Genetic engineering in humans

Engineering

However not until the technological revolution of the twentieth century, did the research and ethical debate on this subject egging to take a more practical perspective, as the tools necessary to study the intricacies of living structures were developed. The concept of genetic engineering has sparked an ongoing debate regarding the bioethics concerns of this field, which focus strongly on the ethics involved in tampering with the work Of Mother Nature and its possible consequences. However this has not been a topic for scientists alone.

Throughout history, the minds of fictional literature have provided countless examples of a genetically engineered world; in several cases presenting a disappoint rendition of society, a clear humbly of what they believe to be the consequence of human intervention with the natural discourse of nature. The ethical issues surrounding human genetic engineering such as genetic discrimination, a loss of human autonomy and the more profound concepts which threaten to redefine what it means to be a human, have universal value, paralleling the concerns of today.

This suggests the paramount significance of exploring ethical issues and the consequences of human genetic engineering, as history implies that such concepts will continue to resonate through time. This essay will examine owe the literary texts of the past have helped shape our ethical perspective on genetic engineering today. In essence genetic engineering is the manipulation of an organism's hereditary material [1].

The goal in creating such genetically altered beings is not only to eradicate disease, but to create a population which carries only the most desirable

physical and behavioral traits and has the ability to pass on such traits to future generations [3]. However the treatment of diseases does not create public anxiety, rather it is the concept of eugenics and gene determinism. Eugenics is essentially 'any attempt to accelerate human evolution by improving the genetic makeup of humans" [1].

Eugenics however cannot succeed unless society accepts some degree of the genetic determinism ideology which perceives that all individuals are " inevitable consequences of the biochemical properties of their cells" and so their " characteristics are uniquely determined by the constituents of their genes" [1]. Ethically this theory seeks to disregard the true essence of human self definition and integrity, eliminating the significance of such immaterial characteristics as self awareness, will power and human spirit.

Additionally, an ethical problem surrounding eugenics is that it is human directed evolution, where individuals set the course of evolution depending on chosen 'desirable' and 'undesirable' traits. As philosopher J; urge Huber mass states " it seems reasonable to allow this in the case of a purely preventive intervention in order to avert diseases (" negative eugenics"). It becomes questionable, however, when it is a case of fitting out a chi lid with certain desirable characteristic (" positive eugenics") [1].

This statement alludes to several ethical dilemmas which can arise from a society herring on the application of positive eugenics. From a virtue ethics standpoint, the application of positive eugenics suggests that the accessibility of genetic manipulation will be limited to those parents who can afford it, thus creating discrimination between sectors of society. If a

technology is available to eliminate disease and achieve a " better' quality of life, should it not be available to all individuals in so to create an egalitarian society which is indiscriminate?

F-Rutherford, how does the implications of such a tech oenology impact upon the individuals sense of privacy and individualism? A world of positive eugenics would suggest an adoption of the gene determinist theory which proposes that all traits and behavior are ingrained within our genes and thus are not influenced by any other external factors. In such a world, genetic analysis would be Open, rendering a complete breakdown Of the moral boundaries which hide our genetic makeup from the outside world.

People could be tested, controlled and manipulated when access of their hereditary material is in the hands of others, violating their right to privacy. George Wald offers one view of the ethical debate stating that, "[genetic engineering] faces our society with problems unprecedented... It places in human hands the capacity to redesign living organisms... Let presents probably the largest ethical problem that science has ever had to face" However scientist James D. Watson claims that " until a tiger devours you, you don't know that the jungle is dangerous" [7].

In essence, there is a conflict of interest between the possibility of eradicating life threatening diseases and the ethical consequences which may arise from using the technology to alter the evolutionary process for mankind's own benefit. As a society we must see his as a cost-benefit analysis, where we weigh the proposed advantages of genetic engineering

against the possible and in many cases unforeseen, consequences. Profoundly the main issue is of self-definition.

From an ethical perspective, the true essence of human nature is challenged by the proposed applications of genetic engineering. With these ethical issues in mind, we can see that certain measures must be taken to contain the ethical consequences of genetic engineering to a manageable level and not let the technology overcome our sense of self, compassion and humanity. This will only be successful however, if the key issues are examined prior to genetic engineering becoming mainstream, as when such technology is unleashed to the public it cannot be invented.

Therefore those in the field of science and engineering must ensure that their research and experimentation adheres to all regulations outlined in the Code of Ethics. Engineering practitioners must " act on the basis of a well informed conscience" [8] as well as " respect the dignity of all persons" [8] when carrying out research and experimentation. When faced with unique bioethics concerns emerging from previously uncharted areas of technology, society turns to the scientists and engineers to offer their technocratic decision regarding the new concept. This is the case presently faced by genetic engineering.

The engineer in this situation becomes a model of a guardian, social servant and social enabler to humanity, who not only predicts the direction this field will take in the future, but analyses the potential consequences of genetic engineering and helps society to understand its own needs and develop moral autonomy. In this way the engineer is governed by strict ethical codes

to " be honest and rusticity" [8] as well as " practice engineering to foster the health, safety and wellbeing of the community and the environment" [8] as well as other stakeholders involved.

It can be useful to explore such notions in literature, where the scientist or engineer has experimented without considering the potential consequences of their actions, resulting in an imbalance of the natural order of life. Such is the case in Mary Shell's 'Frankincense', where the experimenter did not " act on the basis of adequate knowledge' [8] as the Code of Ethics outlines, but instead allowed human curiosity to rule, impairing with inanimate organisms to produce new a life form. The strong ethical dilemma posed by this novel is that when such organisms are created what are their rights and how do we determine their humanity?

The situation developed in Frankincense is one of blind sightedness, where the unforeseen consequences of the social experimentation are so detrimental to society that they eventually become the undoing of the experimenter. The text explores the ethical ideas that society should uphold certain virtues when dealing with Mother Nature and that the organisms we alter have certain rights just like there member of society. Most significantly however, it highlights how important the duty of the engineer is to society; to warn and to educate on the possible consequences of new technology and application.

The Frankincense story warns us that the time to address the ethical implications of genetic engineering is before we actually apply it Furthermore, science fiction literature provides an interesting insight into

how the world has perceived genetic engineering and its consequences in a social and cultural sense. The idea of direct genetic control for the " betterment" of humanity darted with evolutionary geneticist, J. B. S. Halide's book 'Deals', in 1 924 [11. The ethical consequences of genetic engineering are explored extensively in texts such as Andrew Nicolas movie Cataract (1997) and Aloud Huxley Brave New World (1932).

Halide's vision is sharply satirized in these texts, reflective of the view society had taken after the fall of the eugenics movement in the sass. These texts are significant in our understanding of what might happen to society through gene determinism and the absolute acceptance and application of genetic engineering, as scientists at the Gene Therapy Policy Conference in 1 997 " concluded that the possibilities [of germ line gene therapy] aren't entirely in the realm of science fiction" Furthermore, the ethical issues discussed in these texts are repetitive, although being from different time periods.

This suggests the significance and universality of the ethical risks associated with genetic engineering. The movie Cataract released in 1 997 is a bioethics text which explores the societal implications of genetic-determinism and genetic engineering and gives light to the consequences which may occur from new eugenics. Cataract raises the issue that many problems associated with the new eugenics, such as genetic discrimination, genetic prophecy, and the homogeneities of society [1] is not due to the tech oenology itself, but instead these problems arise only if society accepts the belief that individuals are no more than the sum of their genes.

In essence it challenges the notion of genetic determinism. Similarly Huxley within his disappoint novel, Brave New World, explores the ramifications of a society that has rejected Mother Nature in all forms and instead is governed by " controllers", who dictate how, when and on whom genetic manipulation would be applied, with the overall goal to achieve absolute stability of a totalitarian state.

In this world, Individualism becomes non-existent and a sense of human integrity is eliminated, resulting in complete totalitarian control, in essence " a pessimistic accounting of the shape a scientifically planned community would take, of its sterility and human emptiness" One of the most crucial ethical concerns is the dilemma of genetic discrimination against those who are genetically enhanced. Genetic engineering in humans implies that we can create an elite race of human beings which are period to the common man or control genetic engineering in such a way as to create groups of altered beings each with predetermined roles in society.

Arguably this gives rise to significant ethical concerns, especially in areas of reproduction where parents can alter the genetic makeup of an embryo before birth. While this is seen as an advantage in the scope of eliminating genes coding for certain diseases, it suggests a violation of humanitarian rights and discrimination between those who can afford the technology and those who cannot so that " a large fraction of human beings will be the victims f the omissions and commissions of science because they lack the material wealth and the social power to control their own lives" [11, as stated by evolutionary geneticist Richard Allentown.

Arguably this will differentiate people in the matter of career advancement and social relationships [3]. This is a prominent concept in Cataract, as the protagonist despite being a suitable candidate for a job position is discriminated due to his enhanced form, stating that in a world of genetic determinism " the best test score in the world wasn't going to matter unless I had the blood test to go with it" As well as his, genetic enhancement challenges the concept of virtue ethics.

If we have the power to combine all desirable traits together to enhance and elevate ourselves above other individuals, is it morally permissible to do so and will this lead to greater vanity and commercialism in mankind? Additionally how does this affect our relationship with others who either oppose the technology or cannot afford the luxury of such enhancement? Furthermore, genetic engineering in humans alludes to the development of new class structure within society which will widen the gap between the enhanced and enhanced even further, questioning the right of all individuals to an equal quality of life.

Discrimination of individuals has always been a universal predominant concern and significant measures are taken to protect the rights and welfare of citizens in society. Modern society in particular supports and appreciates the significance of egalitarianism. This has not been an easy venture for mankind as history shows us that previous class structures were difficult to dissolve and even today are not extinct.

With genetic engineering and genetic discrimination however, the argument emerges that although e have made it illegal to discriminate people on the

basis of race, religion and sex, by genetically engineering them we give rise to a new form of discrimination, one not so easily detectable, as Vincent in Cataract states " it's illegal to discriminate on the basis of genetics-? genomes it's called-? but no one takes the laws seriously" These concerns are mirrored in Aloud Huxley Brave New World, where he demonstrates the stringent societal class order where Individuals are predetermined to be alpha, beta, gamma, delta or epsilons and are thus classified in the societal ladder as such. Each class has different genetic traits so to ensure they can carry out their predetermined role in society and are conditioned to enjoy their fate.

Huxley presents such a blatant view of genetic discrimination to highlight the complete loss of individuals' rights, free thinking and the ineffectiveness of those in power to carry out their duties to the public. The major ethical dilemma extends from the concept of utilitarianism, in which certain individuals have taken it upon themselves to control what all aspects of life for the " greater good of society". This abolishes all concepts of virtue ethics as in a state of totalitarianism, individuals are discriminated against before they are born and have a chance to prove their worth, as Huxley demonstrates with the lower classes of society, who through gene manipulation are genetically stunted to ensure they will forever remain at the bottom rung of society.

The prominence of genetic discrimination as one of the key ethical concerns in these texts highlights the fact that our societal problems are so universal that regardless of how or in which way society changes, the ethical implications of classicism will inherently be the same although inflicted in a

new form. Therefore a mechanism to sustain egalitarianism in society and retain the rights and freedom of individuals must be developed before we allow genetic engine emerging to become a stronghold in society, as although we may be advancing forward technologically, ethically we will be taking a step backwards. Additionally, genetic engineering in humans raises the profound ethical concern of losing one's Individuality in a genetically altered world and by extension losing moral autonomy. Genetically altered individuals would e themselves as a product of the deliberate intervention of others, giving rise to the misconception of self integrity.

This ethical issue causes raises concerns of homogeneous societies, which would violate the engineer's Code of Ethics to " support and encourage diversity" [8]. This notion is explored extensively in Brave New World, which abolishes the importance of individualism and demonstrates the ways in which those who have access to gene altering technology can utilities it unethically for their own benefit. As a result we must question not only our self integrity but also who should be expansible for determining what traits can be modified. Here the ethical concern stems from the argument that those with the knowledge to implement the technology may reject the previous moral doctrines and create their own, based on their perception of moral relativism [5].

Huxley supports the view that individuals of a utilitarian predisposition will govern the world believing it is done for the " greater good of humanity'. Additionally, from the perspective of rights ethics, individuals in this world "... Are refused any opportunity to plan their own property, change their role, rank or employment in society. Or even live permanently with another

person Of their choice" [4], thus rendering the rights of the individual non-existent. Additionally the government enforces strict utilitarian ideology, as it " believes that stability can be achieved if people think and look the same" and in doing so, these control agents fail to uphold their duties to their citizens, demonstrating a complete lack of respect for human value and dignity.

This ethical concern of losing one's autonomy and individualism is of paramount importance; as different civilizations throughout history have struggled to obtain freedom and a sense of identity. The portrayal of these notions in the mentioned texts, demonstrate that there is no compromise for humanity free will and sense of individuality, as this is seen as a basic humanitarian right. As a result, our support or rejection of human genetic engineering will focus on our examination on how this field will impose on our rights as human beings and free thinking individuals. Perhaps the most profound ethical concern regarding genetic engineering is the questioning of what it means to be human and if genetic engineering results in demonstration, storing the concept of humanity as we know it?

In a genetically altered world, do we define genetically engineered beings as human if they have no flaws? Such ethical questions challenge our perception of what makes us human and force us to examine whether there is a necessity in genetically altering ourselves if the advantages do not outweigh the possible consequences, as it can be argued that not every scientific advance automatically makes our lives more " meaningful" Both Huxley and Niccole examine this profound ethical concern in their texts, providing the conclusion hat although we may alter our genetic makeup, we

cannot alter the primal, immaterial characteristics of human beings such as our emotional vulnerability.

Thus emotional variability, self awareness, will power and human spirit are all subject to human autonomy and while these remain we do not lose our integrity. In essence it is a rejection of the gene determinism ideology as we do not define our individuality on the basis of genetic makeup, since " there is no gene for the human spirit" [1]. In Cataract, the essence of humanity is portrayed through the enhanced Vincent, who overcomes his emetic heritage through shear motivation and will power, demonstrating that these qualities cannot be engineered, emerging instead from an individual's motivation when confronted with the challenge of a specific context or environment. In this sense it is Vincent flaws which fuel his determination and lead to his ultimate success, not his genes.

This is contrasted against the genetically enhanced characters, who suffer form the burden of perfection, as Cataract poses the ethical dilemma that the expectations put upon the genetically enhanced to live up to their genetics are almost as debilitating as he discrimination against the enhanced [1]. However the individual who has been engineered with no flaws, has nothing to overcome and no apparent need to improve, thus lacking the traits of will power and motivation that Vincent possessed. This is similar to the genetically engineered characters of Bernard and Hellholes in Brave New World. They are dissatisfied with the limitations their " stable" society imposes, despite undergoing full conditioning These examples suggest that individual desires cannot be suppressed with social intervention and

although genetic engineering may eliminate imperfections and flaws, it comes at price, which is that of emotional awareness and human spirit.

Additionally, the most philosophical ethical concerns arise from a theoretical examination of how genetic engineering may influence the evolutionary process in the future. Genetic manipulation can be seen as a mechanism to aid humanity in adapting to new environmental conditions. Therefore in terms of evolutionary progress, we must question where genetic engineering places us. Are we speeding up the process of evolution or are we simply roving a new form of natural selection, one which is better suited to our technologically advanced context? So that over time, humanity as we know it will become non-existent having made way for the " superior" genetically enhanced beings.

In the future if genetic engineering became widespread in society, will survival be dependent upon the extent and type of our genetic enhancement and if so, who governs these moral " absolutes"? Although not practical, these are interesting ethical dilemmas to consider. Essentially, we are approaching a point in history where we have the genealogy and the expertise to alter our genetic makeup in ways which seemed unthinkable even a decade ago Genetic engineering provides many advantages to human life such as eradicating disease and eliminating undesirable traits, however it also raises serious bioethics concerns such as those examined in Cataract and Brave New World.