the argument seems inadequate in light of the social consequences of our existing practices of agricultural genetics, which already display a profound disrespect for the sanctity of human life, and the basic right to life.

A critical element to the potential development is the current international legal and political structure, which it can be argued lacks not only the political motivation to prevent and real harm to human life (as demonstrated by Rwanda, which would leave us in the position that bioinformatics would be deployed only non-western nations/individuals) but that the invisibility of TNC's legally⁴⁴ also creates a scenario where the extension of this application of bioinformatics to Western populations could not be effectively blocked. Specifically, TNC's do not formally possess international legal personality and so are not directly subject to international laws, and they take on an amorphous form that makes their specific national subjectivity ambiguous, but at the same time are taking on a significant regulatory role in international law, creating a crisis of legitimacy in international law.⁴⁵ This alone is not reason enough to believe that it would reach the heart of Western civilization, as there is a social division between the margins of Western society and its core. But there are several possible ways of conceiving the collapse of this final barrier to total eugenics.

Jean Baudrillard, in his article "The Mask of War" explores how the center of the West could be directly targeted by a shift toward eugenic genetic science by looking at the Iraq War and how it has altered the nature of power in the United States. He makes the argument that the complete disregard for the democratic requirement of representational support, the foundation of democracy, creates an "unrestrained power" that exists "in a state of nature (with no longer a natural brutality, but a technological one)."⁴⁶ Without the limits of accountability to its own domestic population there is little resistance to a eugenic movement. There is also the political drive to do so, as Baudrillard describes how "this power that does not have a legitimate reference any longer or even one true enemy (since it transforms it into some kind of criminal ghost) turns without compunction against its own populations."⁴⁷ The impossibility of a final conclusion to the non-event of the Iraq War, since an invisible enemy can not be vanquished or dominated, creates a situation where the aggressive and militaristic rhetoric of the administration is potentially redirected. In being unable to find means outside its borders to resolve the threat created by the unplanned event of 9/11, it could very easily turn inward and come down on its own population.

This inward eugenic turn is all the more threatening when considered as the practice congruent with the revealing of reality through the lens of biotechnology. Beyond even the threat of the acquiescence to a biotechnological imperative, where we consciously do not object to obvious negative consequences of biotechnology, William Leiss argues

that biotechnology presents an even more subversive threat. This is that if the under theorization of developments in genetic science is not challenged advancements in the field will continue to be presented in the utopian language of medical progress.⁴⁸ Already this language has been used in the justification of genetic testing at birth,⁴⁹ the application of Supercomputer technology to genetic research⁵⁰ and the creation of a Haploypotype map that creates genetic profiles comparing the different races⁵¹. Respectively, these were advocated as solutions enabling us to curb the effects of genetic disease through genetically informed pediatric care, develop pharmaceutical solutions to genetic disease such as Alzheimer's Disease caused by the mis-folding of protein, and the creation of more efficient drugs based on racial based genetic differences.

But the social eugenic drive from within is not the product of a single force, its impetus can also be accredited to the privately owned medical and pharmaceutical industry that profits massively from providing the means to realize the social ideals pushed by brand ideology. As Baudrillard states; "Technological society thrives on a tenacious myth, the myth of un-interrupted technical progress accompanied by a continuing moral 'backwardness' of man relative thereto" which absolves the system of production of all responsibility for the consequences of its production.⁵² For this reason Western society will not challenge the provision of genetic enhancements by the medical industry, it will be a reflection of mans moral backwardness and so man, as individuals and groups, should be punished and technology left to continue on.

Supplying the means to satisfy the social desire for self-improvement, aside from even 'legitimate' medical applications, has the potential for a near limitless source of profit. As Leiss gives the example, a scientist claiming to be able to increase muscle mass growth through genetic therapy was overwhelmed with inquiries. Most of those interested were un-phased by the unknown potential consequences of such treatment.⁵³ The size of the American market for cosmetic surgery also suggests that any company able to provide genetic enhancement will be met with sizable financial rewards. This pressure to conform to the ideal form of existence, or health, and physical appearance, through the private provision of genetic enhancement reaches a new level of potential threat to society when the patenting of the human genome is introduced. This could function as the realization of the privatization of the access to life, or at least the access to a life in a competitive environment.⁵⁴ As in *Gattaca*, there is the distinct potential that the enhanced body would expand until it formed the privileged class in a new social structure, with the "faith-births," those unable to afford or

obtain genetic enhancement forming a new social underclass. This opens the door for discrimination “justified by science.”⁵⁵

What *Gattaca* presents is not just the formation of a new social class, but the realization of this new biological divide by way of consumer choice. Liess also stresses that social cleavage is not necessarily imposed on a population, but may present itself as facilitating improvement necessary for existence in a competitive society. While initially this may distinguish between the members of a very small new elite class, we can see by way of *Gattaca* that it has the potential to expand into the dominant form of life on the planet and form a new norm that distinguishes not superiority, but the inferiority of those not genetically enhanced. There is no need for the imposition of eugenic standards and regulations when to not conform to the social norm is to relegate you or your child to a lower or lesser form of being, to membership in a social underclass.

There is also no need to supply a new ideal being to act as a standard for societies self-imposed eugenics, as a comprehensive network of images and ideas as to what the body and the individual should aspire to exists courtesy of brand culture. Branded media provided by Time Warner, branded lifestyle sold to you by Starbucks in your coffee, and now branded life, the culmination of the network of branding images imposed on society and sold to you by biotech and genetic medicine companies.⁵⁶ In the Eighth Day Center in *Gattaca* the geneticist offers Antoine’s parents not only a host of desirable physical traits, from eye colour to race, but several cosmetic choices as well, the ability to excel at music, or advanced ability to understand math. In the age of genetic science, cosmetic genetics is not limited to outward physical appearance as cosmetic surgery is now. It enters into a far more complex system of images and desires that have been developed over decades by companies trying to package lifestyle in order to sell it through consumer goods. This is where corporate brand culture has the opportunity to shape and mediate the direction of bioinformatics and fundamentally, our knowledge of the genome, when the new technology of the genome becomes lost “in thrall to fashion and forced consumption”⁵⁷ as a consequence of growing involvement of private biotech firms.

One critical aspect of understanding bioinformatics and genetic science is the social context that the science is developed within. Stem cell testing is not inherently dangerous, but takes the form of a threat within the framework of the philosophy of biology, where human existence is held as somehow sacred.⁵⁸ We can closely observe how in the development of bioinformatics, “code is haunted and transformed by

the interaction of conceptual and biological sequencing," it does not exist independent of the social reality it is introduced into, but both mediate and drive the developments of the other.⁵⁹ The functioning of this relationship, and especially how a collective consciousness can create a real existence, is explored by Gary Zebington in his net art project "Fossil." The project takes the form of a traditional inkblot test, but with the modification that the ink is constantly morphing shapes, and only begins to solidify as the viewer inputs responses. Frequently repeated responses have more of an hardening effect, while new responses show little impact, with results being stored from user to user so that a set of collective perceptions are formed. Just as the human genome map was initially presented as near-raw data, "initially unencumbered by experience, Fossil is gradually infested by subjectivities and perceptions...as its identity and self-perception are fixed by collective perception, it hardens into aged stillness where freedoms of appearance are eliminated."⁶⁰

Fossil is described as a "private genome of words" which mimics the biological human genome, as it develops its form reflects those who are responsible for developing, or 'reading' it.⁶¹ As the human genome project solidifies into a more rigid data set, through such projects as the Hap Map, it will be clear that what we are really discovering in the genome is a reflection of ourselves rewritten in the language of genetic data. The continuing history of racism will not be eradicated by the genome project, but reflected in it and amplified as it is cemented in our minds as a scientific truth. Class divisions threaten to be reflected in a growing 'genetic divide' that reflects current class divisions, as we have seen happen with the development of technology in the late 20th Century with the emergence of the 'digital divide.'⁶²

This contrasts Heidegger's conception of a society purely defined by the technology through which it is observed, presenting a much more complex understanding of the influence the genome will have on our society. It is undeniable that, as Heidegger observes, to accept science as a neutral force will have serious negative impacts on society⁶³ as technology exists and shapes society as a way of revealing, as the site of the revelation of truth.⁶⁴ But it must be recognized that this technology is not imposed on a static society which it proceeds to set into motion under its own rules. It is introduced into, and developed within a pre-existing society with well developed ideological foundations. As *Fossil* demonstrates, those who develop the technology to read and alter the genome have a significant impact on the form of our final understanding of the genome. They shape the way in which knowledge of the genome is presented, and can be read, infusing it

with understandings of race and gender, among other things, that are socially created. If a period of stasis is the eventual product of this body of knowledge, it is important to understand that this will not be the conclusion of a linear history of progression toward a perfect society and, over the deafening roar of claims to medical achievement and scientific improvement, to question what has been sacrificed and silenced in order to achieve this stasis. To best understand how the genome will change our society, and the final form that both genetic science and our social organization will assume, we must look at the way in which the two elements mediate each others development in a mutual shaping effect. Neither ideology nor technology can exceed the boundaries set out by the other, but both may influence where these borders lie.

Notes

¹ Jeremy Rifkin, *Declaration of a Heretic* (Boston: Routledge, 1985), 60.

² Rifkin *Declaration of a Heretic*, 60.

³ William Leiss, "Genetic Enhancement: The New Technology of Body and Mind" and "Genetic Enhancement: DNA, Science, and Religion" *PACTAC Lecture Series*, January 25-26 2005, <http://www.pactac.net/pactacweb/web-content/videoscroll1.html#>.

⁴ Leiss, "Genetic Enhancement".

⁵ Jeremy Rifkin, *The Biotech Century* (New York: Putnam, 1999), 4

⁶ Rifkin, *Biotech Century*, 4-5.

⁷ Martin Heidegger, *The Question Concerning Technology and Other Essays*, trans. William Lovitt (New York: Harper Colophon Books, 1997), 12.

⁸ Rifkin, *The Biotech Century*, 3.

⁹ *Minority Report* Dir: Steven Spielberg (Dreamworks Pictures: Canada, 2002)

¹⁰ Jean Baudrillard, "The Mask of War", trans. Alex Barder, *CTheory.net* article td022, 11/3/2005, www.ctheory.net/articles.aspx?id=494.

¹¹ Carolyn Abraham, "Genome Project Links Illness and Ethnicity" *The Globe and Mail* (Toronto) 27 October 2005, p. A1, A21.

¹² Heidegger, 12.

¹³ In *Minority Report* this ability takes the form of 'precogs,' a group of individuals with the ability to see future murders, coupled with a technology that projects and stores their 'pre-visions' in a way that allows their ability to be harnessed for practical applications, such as policing. The example is not intended to warn of the specific threat posed by the possible emergence of 'precog' beings from science fiction into reality. It is intended instead to demonstrate the potential impact a technology granting us a similar capacity could have on social and political organization.

¹⁴ Joan Hawkins, "When Taste Politics Meet Terror - The Critical Art Ensemble on Trial" *CTheory.net* article td007, www.ctheory.net/articles.aspx?id=482.

¹⁵ *After Darwin* Gala Films Inc.

- ¹⁶ Jordan Crandall, "Drive", jordancrandall.com/drive/index.html.
- ¹⁷ Crandall "Armed Vision", jordancrandall.com/main/ 1999.
- ¹⁸ Crandall, "Trigger", jordancrandall.com/heatseeking/index.html.
- ¹⁹ Crandall, "Operational Media" *CTheory.net* Article a148, 1/6/2005 http://www.ctheory.net/articles.aspx?id=441#_ednref5.
- ²⁰ Crandall, "Trigger".
- ²¹ Lisa Belkin, "A Doctor For the Future" *New York Times Magazine* 6 November 2005, Section 6 pgs 68 -73, 92 - 94, 114- 115.
- ²² Leiss, "Genetic Enhancement".
- ²³ Leiss, "Genetic Enhancement".
- ²⁴ Crandall, "Trigger".
- ²⁵ *After Darwin*.
- ²⁶ Crandall, "Trigger".
- ²⁷ Crandall, "Trigger".
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