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# Human Cloning: Fact or Fiction

An Interactive Qualifying Project Report  
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by

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## *Abstract*

Human Cloning: Fact or Fiction is an evaluation of the portrayal of cloning in the media. Cloning technology has not only made a huge impact in the scientific community, but it has also affected the general community. Cloning is often misrepresented in literature and films, however, giving the public only a partial picture of the different aspects of cloning, such as religion, ethics, and government. Informing them of the facts of cloning technology will form better educated opinions.

## ***Section 1 - Introduction***

In 1997, Dolly was created and cloning became a household word. Before this event, cloning was just a possibility, a fictional thread to weave together tales of science fiction. Once Dolly was born, however, there could be serious talk of cloning and these stories that once seemed like fiction could be considered reality. However, can stories like this really be considered reality?

In most fictional books and movies, cloning starts as an amazing scientific breakthrough. However, one or more characters take advantage of the technology and attempt to create, for instance, the perfect army, or a Hitler for the current generation. It could even be as innocent as creating clones to help do a particular tedious task, but even then they get out of hand. There are very few novels that accurately portray and promote cloning to be a worthwhile and scientifically worthy notion.

The science of cloning is such: somatic cell nuclear transfer is used, with DNA coming from a single cell taken from her mother egg, which is fused with the mammary cell. The fused cell then develops into an embryo, which is implanted in a "surrogate" sheep. The embryo grows into a baby, ideally, which is genetically identical to the donor. Cloning is, in simple terms, when an exact genetic copy is created of something that already exists. In the case of living creatures, cloning is when an identical copy of an organism is created without genetic material from a mother and a father. An adult nucleus is taken and inserted into an egg from which the nucleus has been removed using electric shock. This simulates the creation and growth of an embryo because the egg

believes it's been fertilized by just fusing the adult nucleus to the egg. This embryo is then implanted in a mother and nine months later, a genetic clone is born.

This kind of issue is important to many people, but also is one of the most debated. There are many different opinions on cloning, coming from various religions and governmental sources. President Bush spearheads a powerful group of conservatives in the federal government who are wary that cloning and stem cell research infringe on basic human rights, and by doing so should be outlawed. The promise that therapeutic cloning could potentially cure many diseases and ailments that are currently incurable helping millions of citizens, feeds the debate. Many of the liberal states are currently passing legislation to support stem cell research for the purpose of therapeutic cloning. Most of those who oppose the research do so because of religious beliefs. The Catholic Church is staunchly opposed to all research that involves human embryos because they view this as the destruction of human life and akin to murder. Many other religions, however, that have a different view of the afterlife and the soul of a human being have no objection to therapeutic cloning, and are in fact in full support of further research.

Since cloning exploded onto the scientific community, there have been many opinions and views on how it should be controlled. Many people feel that there are too many ethical questions that need to be answered before cloning can even be attempted on humans. Some of these issues include, if the technology is currently safe for humans or if it ever will be safe, fear of the

slippery slope problem and cloning being taken too far, whether or not therapeutic cloning should be used, and the psychological effects that could result from cloning human beings. These issues must be addressed and regulations need to be put in place on an international level in order to ensure that if cloning is performed, it is safe and ethical.

With the arrival of many scientific advances and innovations in society, there come many effects that were not originally predicted. With genetic engineering, there are many psychological aspects that could possibly have a negative effect on human disposition. When humans use science to augment what was originally created in nature, there are many consequences that need to be addressed. One needs to assess whether these genetic changes could have an effect on human mental power and social coordination. Also, there is a possibility that these individuals may feel ostracized or inferior because of their genetically engineered heterogeneity. Thus, cloning and genetic engineering may have a negative effect on the development of human psychology and social acceptance.

Cloning has become a hot topic in realm of American society and with this increased attention it has become a large focus in the media. Issues of genetic engineering have surfaced in film and literature, in which it can be portrayed quite accurately at times and quite erroneously at others. It is an equivocal issue because cloning could create some serious psychological harm to human beings, but could also have various medical uses that could improve the lives of human beings. Thus, some media outlets have the ability to portray cloning with striking

scientific certainty (such as Brave New World), however it is oftentimes misrepresented in literature and film.

These are the types of aspects that authors seem to comment on in literature, not only the current literature, written while cloning has made great strides in these fields, but also, in literature written when cloning was purely science fiction. The messages that these authors are sending to the public often misrepresent the truth behind the science, giving the public a bias. This bias, however, is undeserved unless the literature is compared to the truth.

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Today, some of the greatest possible advancements in medical technology are in the field of human cloning. Therapeutic cloning has great potential to cure cancer, genetic conditions, grow new organs, and many other problems medical science has not yet been able to cure. Reproductive cloning

offers a chance to replenish the world of endangered animals. However, these possible advancements are being undermined by the government, while also often being maligned by the media and Hollywood. Cloning has often been unfairly portrayed as an evil and immoral act in many books, movies and other forms of media.

# **Section 2 - Fact**

## **2.1 Science**

When children first go to elementary school, there are certain things that are considered “the basics” for each subject. For instance in math classes, one of the first main focuses is on making sure students know basic skills like multiplication, division, addition, and subtraction. In elementary school science classes, one of the most basic ideas is the scientific method. The scientific method is the best way defined, so far, for separating the truth from lies and is, if defined simply, as such:

- 1. Observe some aspect of the universe.
- 2. Invent a tentative description, called a hypothesis that is consistent with what you have observed.
- 3. Use the hypothesis to make predictions.
- 4. Test those predictions by experiments or further observations and modify the hypothesis in the light of your results.
- 5. Repeat steps 3 and 4 until there are no discrepancies between theory and experiment and/or observation. <sup>1</sup>

There is no talk of ethics, no talk of feelings, and no talk of how religious beliefs will affect work. Scientists are trained to think about science. They are trained to think in scientific ways, meaning that all the while performing scientific

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<sup>1</sup> [http://phyun5.ucr.edu/~wudka/Physics7/Notes\\_www/node6.html](http://phyun5.ucr.edu/~wudka/Physics7/Notes_www/node6.html)



experiments, the only thought in their minds are “How will this technology help the scientific community?” To a scientist, cloning is not only a chance to achieve fame for being one of the first to investigate a recent scientific breakthrough, but an opportunity to learn more about life and the creation of life. However, in today’s world, ethics are becoming a larger part of what science is, possibly due to the more politically correct vision that is strived for, as worldwide equality is still in progress, or, perhaps in the case of cloning, the magnitude of the ethics involved. Most scientists still try to think of the science first and how it will benefit mankind in the future, but it is much more difficult than before the field of bioethics existed.

The field of bioethics didn’t even come into existence until the late 1960s, early 1970s. By this time, the basic structures of genetic components were confirmed and the technology of engineering could be applied and the fundamentals of genetics could be investigated. The ethics of the past did not contend with this new technology (because it did not exist) and bioethics was born.<sup>2</sup> Ethicists have always argued about the possibilities of the technology that is developed, and scientists have consistently argued back to ethicists, complaining that many of the arguments they’re dreaming up are just fiction, and will always be so. Clearly, this doesn’t disturb scientists who are only trying to make progress possible for the advancement, and hopefully betterment, of mankind. To a scientist, cloning offers only great opportunities for advancement, but when the issues are stacked this high, their closed vision could be a problem for some.

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<sup>2</sup> <http://www.eugenics-watch.com/roots/chap17.html>

Cloning, in simple terms, is making an exact genetic copy is created of something that already exists. This doesn't mean that personalities or their lives are going to be the same. It simply means that someone/something who hadn't an identical twin before the cloning process now has one. For example, if there are two eggs laid on a table and one was hard boiled and the other was raw, there would be no way to tell the difference just by looking: the outside is exactly the same. However, when looking inside the egg, the difference is obvious, but only once you get past the outside.

There are two different recognized types of human cloning: cloning for reproductive use, and cloning for therapeutic use. Reproductive cloning is used to generate an animal or human that has the same nuclear DNA as an already existing animal or human. The process through which this is done is called "somatic cell nuclear transfer", or SCNT for short. The genetic material from the nucleus of a donor adult cell is transferred to an egg whose nucleus has already been removed. These ova are collected through a pinhole surgery known as laparoscopy. The ova are then maintained in a nutrient medium, providing them with the necessities to thrive. Since the failure rate is high, it is necessary to begin with a larger number of ova, so that finally at least one successfully reaches the last stage. The reconstructed egg is treated with either an electric current or chemicals to stimulate cell division. Once the clone's embryo reaches a suitable stage, it is transferred to the uterus of a host female where it will continue to develop until it is born. Any animal that is cloned using this method is not truly identical to the original donor animal. Only the clone's chromosomal or

nuclear DNA is the same. Other genetic materials may surface from the mitochondria of the enucleated egg. They contain their own segments of DNA.<sup>3</sup>

Therapeutic cloning is the production of human embryos for use in research. Unlike reproductive cloning, the goal is not to bring cloned human beings to term, but to harvest stem cells from them that can be used to research human development and treat disease. Stem cells are the most basic type of cell and can be manipulated to generate any type of cell in the body. Stem cells can be extracted from the cell while it is a blastocyst. The reason stem cell research starts a whole new controversy over ethics, is due to the fact that the extraction process destroys the embryo.

The cloning technology can be used in a variety of ways. Endangered animals can be repopulated by using reproductive cloning. Families who are unable to become pregnant by the natural method can have another option. Therapeutic cloning holds a higher value for human welfare by helping to treat and save those with diseases whom, without stem cells, wouldn't survive. Researchers hope that this technology will someday be used to help produce whole organs and tissues from single cells, or to produce healthy cells that can replace damaged cells in degenerative diseases.

Although cloning in terms of science seems like a groundbreaking concept, the reason there are so many opponents, even in the scientific world, is because currently these technologies are very expensive, highly inefficient and unsafe. More than 90% of cloning attempts fail. Cloning just one person could take up to as many as 1,000 eggs and 20 to 50 surrogate mothers. In the past,

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<sup>3</sup> [http://www.ornl.gov/sci/techresources/Human\\_Genome/elsi/cloning.shtml](http://www.ornl.gov/sci/techresources/Human_Genome/elsi/cloning.shtml)

cloning has produced animals that have poorer health, with higher rates of infection, tumor growth and other disorders<sup>4</sup>, which leads people to wonder if they want to bring this sort of suffering upon human beings.

Cloning first became a widely known topic of discussion when Dolly, the sheep, was cloned by Dr. Ian Wilmut on July 5, 1996 in Roslin, Scotland at the Roslin Institute. Dolly was the first documented mammalian clone and when she was born, it gave new life to a possibility that seems to have been written off by the general public and scientists.<sup>5</sup> However, the history of cloning science goes back much farther than that and the history of genetic engineering goes back even further than that.

The history of genetic engineering begins even in prehistoric times up until the 1900s. Farmers and gatherers have been experimenting with different ways to get the best crops. However, in 1880, Gregor Mendel gave substance to genetic engineering by his research of pea plants. Mendel found that characteristics are transmitted in discrete units called genes. The presence of these genes in an organism dictates the expression of certain traits. Mendel had become the first person to trace hereditary characteristics.<sup>6</sup>

Also in 1880, August Weissmann stated that genetic information of a cell diminishes with each cell division. He showed that mice whose tails are cut off do not produce short-tailed offspring. This was a big step moving away from previous thinking that biological characteristics are mutable. People in this time

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<sup>4</sup> [http://www.ornl.gov/sci/techresources/Human\\_Genome/elsi/cloning.shtml](http://www.ornl.gov/sci/techresources/Human_Genome/elsi/cloning.shtml)

<sup>5</sup> Kolata, Gina. Clone : The Road to Dolly and the Path Ahead  
New York, NY William Morrow and Company 1998, p. 1

<sup>6</sup> [http://www.accessexcellence.org/RC/AB/BC/Gregor\\_Mendel.html](http://www.accessexcellence.org/RC/AB/BC/Gregor_Mendel.html)

believed that human races were ranked hierarchically, with white Christians being at the top, and if you were born into a “lower race”, it was believed that surrounding the race with Christianity would help raise them to a higher status. However, if race is genetic, then there was no hope for mankind.<sup>7</sup>

Walter Sutton in 1902 became the first scientist to provide evidence that chromosomes were the unit of inheritance. He noted that in the process of meiosis, chromosomes occur in pairs and each chromosome goes to its own cell when the pair splits. He also discovered that chromosomes contained genes. Hans Spemann, an embryologist, came up with the idea currently known as embryonic induction, also in 1902. He succeeded where others had failed by dividing a salamander embryo into two, using a very simple method. He used a strand of hair, slipped it over a two cell embryo, until it split. Amazingly, both embryos grew into normal salamanders. He continued his research in this method, sometimes resulting in two heads. He also showed that larger celled embryos were still capable of direct development. This shows that all the genetic material needed to create a living being is contained inside the early embryo cells, embryonic induction.<sup>8</sup>

In 1928, Fredrick Griffith began an experiment to show that DNA was connected to inheritance. Oswald Avery confirmed this fourteen years later with a continuation of Griffith’s experiment. He destroyed the lipids, ribonucleic acids, carbohydrates, and proteins of a virulent pneumonia. Transformation still occurred after this. Next he destroyed the deoxyribonucleic acid.

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<sup>7</sup> <http://gupress.gallaudet.edu/excerpts/GDDone.html>

<sup>8</sup> Kolata, Gina, p. 57

Transformation did not occur and hence, he concluded that DNA is the “inheritance molecule”.<sup>9</sup> In the 1940s, a chemist named Erwin Chargaff came up with a better model of DNA. He noted a pattern in the amounts of the four DNA bases: adenine, guanine, cytosine and thymine. He took samples of DNA of different cells and found that the amount of adenine was almost equal to the amount of thymine, and that the amount of guanine was almost equal to the amount of cytosine. This is now called Chargaff’s Rule and more than sixty years later, this holds valid.<sup>10</sup>

In 1952, Alfred Hershey and Marsha Chase conducted an experiment connecting DNA (deoxyribonucleic acid) to heredity. This is the way in which the experimentation was conducted: Two virus cultures in which the protein capsule is labeled radioactive sulfur or the DNA core is labeled radioactive phosphorus. The radioactively labeled phages are allowed to infect bacteria and blending dislodges phage particles from bacterial cells. Then, centrifugation concentrates cells, separating these cells from the phage particles left from the centrifugation process. Hershey and Chase saw that radioactive sulfur was found predominantly in the leftover portion from the centrifugation and the phosphorus was found predominantly in the cell portion, from which a new generation of infective phage can be isolated. They concluded, by process of elimination, that the active component of the bacteriophage that transmits the infective

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<sup>9</sup> <http://library.thinkquest.org/20465/griffith.html>

<sup>10</sup> <http://www.answers.com/topic/erwin-chargaff>

characteristic is the DNA, hence a clear correlation between DNA and genetic information.<sup>11</sup>

1952 contained another milestone for genetic research and cloning. Robert Briggs worked with embryos of the northern leopard frog. He was urged into trying to transplant a nucleus from a frog cell into a frog egg to see if the DNA would be damaged or whether a normal frog would develop. The first few attempts were failures, however, eventually, one of the eggs survived and appeared to be developing. Briggs and his team tried again to confirm their results, and were happy to get just that. The next step for cloning would be to see if frogs or any other animal could be cloned from fully differentiated cells.<sup>12</sup>

Just a year later, James Watson and Francis Crick made a breakthrough in the microstructure of genetic material. They discovered that the structure of DNA was the double helix by using Rosalind Franklin and Maurice Wilkin's previous work done on the structure. Franklin and Wilkin created an x-ray pattern of DNA, and it was seen that the pattern contained rungs as well as a helical shape. Their model showed a double helix with little rungs connecting the two strands. These rungs were the bases of a nucleotide. At first Watson and Crick were set back with a problem, how to bond the bases together, and how to solve the problem of the sizes of the bases. Adenine and Guanine were purines having two carbon-nitrogen rings in their structures. Thymine and Cytosine were pyrimidines having one carbon-nitrogen ring in its structure. If DNA were to have

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<sup>11</sup> <http://opbs.okstate.edu/~melcher/MG/MGW1/MG11212.html>

<sup>12</sup> Kolata, Gina., p. 64

its bases pair up so that the purines and the pyrimidines were together, then it would look wobbly and crooked. Watson and Crick then found that if they paired Thymine with Adenine and Guanine with Cytosine DNA would look uniform. This pairing was also in accordance with Chargaff's rule. They also found that a hydrogen bond could be formed between the two pairs of bases. In all DNA strands if one side has a Thymine base then the other has the opposite: Adenine and so on with Guanine and Cytosine. Each side is a complete compliment of the other.<sup>13</sup>

In the 1960s, scientists cracked the genetic code and put cloning on the horizon. In 1962, John Gurdon cloned a frog from differentiated cells. He began his work stemming off from what Briggs had started, except using differentiated cells. However, his frogs only developed 2% of the time, and they never made it past the tadpole stage.<sup>14</sup> In the mid-60s, Marshall Nirenburg, Heinrich Mathaei, and Severo Ochoa cracked the genetic code by determining which codon sequences corresponds to which amino acid. This means they figured out which three bases in a DNA or RNA sequence specify a single amino acid. This led to a massive increase in genetic engineering research.<sup>15</sup>

In 1973, Herbert Boyer and Stanley Cohen created the first recombinant DNA organisms. This pair invented the technique of DNA cloning, which allowed genes to be transplanted between different biological species. Their discovery signaled the birth of genetic engineering. Boyer and Cohen recognized that living

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<sup>13</sup> <http://www.time.com/time/time100/scientist/profile/watsoncrick02.html> Watson, The Double Helix

<sup>14</sup> Kolata, Gina., p. 68

<sup>15</sup> <http://library.thinkquest.org/C0122429/history/history2.htm>



organisms are able to serve as carriers for genes from another organism, enzymes cleave and rejoin DNA fragments that contain such genes, and DNA molecules from one organism can be precisely targeted and manipulated for insertion into the DNA of another organism. Within several years, enhanced by new techniques for mapping and rapidly sequencing genes, genetic engineering became the basis for an explosion in biotechnology.<sup>16</sup>

Progress continued until the next big milestone. A Danish scientist named Steen Willadsen succeeded in cloning a sheep from embryo cells. His work was the first verified cloning of a mammal using the method of nuclear transfer. Willadsen made a genetic copy of a lamb from early sheep embryo cells using a process now called "twinning." Other scientists will eventually use his method to "twin" cattle, pigs, goats, rabbits and rhesus monkeys. He joined Grenada Genetics to commercially clone cattle the next year and successfully clones a cow using differentiated, one week old embryo cells. The work proved that the genetic information of a cell did not diminish as a cell specialized and that DNA could return to its original state. Willadsen never officially published his results, but the work was a strong influence in Ian Wilmut's decision to attempt to clone from adult cells, which he accomplished in the famous 1996 birth of "Dolly."<sup>17</sup>

Three men named Neal First, Randal Prather, and Willard Eyestone were also influenced by Willadsen's work in 1986 at the University of Wisconsin. They used

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<sup>16</sup> <http://library.thinkquest.org/C0122429/history/history2.htm>

<sup>17</sup> <http://www.reproductivecloning.net/hosting/waite/>

the same method to clone a cow from embryo cells that grow to at least 120 cells.

In October of 1990, the National Institutes of Health officially began the Human Genome Project, a massive international collaborative effort to locate the 50,000 to 100,000 genes and sequence the nucleotides to make up the entire human genome. By determining the complete genetic sequence, scientists hoped to begin correlating human traits with certain genes. With this information, medical researchers have begun to determine the intricacies of human gene function, including the source of genetic disorders and diseases.

In July 1995, Ian Wilmut and Keith Campbell of the Roslin Institute in Scotland successfully cloned two sheep, named Megan and Morag, from differentiated embryo cells. Wilmut replicated First's experiment with differentiated cells from sheep, but puts embryo cells into an inactive state before transferring their nuclei to sheep eggs. The eggs develop into normal lambs. A year later, Wilmut created Dolly using a technique similar to that with which they created the first sheep from differentiated embryo cells, which is outlined earlier.<sup>18</sup>

To this day, the science and technology that propels cloning continues to make further advances. Today, it's even possible to send in a sample of recently deceased pet and get a genetically identical animal in return. With so many possible benefits, it seems impossible that so many would want to stop the

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<sup>18</sup> Kolata, Gina, p. 1

development of the field. Research in therapeutic cloning is purely for the investigation into the whys of how certain diseases work to help banish them forever and reproductive cloning could help replenish endangered animals across the globe. In the future, there may be even more possibility for advancement.

## ***2.2 Government and Religion***

The potential to cure so many medical ailments, coupled with the hazy ethical boundaries surrounding stem cell research, has made cloning one of the most difficult issues to address on Capital Hill. To address the ethical dilemma facing the nation the President appointed a council to tackle the matter on November 8, 2001. On July 10, 2002, the President's council on bioethics issued its report on human cloning. The council considered seven policy options: Professional self-regulation with no legislation action; A ban on cloning to produce children neither endorsement nor restriction on cloning for biomedical research; a ban on cloning to produce children with regulation of the use of cloned embryos for biomedical research; Governmental regulation perhaps by a federal agency with no legislative prohibitions; a ban on all human cloning to produce children or biomedical research; A ban on cloning to produce children with a moratorium for biomedical research; a moratorium on all human cloning whether for research or to produce children.<sup>19</sup>

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<sup>19</sup> Presidents Council p xxv-xxxv; 195-223

The majority of the council decided that there should be an outright ban placed on cloning for the purpose of creating life, and a four year moratorium placed on cloning for the purpose of biomedical research. The reason of the moratorium was multifaceted. First, to find out the moral consensus of the national majority; to find provide time to gain needed scientific knowledge; time to educate the public so that well informed debates can lead to a better informed decision; and finally our of respect for those large groups of citizens vehemently opposed to cloning. A secondary proposal given by a minority group in the council advised that an outright ban be placed on cloning with the purpose of creating life, but cloning with the purpose of biomedical research proceed with little impediment. They opposed the moratorium because they felt that the ban adequately addressed the ethical concerns of misusing and abusing embryos, thus paying proper respect to those embryos sacrificed in research. This minority believes that research should be allowed to continue as long as the research is being used to benefit medical science, and that these potential benefits greatly outweigh the sacrifice of any embryos.<sup>20</sup>

The intentional destruction of a human embryo, that if properly stimulated could become a human being, for the purpose of cultivating stem cells is what conservatives in our government find reprehensible. The potential for life contained in the embryonic cells is the focal point of nearly all those, such as President Bush, who objects to, and wish to prevent or extensively limit further cloning research. Senators Sam Brownback (R-Kansas) and Dave Weldon (R-Florida) are some of those who lead the campaign against cloning research.

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<sup>20</sup> Presidents Council p 225-256

They have been pushing anti-cloning bills through Congress since 2001. President Bush is likely to endorse such bills into law. Such laws could punish violators with up to \$1 million in fines and jail time.<sup>21</sup> As of today research continues under the guidelines that President Bush set forward. The derivation process took place before 9:00 pm EDT August 9, 2001. That the embryo is unneeded remains of in-vitro fertilization. And finally, that the embryo was knowingly donated without any financial compensation.<sup>22</sup>

The United Nations is so far taking much the same stance as the Bush administration on the topic of human cloning in all its forms. On March 8, 2005, The UN passed a nonbinding ban on all forms of human cloning by a vote of 84-34. The ban was a hard fought victory for the opposition, the culmination of four years of debate. However, the ban has little real strength, but is a victory for the religious objectors to cloning who were the greatest supporters of the bill. Proposed by Honduras, and backed predominantly by other Catholic countries; the ban stands as testament to the political power the Church still holds. However, with 37 countries refusing to vote, and vehement opposition by influential countries such as Great Britain; it is clear that the international community is by no means prepared to outlaw human cloning, especially for therapeutic purposes.<sup>23</sup> Expressing its unconcern with the UN's decision Australia decided later that same month that it was prepared not to continue with the pursuit of a three year moratorium on human cloning. The decision effectively allows stem cells created after April 5, 2002, may now be used in stem

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<sup>21</sup> <http://www.wired.com/news/medtech/0,1286,66533,00.html>

<sup>22</sup> <http://stemcells.nih.gov/policy/NIHFedPolicy.asp>

<sup>23</sup> <http://www.stemnews.com/archives/000465.html>

cell research. Despite strong outside support to extend the moratorium Prim Minister John Howard abandoned effort after finally failing to obtain state and territory consensus.<sup>24</sup>

Within the United States the scientific community is anxious to realize the potential of therapeutic cloning. There is potential for great financial gain pending a realization or marketable cures for diseases like Parkinson's and spinal cord injuries. This is prompting many of the more liberal states that are home to the researchers, to pass state sponsored support for the research into law. Many states, California and Massachusetts in particular, but also Maryland, New York, New Jersey, Kansas, Illinois, Virginia, and Utah, have passed into legislation or are considering with strong support bills that will provide protection and in many cases state funding for stem cell research.<sup>25</sup>

The State of Massachusetts composed a bill in late March of 2005 laying forth guidelines of operation. Under these guidelines, institutions wishing to conduct cloning research must apply for a license from the state, and submit reports of their activities to a newly formed panel of cloning review. Hefty fines of up to a million dollars would be handed down for infractions of the guidelines, which include cloning with the purpose of creating life.<sup>26</sup> On April 11, 2005, the Massachusetts senate passed the bill by a vote of 35-2 also passing an amendment that supports education of umbilical cord blood banking for maternity patients.<sup>27</sup>

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<sup>24</sup> "[http://www.thecouriermail.news.com.au/common/story\\_page/0,5936,12657378%255E421,00.html](http://www.thecouriermail.news.com.au/common/story_page/0,5936,12657378%255E421,00.html)"

<sup>25</sup> <http://www.stemnews.com/archives/stem-cells-and-government.html>

<sup>26</sup> Greenberger, Scott

<sup>27</sup> <http://www2.townonline.com/brookline/localRegional/view.bg?articleid=219348>

Romney has said that he will veto any bill supporting stem cell research because he believes that an embryo that has the potential to become a human should not be destroyed. He has stated that embryos left over from in vitro fertilization that are going to die anyway could be used in the research, but he is against the harvesting of embryos that may have the potential to become humans. Scientists and supporters argue that somatic nuclear transfer, the process used in therapeutic cloning, does not create a fertilized embryo that has the potential to become a human. The process involves removing the nuclear material of the cell and replacing it with the desired nuclear material tricking the cell into thinking it has been fertilized when in actuality it has not. Most scientists agree that the cell could not be implanted in a womb, and if it were it would not grow. Supporters of the bill are convinced that the more people learn about the technology the more likely people that are undecided will become supporters, and are hopeful this will carry the two thirds majority needed to overturn the veto.<sup>6</sup>

Romney's decision to oppose cloning is often criticized by local media as a ploy to distance himself from the liberals in Massachusetts in preparation for an expected try for the presidency come the next election. Recent polls show that the governor's chosen stance may have carried with it a large drop in approval ratings, particularly with young college students.<sup>28</sup> As people begin to understand the science behind therapeutic cloning most of them support its research. Every year people become better educated about embryonic stem cell

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[http://home.businesswire.com/portal/site/google/index.jsp?ndmViewId=news\\_view&newsId=20050425005150&newsLang=en](http://home.businesswire.com/portal/site/google/index.jsp?ndmViewId=news_view&newsId=20050425005150&newsLang=en)

research and with knowledge comes support. A recent poll suggests that 63% of Americans are in favor of stem cell research, and 70% are in favor of legislation that promotes the research.<sup>29</sup> Conservatives are racing to prevent any further research on human cloning, but hopefully public support will continue to grow, and with the support of the states that provide safe haven for the research scientists will be able to perform new medical miracles effectively silencing the majority of the opposition.

In the 1800's the advent of microscopes forced the Church to confront the reality of cellular existence invisible to the naked eye. After witnessing the union of sperm and egg, the Church was forced to reconsider the point at which life begins. The Catholic Church once held the belief that human life did not begin at conception, but rather held the same view as Islam and Jewish faiths, that the soul is infused in the body between 40 to 80 days after pregnancy is established. Changing times and new scientific advances continued to challenge the Church's doctrine.<sup>30</sup>

All questions were answered on July 25, 1968 when, Pope Paul VI issued the *Humanae Vitae* a statement that made clear the position of the Catholic Church on human life and how it should be created. It was with this statement that the Church famously condemned all forms of birth control, and stated that the only proper way to create life was through natural intercourse within a consecrated marriage.<sup>31</sup> From this statement it is concluded that in-vitro fertilization, cloning, or any manipulation of genetics to create or end life is a sin,

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<sup>29</sup> Jones, Mike

<sup>30</sup> Herdsman

<sup>31</sup> *Humanae Vitae*



and not intended by God. Pope John Paul II exercised unflappable support of the *Humane Vitae* throughout his papacy. When confronted with the reality of cloning John Paul II championed human rights and made clear the Church's disapproval of the technology. The Pope John Paul II made clear that the Church respects the potential of therapeutic cloning, but believes that the destruction of human embryos is unacceptable. John Paul II urged the scientific community to continue research, and help those in need, but to concentrate research on adult stem cells, not embryonic, to preserve human dignity and the sanctity of life.<sup>32</sup>

On September 23, 2002, the Church expressed its opinion to the United Nations. They called upon the United Nations to recognize that cloning, in all forms, necessitates the intentional destruction of multiple human embryos. The Church pleaded that this is an obvious violation of the basic human rights of these embryo to live, and therefore allowing it to take place is in total contradiction of why UN was formed, to protect those members of the world unable to do so themselves.<sup>33</sup> On September 30, 2003 the Church further clarified to the UN that its objection is not with the science used in cloning, but with the end result of the cloning, and the specific cells that are being used. It condemned reproductive cloning as a gross violation of human dignity, but also recognized the exciting possibilities of therapeutic cloning. The Church again beseeched that adult stem cells be used in research rather than embryonic cells

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<sup>32</sup> John Paul II

<sup>33</sup> HOLY SEE DELEGATION

out of respect for human life.<sup>34</sup> The impact of these dissertations was recently seen when a non binding ban on human cloning was passed by the UN on March 8, 2005. The ban was proposed by the strongly Catholic country Honduras, and most of the 84 countries that support the ban are also Catholic.<sup>35</sup>

So much of the Catholic's objection to cloning revolves around the concept of each embryo possessing a life, and each life a soul. Buddhism and Hinduism have vastly different concepts of life and its purpose than the western religions, and therefore have very different views on cloning. Hindu scripture contains many writings that can be used to justify cloning, including the creation, or cloning, or a parallel universe. Life is a force presided over by Gods; therefore the manner in which life is created, natural, supernatural, and even unnatural, is simply life, and should be treated as such. There is even a story of a demon that could clone himself from a single drop of his own blood, the encounter of the Great Goddess with the demon Raktabija. If Raktabija was injured in a battle he could recreated himself from a single drop of blood that had fallen on the ground. However, the Goddess used her cunning to overcome the demon's amazing regenerative capacity; she used her extra long tongue to lick up all of his blood before it fell to the ground. This story could be interpreted as a doomsday cloning scenario, such as the one presented in *The Boys From Brazil*. The Hindus trust the goodness of people and gods to protect them from evils.<sup>36</sup> Hinduism does not completely endorse cloning; it is simply not against it. Reproductive cloning seemingly serves no purpose in the Hindu faith; it does not increase human

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<sup>34</sup> Archbishop Celestino Migliore

<sup>35</sup> <http://www.stemnews.com/archives/000465.html>

<sup>36</sup> Sharma, Arvind

consciousness or improve life in any foreseeable way. Therefore, Hindus believe that reproductive cloning is misguided and unnecessary, but not evil.

Therapeutic cloning on the other hand shows valuable potential and is therefore worth pursuing. The potential to remove so much suffering from curing diseases like Parkinson's, leukemia, and spinal cord injuries would improve the lives of millions. It would be wrong not to pursue therapeutic cloning because doing so impedes one of the most obvious ways to increase the quality of life among a large number of people.<sup>37</sup>

Eastern religions view life as a cyclical process, cloning is often thought of simply as a new way to think of life recycling itself. Reincarnation negates, in a way, the destruction of embryos for the purposes of cloning stem cells. It is not that an embryo is not life, but the fact that cells created from its destruction may do so much good. The intention is what matters in Buddhism; therefore therapeutic cloning with the intention of helping is a noble and valuable cause. New York bioethicist Murray joked, "The Buddhist perspective in particular is one that scientists who work with mice and rats should probably take more seriously, unless they come back in precisely that form." Laurie Zoloth, professor of medical ethics and a scholar of religious studies at Northwestern University in Chicago believes that other religions could look at Buddhism and find ways to change and adapt with the times without comprising deeply held religions beliefs and traditions.

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<sup>37</sup> Logston

## 2.3 Ethics

In the world today, people have many different opinions on what is right and wrong in the field of biotechnology. Ethicists, scientists, politicians, and religious figures debate over such issues as when a baby begins living or if the use of stem cells is ethical. One of the most highly debated issues is the right to clone humans and to what extent it should be used. There are people who feel that cloning can be beneficial when used in the right circumstances, such as by people who can not have children in the traditional sense. Then there are people who feel that humans have no right messing with what God created and humans should never be cloned. After Dolly the sheep was cloned in 1997, a survey was taken in America and it showed that two-thirds of the people surveyed felt that cloning was morally unacceptable.<sup>38</sup> There is no doubt that there are some serious ethical issues, such as its safety, personal choice of people involved, and the slippery slope problem that may arise in the discussion of human cloning which should be analyzed heavily before any decisions are made on the topic.

Dolly was cloned in February of 1997 and it was actually a matter of some chance. Scientists began with two hundred seventy seven cells which were donor cells fused with unfertilized eggs. Of those two hundred seventy seven, only twenty nine became embryos. Those twenty nine embryos were implanted into thirteen ewes, and out of that came Dolly.<sup>39</sup> Many critics of cloning claimed that these statistics were not very good, and that those chances could not be taken on human lives. They felt it would not be worth it for a large number of

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<sup>38</sup>Lee Silver, Remaking Eden p.92

<sup>39</sup> Silver p.9

human embryos to be created only for a certain amount of them to turn out as actually humans.

What the critics failed to realize was that these were the very first successful trials and obviously cloning technology would improve as more experiments were done. Developments could be seen very early by looking at a Wisconsin company that cloned an entire group of healthy calves with new technological advances just six months after Dolly was born.<sup>40</sup> Researchers believe more experiments done with animals which are closer related in genetic data to humans, such as monkeys, will tell a lot more about the chances that humans have of being cloned.

Through the life and death of Dolly on February 14<sup>th</sup> 2003 from a lung disease much more can be learned about the effects of cloning on animals. Early on in its life Dolly was diagnosed with arthritis, which was thought to be caused by inheriting short telomeres from her mother causing Dolly to be just as old genetically as her mother when she was born. When Dolly died at the early age of six years old and normal sheep live to be around 11 or 12 the theory of clones dying young due to short telomeres was given its first solid piece of evidence.<sup>41</sup> If it is true that all clones will inherit the age of the person they were cloned from that could mean that humans should only be cloned from new born children. If they were cloned from an older person you would be subtracting the number of years old the person was from the life of the cloned person. It would

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<sup>40</sup> Silver p.105

<sup>41</sup> <http://www.globalchange.com/clonenews.htm>

not be ethical to clone a person knowing that you would be shortening their life from what it really should be.

While there are chances that human cloning research could progress and be safe, there are recent studies which show that it might not be so safe. "Some scientists reported to be abandoning cloning because the vast numbers of lethal mutations and other major abnormalities."<sup>42</sup> Up to twenty-five percent of cloned pigs, cows, goats, and mice grow much larger than normal, may abort spontaneously, or have underdeveloped lungs. Similar results were found in experiments done on mice in Japan. Ten out of twelve cloned mice born apparently healthy at birth lived less than eight hundred days, dying from damage to immune systems, pneumonia, liver failure, and spontaneous abortions. These studies indicate that cloning might not be very safe and that human cloning is too risky to perform. While continued research will help discover whether cloning humans safely is possible these studies show that cloning may have problems that can not be solved.

One of the major implications that cloning could have is with the slippery slope problem. This is when a new technology comes out that is controversial, and an exception is made to the rules, and then another, and then another. People will soon be completely ignoring the rule because of all of the exceptions that have been made. By making the initial plunge into the new technology people feel that it will be easier and easier to make new steps which might not be beneficial to society. One of the main fears that people have about the slippery

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<sup>42</sup> <http://www.globalchange.com/clonenews.htm>

slope problem in cloning is that if we develop and improve the technology of cloning human embryos for purposes of research and therapy, there will be scientists who misuse the technology for purposes of human reproduction. These scientists might feel that exceptions were made for therapeutic cloning, so why can't they also be used in reproductive cloning. Another scientist could then decide that reproductive cloning was attempted, so why not try to attempt cloning a whole litter of cloned babies to experiment with. While the slippery slope problem does not break conventional logic, it allows people to not follow the rules based on their opinions of previous exceptions. This could potentially lead to many problems because someone could believe that any exception to any rule is OK based on their own reasoning.

In the past there have been many other ethical issues with slippery slope problems that have been debated. Examples of these types of technologies are computers, euthanasia, abortion, and the atomic bomb. People feared that they would have awful consequences, but today they are all under control for the most part and commonplace in the world. However there are others who feel that they are not under control and the slippery slope problem could still apply to them. One of the main ways to avoid the slippery slope problem is to regulate them from the beginning, which will be described later in this section.

There are possible negative implications of cloning that could take place under extreme circumstances. A nation trying to enslave women in order to produce a master race of clones with peak physical and mental performance is one theory that has been discussed. Another thought is that cloning will bring

about the return of eugenics; however this falls more on the side of genetic engineering. Considering DNA can be taken from any human cell, it is possible to steal someone's DNA and make a clone from them without their consent. On that same note it could be possible to clone a historical or religious figure in hopes that they would be the exact same person as the original. In actuality this would be almost impossible to do since much of a human being is drawn from the environment surrounding them and not just their genetic makeup, and it would be almost impossible to reenact someone's entire life.

While all of these scenarios are possible, you must also ask the question, why assume the worst motives? All of these things could happen, but in actuality most would have very small chance of happening. The most likely scenario would be that people would use cloning for their personal benefit, and it does not affect anyone else in the world including the clone. There is no reason to believe anything other than this would happen. A small fear that something terrible could happen can not be a reason to hold back from change for the better for many people.

"In a society that values individual freedom above all else, it is hard to find any legitimate basis for restricting the use of reprogenetics.(a term for genetic engineering and cloning technology)" <sup>43</sup> This sentiment was felt by many after the ethics debate on cloning started several years ago. Many also thought that cloning should move on unhindered because every person has the right to reproduce. <sup>44</sup> For couples who are infertile and can not have children on their

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<sup>43</sup> Silver, p.9

<sup>44</sup> Klotzko The Cloning Sourcebook p.154



own by natural means, which is approximately eighteen percent of heterosexual couples and one hundred percent of homosexual couples<sup>45</sup>, technology gives them some chance of having a child that will be a genetic descendent of themselves. In-vitro fertilization has given many couples the opportunity to have children, but this process does not work for every couple. While adopting children or using egg or sperm donors is an option, it is natural for people to desire to have children that are genetic related to them in some way. Cloning would allow many more infertile couples as well as homosexual couples to produce offspring that had some genetic link with one of the parents.

Today in America there are no bans on human cloning, which may be a surprise to many people. The United States Senate at the end of 2001 rejected a plan to impose a 6-month ban on human embryo cloning. If it had passed, anyone who cloned or attempted to clone a human embryo would be liable for \$1 million in fines and up to 10 years of jail time. The President's Council for Bioethics suggested a reproductive cloning ban linked to a four-year halt on cloning research with the thought that at least four years would be necessary to set up appropriate rules to regulate cloning research. The council came to the following conclusions and recommendations:<sup>46</sup>

- I. The Commission concludes that at this time it is morally unacceptable for anyone in the public or private sector, whether in a research or clinical setting, to attempt to create a child using somatic cell nuclear transfer cloning

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<sup>45</sup> Silver p.116

<sup>46</sup> <http://www.georgetown.edu/research/nrcbl/nbac/pubs/cloning1/executive.htm>

- II. Federal legislation should be enacted to prohibit anyone from attempting, whether in a research or clinical setting, to create a child through somatic cell nuclear transfer cloning.
- III. Any regulatory or legislative actions undertaken to effect the foregoing prohibition on creating a child by somatic cell nuclear transfer should be carefully written so as not to interfere with other important areas of scientific research.
- IV. The federal government, and all interested and concerned parties, encourages widespread and continuing deliberation on these issues in order to further our understanding of the ethical and social implications of this technology.

The council outlines that it is not safe to clone humans at the current time and legislation is necessary to stop cloning, but not to interfere with important issues of scientific research. It also states that it is necessary for people to become informed about the issues and debate the possible implications of cloning in order to fully understand the issue. This ban did not pass through Congress because not enough support was shown for the bill.

While there is not a nationwide ban on human cloning many states have imposed their own bans on cloning. Some states have banned both reproductive cloning and therapeutic cloning including Arkansas, Iowa, Michigan, and South Dakota. Other states have only banned reproductive cloning and still allow therapeutic cloning for research purposes including California, Louisiana and Rhode Island.<sup>47</sup> In 1998, Michigan became the first state to impose regulations on cloning. Governor Engler signed the law making human cloning illegal with harsh penalties if it is attempted.<sup>48</sup> Michigan's government believes

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<sup>47</sup> <http://www.ncsl.org/programs/health/genetics/rt-shcl.htm>

<sup>48</sup> <http://www.euthanasia.com/clone4.html>

cloning to be unsafe as well as unethical due to the safety risks and placed bans on both therapeutic and reproductive cloning.

If there was a ban in this country, it may not effect research very much because there would be an entire world left where people could go and do research. While some countries do have their own set of regulations, there are many third world countries that can not be regulated very effectively. Scientists would be free to do whatever they wanted in these foreign countries if a ban were ever put into place in America.

While there are no regulations in most countries, there are other countries which have very active commissions that regulate cloning and embryo research. Japan has passed legislation punishing scientists 10 years in prison for cloning a human being and a fine of 10 million yen.<sup>49</sup> In the United Kingdom, the Human Fertilisation and Embryology Authority (HFEA) and the Human Genetics Advisory Commission (HGEC) have approved human cloning for therapeutic purposes, but not to clone children. A set of regulations has existed in Britain for more than 10 years which strictly regulates both embryo research and in vitro fertilization clinics there. The HFEA tracks the fate of every human embryo produced in Britain and mandates that all that are not implanted be destroyed by the 14th day of development, thereby eliminating the possibility of reproductive cloning.<sup>50</sup>

The best idea in my opinion would be to set up an international council on human cloning that would set regulations for what can and cannot be done. The council, possibly headed by the United Nations, would be in charge of

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<sup>49</sup> <http://www.globalchange.com/clonenews.htm>

<sup>50</sup> Francis Fukuyama. The Washington Post. "Our Cloning Policy"

regulating where to draw the line in on certain issues in order to make sure that the technology is not taken too far and does not fall into bad hands. While this seems like a good idea there would be no way to make everyone conform to these regulations. It would be too hard to search every building of every city in every country in order to look for laboratories where illegal cloning procedures were being done. Regulations would help, but there is no way to ensure that they would be one-hundred percent effective.

Another highly controversial issue in the scientific community is the issue of therapeutic cloning. This process is much the same as reproductive cloning however the cell is stopped from growing after about two weeks and the stem cells are extracted. The stem cells are then grown into specific tissues or organs that would be used as replacement parts for humans with certain diseases. Farms of organs would be grown so that people in need of specific body parts would have them readily available.

Therapeutic cloning leads to many other ethical problems that are separate from those of reproductive cloning. Is it right to fertilize an egg and let it grow only for the purpose of killing it? Is saving one human worth killing a cloned embryo? Many would argue that lives of existing humans are much more valuable than embryos which have not yet become human, so it is worth killing the embryo to save a life. One argument is that if a fertility clinic were on fire the people would be saved far before the embryos would even be thought about. However others still feel it is not right to create an embryo solely for the purpose of killing it, even if it is to save a life. These are difficult ethical questions that will

be debated upon in the future as cloning technology continues to progress further.

Along with many of the physical harms that were discussed earlier in this section, it is also a possibility that clones could be psychologically harmed. Given that they are an exact copy of another already existing person, the clone may know about many future illnesses or medical conditions that they might have to endure. They also know almost exactly what they will look like when they grow older. In addition, their parents may have certain expectations of them based upon the person that they were cloned from.<sup>51</sup> There is also the thought that it would be traumatic for someone to live knowing that they are not an original or unique person, but merely a copy of someone else.

All of the psychological issues above seem to be possibilities, but there are many reasons that they may not be true at all. Studies show that children born through in-vitro fertilization do not seem to be psychologically harmed by finding out they were not conceived in the womb, but by a scientific process.<sup>52</sup> While this obviously is not the exact same thing as cloning, it shows that people are not completely mentally traumatized by not being created naturally. In the case of identical twins two people have the same genetic identity and are essentially clones of each other. Twins are clearly not mentally affected by not being a unique individual. More information is given about the relationship between twins and clones in the psychological section of the paper. People also have the misconception that a clone will turn out to be the exact same as the

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<sup>51</sup> Francis Fukuyama Our Posthuman Future p.99

<sup>52</sup> Silver p.102

person they were cloned from. This is not true at all since it is believed that only 40% of a person is based on their genetics while the other 60% is based on the environment that they live in and the experiences that have made them who they are.<sup>53</sup> These issues will be further discussed in the psychological section of the paper.

The ethics debate on human cloning and its various uses will go on for many years to come. It possible that human cloning is right around the corner, but it is also possible that progress might be stopped by a ban or for scientific reasons. Whichever is the case, people will argue over whether anyone has a right to use human cloning, and if so, for what purpose it should be used.

## ***2.4 Psychological***

Genetic distinctiveness symbolizes the unique characteristics of each human life. When you produce a copy of human genetic material, a certain degree of identity and individuality is lost. This could have a large impact on the way a human clone will develop psychologically and socially within a normal human population. Although genetic engineering can have negative effects on the psychology of humans, one should not let this mask the usefulness and importance of cloning.

Social identity and ties of relationship and responsibility are widely connected to biological kinship. The human sense of identity is matured and changed throughout life and this development is dependent on the various

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<sup>53</sup> Silver p.107

relationships with family and others. A cloned individual could have a misconstrued sense of identity and an unusual sense of relationships, and this may arise because of the disrupted biological kinship. Cloning has the potential to change this natural manner of human development; personalities seem more manufactured and manipulated; a biologist can choose and augment the genes and thus the personality of human beings.

Social development can be strongly affected by genetic engineering and cloning. It is a matter of ethics as to whether human beings have the right to modify nature and take control of genetics and reproduction. Cloning can have many negative aspects when it comes to emotional and sociological development. A cloned human being may have a difficult time assimilating in social situations and in relationships with family members and friends. Many problems can arise. For example, the parent of a cloned child would be inclined to make comparisons between the clone and the cloned. This argument is also amplified by the fact that the clone is likely to resemble the cloned. Many believe this to be an unfair burden to place on any child.<sup>54</sup>

Some think that cloning will bring grave risks of abuses to human dignity and exploitation. Genetic engineering and cloning has the potential the “dehumanize,” taking away the feeling that one truly belongs to the human race. It deprives the clone of real, authentic parents. This can be psychologically damaging to have a strained family life and unclear relationships with family and

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<sup>54</sup> Consider also that in some cases a child clone could be the identical twin of his father or mother; no one knows what the psychological effects of being a cloned version of one's father might be, or vice versa a cloned version of one's mother.

parents. Cloning can also be destructive psychologically and from evolutionary principles in the fact that it lowers the sanctity of sexual relations and reproduction. Cloning would essentially replace sexual procreation. The primary role of the agent in procreation would be handed over even more completely to technicians, since prospective 'parents' would be reduced to providers of parts even smaller than a gamete.<sup>55</sup> Children do not understand why their manner of creation is so drastically different from most other people. It is difficult for a young child to understand the fact that he or she is the product of scientific manipulations; it is also hard to assimilate why he or she may be the product of one individual whereas most other humans are the product of a man and a woman. The idea of conception is warped and the manner in which men and women have the ability to create children becomes tainted.

There are also significant psychological concerns, including the effect of genetic similarity on the clone's view of him or herself. Human clones are essentially manufactured and produced, rather than created in human likeness. This is relevant because cloning disregards the sanctity of human conception and damages the human selfdom and community sentiment. Cloning creates difficulty in the normal developmental process; a clone has a tainted heterogeneity, since it is a product of technological manufacture. When a human is not a mix of two sets of genes, there is no chance for developing a random and unique distinctiveness; there is just a copy of genetic material in which there is a direct transference of biological characteristics. A clone would feel as if it was replicated from another being, and thus is an inferior duplicate, something

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<sup>55</sup> Leon R. Kass. *Human Cloning and Human Dignity* (Public Affairs, 2001), 226



secondary and substandard. It is hard to see equal treatment, much less acknowledgement of human equality, when one person is planned and designed by another and then manufactured to the latter's specifications.<sup>56</sup> By lowering the value of human life and the method of procreation, cloning jeopardizes the way a human will be accepted into the social area and also may affect the definition of his or her self-worth.

Individuality and identity are seemingly altered as well. A human clone may not feel that he or she is special or unique but again is just a duplicated, manufactured version of the "real thing." This is evident when we think of large numbers of clones being produced together, for example ten or twenty at a time. While each of the clones produced will be a separate human being with his or her own life to lead, clones are likely to be treated as interchangeable by some of those with whom they have to deal. People value less what they see as interchangeable.<sup>57</sup> Genetic individuality defines the way humans look and act. The fusion of the parents' genetic makeup forms a new and distinct individual which is very much similar to his or her parents, but more importantly is different enough to someday become independent and form his or her own identity. The child is genetically related to both parents, but is not identical to either. There should be a natural balance at birth and throughout life, one between dependency and individuality. As an infant and a child, there is a heavy dependence on parents and caretakers, and little sense of individuality. As adolescence begins, there is a shift of distribution as individuality is formed and

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<sup>56</sup> Michael Jonathan Reiss. *Ethics of Genetic Engineering* (Cambridge University Press, 1998), 110

<sup>57</sup> Leon R. Kass. *Human Cloning and Human Dignity* (Public Affairs, 2001), 177

one becomes more independent and matured. Cloning and genetic engineering may abuse both the dependency and individuality of human nature. As mentioned previously, there may be a misconstrued sense of kinship with human cloning and thus an irregular manner of being dependent on one's parents. Also, the development of a unique identity and personality is disrupted by replication of genetic material. The science and genetic engineering of cloning comes with the cost of a diminished sense of humanity. It ruptures the fundamental essence and interrelatedness of being a human being; it may cause one to sacrifice identity and equality, fabricating life and decreasing the sense of uniqueness. Cloning may create serious issues of identity and individuality and forces humans to consider the definition of self. Synonyms for the word "clone" are "replicate," "imitation," "duplication," "copy," and "double." Thus, cloning is regarded as creating something inferior and substandard. Cloning reduces genetic diversity and creates a diminution of genetic quality.<sup>58</sup>

Nature permits that each individual is given a genetically unique identity at birth. In natural conception two humans combine genetic material to create genetically unique and distinct offspring. However, there are also many other factors that can form this sense of "identity," and these factors are not based purely in genetics. Personal identity is not one hundred percent composed of genetic identity. Individuality is the result of having a unique consciousness with a unique personal history, shaped not only by genetic inheritance but also by environmental, social and biological factors. There is an argument among critics that states that a unique genetic identity is not essential for a human being to feel

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<sup>58</sup> Leon R. Kass. *Human Cloning and Human Dignity* (Public Affairs, 2001), 71

individual.<sup>59</sup> Contrary to the aforementioned arguments, environmental factors indeed play a large role in creating the identity of human beings. Every choice and decision and action creates different ways making an impact on identity. Environment has an incredible effect on the psychological development of human beings. Thus, a lot of the debate on cloning can be deduced from many of the arguments of the “nature versus nurture” debate. Although this argument has validity, there is the omnipresent issue that the cloned human can never have a choice in his or her genetic decision. There is one person making the decision for two, which results in a diminished autonomy for the cloned human.

There are other biological rooted factors that negate the argument that cloning is harmful to the identity and psychology of an individual. Genetic determinism is emphasized by the fact that genetic identity does not wholly constitute biological identity. Even cloned cells with identical sets of genes vary somewhat in shape and coloration. The variations are so subtle they can usually be ignored. However when cells are combined to form organisms, the differences become marked and individuality is born. Thus, there is scientific evidence that contradicts the biological reasons in which cloning may be harmful to humans. The environmental surroundings and also the small biological differences between the sets of identical genes can actually create significantly different individuals.

Some scientists who are skeptical of the influence of the environment reject “nature” as being responsible for having a strong effect in human psychology. They believe that genes make the human personality more likely to

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<sup>59</sup> Michael Jonathan Reiss. *Ethics of Genetic Engineering* (Cambridge University Press, 1998), 124

respond to its environment in certain ways. Most psychological variability is thus shaped by experiences; however, these experiences are largely self-selected and that selection is guided by the pressure of human genetic material.

It is difficult to explain what exactly might cause psychological phenomena, and it is difficult to discern exactly what has an effect on social development. Studies of twins reared separately can help in testing environmental and genetic influence on traits. Studies involving identical twins that were raised in different environments show that many times they live similar lives, have similar personalities and similar levels of intelligence. This data may show that genetics can be very significant in determining development and personality traits. There is also the argument that many different environmental inputs can affect the expression of genes. This is one explanation of how environment can influence the extent to which a genetic disposition will actually manifest. Thus, twin studies illustrate the extent in which human genetics can affect these many similarities between identical twins separated at birth.<sup>60</sup>

Researchers have also found an extremely close resemblance between certain twins in the similarity in the association of their ideas. Scientist Francis Galton found in his testing that no less than eleven out of the thirty-five cases of twins were testaments in the mental similarity between twins. They made the same remarks on the same occasion, began singing the same song at the same moment, and so on; or one would commence a sentence, and the other would finish it. Galton also documented a situation in which "one twin, A, who happened to be at a town in Scotland, bought a set of champagne glasses which caught his

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<sup>60</sup> Robert C. Nichols. *Heredity and Environment in Twin Studies* (University of Texas, 2000), 122

attention, as a surprise for his brother B; while, at the same time, B, being in England, bought a similar set of precisely the same pattern as a surprise for A.”<sup>61</sup>

It follows from what has been said concerning the similar dispositions of the twins, the similarity in the associations of their ideas, of their physical characters, etc, that the resemblances are not superficial, but extremely intimate. Galton’s studies claimed to prove the power of biological similarities between twins and thus highlighted the strength that nature and genetics has in psychological and physical development. He tested a group of “thirty-five pairs of twins. In sixteen cases - that is, in nearly one-half of them - these were described as closely similar; in the remaining nineteen they were much alike, but subject to certain named differences. These differences belonged almost wholly to such groups of qualities as these: The one was the more vigorous, fearless, and energetic; the other was gentle, clinging, and timid; or the one was more ardent, the other more calm and placid; or again, the one was the more independent, original, and self-contained; the other the more generous, hasty, and vivacious. In short, the difference was that of intensity or energy in one or other of its protean forms; it did not extend more deeply into the structure of the characters. The more vivacious might be subdued by ill health, until he assumed the character of the other; or the latter might be raised by excellent health to that of the former. The difference was in the key-note, not in the melody.”<sup>62,63</sup>

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<sup>61</sup> Robert C. Nichols. *Heredity and Environment in Twin Studies* (University of Texas, 2000), 104

<sup>62</sup> Galton’s studies are from the 1920 and many have since been disproved. Many of the studies showed bias and inaccuracy. For example, it is hard to disentangle environmental and genetic influences in twins that are from the same families.

<sup>63</sup> Robert C. Nichols. *Heredity and Environment in Twin Studies* (University of Texas, 2000), 166

There are various experiments concerning homosexual twin men that are specific examples of twin studies on genetics. In these studies, identical twins (who have identical genes) are examined. If homosexuality was indeed a biological condition produced inescapably by the genes (e.g. eye color), then if one identical twin was homosexual, in 100% of the cases his brother would be too. But it is known that only about 38% of the time is the identical twin brother homosexual. Genes are responsible for an indirect influence, but on average, they do not force people into homosexuality.<sup>64</sup> Thus, twin studies can provide evidence that genes do not significantly influence sexual and other behaviors.

The debate on the “nature versus nurture” issue can accurately represent the arguments in the cloning subject matter. If two people share identical genetic material, will nature be predominant and create identical individuals? Or will nurture dominate and create individuals that can adapt to their environment? There exists scientific evidence proving that genetics and the environment both have significant impacts in human development. Now, how does one rate the severity of cloning and does genetics and the nature versus nurture debate have a part in his or her decision? How do the media begin to portray cloning once the lines between genetics and environment have become blurred?

When cloning and genetic engineering are portrayed through media such as film and literature, they can sometimes be exaggerated and misrepresented. Novels and motion pictures can exaggerate the scientific aspects and significance of cloning, and close analysis can reveal the true issues associated with the genetic engineering. After discussing the effects cloning may have on

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<sup>64</sup> Robert C. Nichols. *Heredity and Environment in Twin Studies* (University of Texas, 2000), 77

human psychology and social development, it is important to analyze how exactly the media portrays the effects of cloning and biotechnology in society. It is also important to judge how accurately the media is illustrating the cloning of human beings. Many media outlets such as films and books have done much to destroy the image and value of cloning. As discussed, cloning indeed has the potential to harm the human race: it upsets the normal family structure, it can disrupt ones sense of identity, and it can agitate the normal genetic makeup of human beings. Although cloning does have serious psychological implications, the media still often portrays it as being innately bad and misrepresents a lot of the scientific value.

## **Section 3 - Fiction**

Cloning has become a hot topic in realm of American society and with this increased attention it has become a large focus in the media. Issues of genetic engineering have surfaced in film and literature, in which it can be portrayed quite accurately at times and quite erroneously at others. Thus, some media outlets have the ability to portray cloning with striking scientific certainty (such as *Brave New World*), however it is oftentimes misrepresented in literature and film.

### **3.1 *Gattaca***

The movie *Gattaca* does not relate to cloning directly, but deals with genetically engineering people which is a topic closely tied to cloning. The movie focuses on a character named Vincent who is born as God-child or someone who was not genetically modified prior to his birth, which at that time is very rare. He dreams of being an astronaut, but can not because he has a heart condition and no company will hire him because he is a very high risk. He then meets his dream by trading his life and genetic identity with someone of a “good” genetic background. He is then hired as an astronaut at the *Gattaca* facility as he has always dreamed.

This movie brings up many ethical questions that could deal with both genetic engineering and cloning. Is it right to discriminate against someone based on their genetic profile? While even in their world it is not right to do, genetic profiling is still secretly done from their DNA which can be found anywhere on their body. Characters in the movie also look somewhat stoic and



machine like at certain points, mainly while they are working. By genetically enhancing someone are we losing the creativity which makes us human? The tagline for the movie is, "There is no gene for the human spirit." It makes you wonder at what point we lose all humanity and become nothing more than sequences of genes and chromosomes.

The psychological aspect of Gattaca is also quite interesting. In most theories that people talk of, clones will be looked down upon in society and be thought of as sub-human. However in this future society it is people who were born naturally or God-children that are looked down upon. You can tell that this weighs upon Vincent throughout most of his early life as he floats around menial jobs. He studies hard, but knows he has little chance of ever escaping the genetics that he has, and is often depressed and unhappy about his life. Because he is not genetically superior, he knows he will never be able to lead a normal life or have the job he wants unless he switches lives with a genetically enhanced person. Once he switches identities he is no longer looked down upon and shows that God-children are capable of doing everything a genetically enhanced person can do, and more in some cases. This shows that science can not predict the outcome of someone's life as much as people in this movie believe. Just because someone has the tools to do something great does not mean that they will use them. Human spirit and the will to succeed can be much stronger than being genetically perfect.

In the movie Gattaca the genetically engineered are not those doing the deceiving, but rather the other way around. Society has placed so much trust in

science that they have grown to distrust Mother Nature. Genetically engineered people are the prize society; nearly all benefits are handed to them simply because of their DNA. Parents are given the opportunity to decide how good their baby is going to be before conception. They are able to eliminate every undesirable aspect, if only they can afford it. Society trusts so much in science and statistics that they over look human nature, strong desire, aspiration, and uncommon ability when faced with seemingly insurmountable opposition.

Mothers lifting cars to save their children is not possible, the people in *Gattaca* so believe that these uncommon feats are not possible without the specific engineering that they refuse to even attempt them. As a matter of fact, people that try to rise above what science says they are able to accomplish are looked down upon, and even face criminal charges for trying to undermine the system. A large portion of this movie addresses human psychology, and the ability of the mind to force the body to achieve uncommon goals. The main character, while at scientific disadvantage, forces himself to overcome his shortcomings. The most important theme of this movie is that a person is more than just their genetic makeup. A person achieves by overcoming their shortcomings, not because they have none.

### ***3.2 Boys From Brazil***

In the movie *Boys from Brazil*, cloning is used for violent and destructive means. In this scientific thriller, a renowned scientist Josef Mengele has assigned a group of Nazi assassins to kill 94 sixty-five year old civil servants

all around the world over the next two-and-a-half years. The killings must appear as accidents and not as murders. A Jewish hate crime specialist begins to investigate the deaths of all sixty-five year old men the world over. At first he finds nothing but then makes the remarkable discovery that some of the killed men all have identical adopted sons. As he investigates further the true extent of Mengele's scheme becomes apparent. Mengele has cloned 94 copies of Adolf Hitler and is now trying to recreate the events his childhood, wherein Hitler's civil servant father was killed at the age of 65, and in so doing he is replicating the psychological makeup. This movie portrays cloning as a means for evil; when cloning is put in the wrongs hands it could be incredibly disastrous and have a deadly and violent outcome. Cloning in this movie is slightly unrealistic and the "sci-fi" nature of the movie adds various twists that contort the true scientific importance of cloning. It is questionable as to whether it is possible to actually create the same person through cloning. Although the 94 "Hitler's" were biologically identical, and the environment of each mimicked that of the true Hitler, was it possible to create 94 individuals that would make the same choices and actions as the original Hitler? This focuses attention back to the nature vs. nurture debate as well; the potential clones have identical genetic material, but Mengele apparently gives merit to the nurture portion of the debate and stresses that the Hitler's childhood events be reenacted with each clone. *Boys from Brazil* gives merit to genetics and the environment as being capable of replicating exactly identical individuals. Mengele believes that he could recreate the

Holocaust 94-fold through these clones. This portrayal is a scientific inaccuracy and misrepresents cloning as a science-fictional abuse of power.

### **3.3 Multiplicity**

The movie *Multiplicity* is about a man named Doug who does not have enough time in his life to handle his job, his family life, and his personal life. Doug decides that getting cloned would be a good idea because it would give him more time and let him enjoy life a little bit. His clones turns out to be just like him however more masculine, so he decides to let them do his job for him. It is working well for a while, but Doug then finds he still doesn't have enough time, so he decides to make another clone of himself. This time the clone turns out to be more feminine, so Doug decides that this one should be in charge of all of his housework and his wife. This plan works even better, and he now has plenty of leisure time to do what he'd like to do. The two clones wind up getting mad and want some leisure time as well, so the masculine clone decides to make a clone of himself. This clone turns out to be retarded. They all wind up being caught by Doug's wife and no longer are slaves to Doug. They move to away together and open a restaurant, and Doug is left alone with no enough time.

While this movie is a comedy and does not take the cloning process seriously at all, there are many aspects to examine in the movie which may effect how people view cloning. When Doug is cloned it is done by a machine, takes just a short amount of time, and the clone of Doug comes out exactly the same age. In the actual cloning process none of this can actually happen obviously.

All of the clones also come out looking like Doug, but their personalities are all very different. The last clone is retarded and this is explained as happening because he was a copy of a copy. This information is also incorrect as clones would be different, but not exact opposites of each other or mentally inferior. While this movie is a comedy and clearly not meant to be taken literally, it does give off many misconceptions about cloning that could be misinterpreted by someone who knows nothing about the subject.

### **3.4 *Godsend***

The movie *Godsend* is the story of Jesse and Paul Duncan, a couple who lose their only child, Adam, just days after his eighth birthday. At the funeral a doctor named Richard Wells, who was a former teacher of Jesse's, approaches them about cloning Adam and having him again. They can not have children again due to complications from the first pregnancy and are desperate to have another child, so they agree to go along with the procedure even though it is untested. The procedure goes just as planned and Adam turned out just as he had before.

Everything goes fine in Adam's life much like it had in the first Adam's life up until his eighth birthday, the time when the original Adam had died. Dr. Wells hypothesized that after this point it is not known what will happen in Adam's life however things should be fine. However Adam is not fine. When he starts having night terrors where he has awful dreams of killing people and burning alive in a fire, and also has hallucinations of someone attacking him in the shower. Dr. Wells examines Adam and finds nothing wrong with him and claims

that it is normal for an eight year old to experience night terrors and they will go away eventually. Adam begins acting strange at school by spitting in a teacher's face, at home by destroying his mother's dark room, and then secretly killing a classmate. Paul hears Adam yelling one night during his night terrors and hears the name Zachary Clark. After some investigation he winds up finding out that Zachary Clark is the deceased son of Dr. Wells, and was also an evil child who murdered his mother and set fire to his school. Dr. Wells had apparently wanted his son back too and had genetically modified the cloned child to have a part of his son in it. Dr. Wells flees fearing he is in serious trouble and the Duncans start a new life in a new town. At the end of the movie it is still clear that Adam is not recovered and he still has a part of Zachary Thomas in him.

The scientific part of this movie is highly inaccurate compared to the real world. The process that is used to clone the child is not talked about in detail, but described as "shocking" a cell back to its original state as a stem cell. From there it is transferred into the mother's egg and implanted into the uterus. This process does not exist and is not a likely method for cloning any time in the near future. In the movie it also not addressed how they got the DNA from Adam to create the clone of Adam. Since Adam died and you can not clone someone from the cells of a dead person, where did the DNA come from? This is merely another detail that is glossed over in the movie. Another invalid statement that this movie makes is that a cloned child will have the exact same life as the previous child did. When the second Adam was delivered he started crying after forty-five seconds, which was coincidentally the same amount of time the first

Adam took to start crying. This and other similarities between the lives of the two Adam's give the impression that environment has no effect on someone's life and that you would live exactly the same life every time. This is untrue and environment plays a large part in how your life will turn out.

There are many psychological factors which can be examined in this movie. When the Duncans decide to have another child they want it to be exactly the same person as their original child, and even name it the same name. This is not what cloning is meant to be used for. No individual person can be replaced by another person even if they are an exact genetic clone. Another problem is that they decide not to tell the cloned child that he is actually a clone of the first child. This does not seem to be a problem as no one would ever tell him about the previous child, but a problem occurs when he runs into an old picture. Adam sees himself in a city environment with long hair and knows that it is not him in the picture. He is shocked and confused and asks "Did I die?" This movie definitely touches on many of the psychological issues that need to be examined closer before cloning is ever performed on human subjects.

### ***3.5 Television Examples***

Cloning was humorously portrayed in the first half of "Treehouse of Horrors XIII" 1401 DABF19, a Halloween special of the animated series *The Simpsons*. The main character Homer Simpson stumbles upon a magical hammock that can make carbon copy clones of him minus a belly button. Homer begins to copy himself with good intentions, to help around the house, play with the kids, and go to work. The cloning, however, quickly gets out of control and

the country is faced with an army of Homers all not quite as sharp as the original reeking havoc across the country side. While the short cartoon is done with humorous intent it also speaks to the truth of what happens when humanity is too quick to embrace new technology. Just because it was available, and even though he was well intentioned, did not make coping himself a good idea for Homer. The cartoon speaks as a warning to us to look before we leap, and warns against abusing powerful technologies like cloning.<sup>65</sup>

The AARP commercial has a very similar theme to *The Simpsons* episode. A man named Ping feels that he simply does not have enough hours in the day to accomplish everything that he wants to do. That is until he has the great idea of cloning himself. Finally there are enough Pings to help everyone that he wished he could. There are no dire consequences resulting in mass clone termination like *The Simpsons*, just funny mishaps involving multiple pings in a single location.<sup>66</sup> However, both *The Simpsons* and the AARP commercial help to proliferate the incorrect stereotype that cloning is like a photocopy, and that a clone is identical in everyway to the original. Such is not the case. A clone is simply a genetic duplicate. This means that if the DNA was taken from an adult the clone would be much younger, and as a result would be exposed to different experiences growing up that would likely shape a different personality and mannerisms.

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<sup>65</sup> “Treehouse of Horrors XIII” 1401 DABF19

<sup>66</sup> <http://www.visit4info.com/details.cfm?adid=22054&type=coolad&startrow=1>



### **3.6 *Brave New World***

In *Brave New World* by Aldous Huxley, there is a totalitarian government that produces genetically engineered and emotionally conditioned humans. The government provides people with constant substitutes for happiness, in which the people of society are brainwashed and controlled, thus ensuring social stability. There are five distinct groups that make up the *Brave New World* and each group has an intricate part in the social system. There are Alphas, Betas, Deltas, Gammas and Epsilons that make up the entire caste system. Basically the Alphas are bred in a way that suits them (they hold the most important positions) while the lower caste members are bred to be laborers. From their creation these toddlers are conditioned in a number of ways in order to fit into their part of society. They are taught nearly everything that would condition them into having a happy life. From the early ages children are encouraged to partake in heavy sexual activity, drug use and other vices that will keep them happy.

*Brave New World* portrays a situation in which cloning has created a society devoid of human identity, family life, and normal human relationships. There is almost no scope for real love or friendship, for unique individual achievements or for any serious artistic or intellectual pleasures. Cloning is the sole method of procreation in the modern world in *Brave New World*. The genetic and psychological engineering of society voids any sense of identity or psychological uniqueness by flattening human characters. This book predicted

a form of society that would be so emotionally impoverished, and it shows how cloning would prevent people from living psychologically deep lives.

### **3.6 *The Multiple Man***

Author Ben Bova, wrote the book *The Multiple Man*. This book is less about the issues facing the government and religion today, because it is about the evils, and potential misuse of reproductive cloning. While some people believe that with the technology legalized for therapeutic cloning there are bound to be some bad eggs that use it to engineer humans. The government today, along with the vast majority of the scientific community are in agreement to outlaw reproductive cloning. What *The Multiple Man* also touches on is the sanctity of life. The main objection that President Bush has against all forms of cloning is that a potential human life is destroyed. This book operates under the theme that scientists and the government are using cloning technology to get away with murder, along with control the elected government.<sup>67</sup> This disrespect for life is exactly the concern of the Church and the conservative members of the government. Destroying an embryo is hardly murdering the president and deceiving the nation, but the idea that this technology allows people to play god, and not concern themselves with the life that gets wasted in the process is exactly what President Bush, and the Catholic Church are trying to prevent.

Bova depicts a corrupt government that will use its scientific abilities to undermine the wishes of the entire country. They murder the President and replace him with a clone, engineered to run things the way that they want.

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<sup>67</sup> Bova

Deception and distrust, all made possible by cloning. As the subterfuge is uncovered the main character is forced to decide with whom his allegiance lies, the real President who was murdered, or the current clone of his boss whom he so admired. The possibility that the clone was not the person that who thought he was played terrible mind trick on him. So much of this story is based around scientists able to manipulate DNA so well that they can produce desired personality traits.<sup>3</sup>

### **3.7 The Genesis Code**

The novel *The Genesis Code* by John Case is the story of a mother and a child who are killed in a case of arson for no apparent reason. The culprit of the arson is burned while setting the fire and is caught by the police on the front lawn passed out after barely escaping the burning house alive. Joe Lassiter, the brother of the woman who was killed, who is coincidentally a private investigator, vows to find out why the unidentified man burned his nephew and sister for no apparent reason. His search into finding out the identity of the arsonist eventually leads him to Italy where he finds the killer was working for a religious group called Umbra Domini, an ultraconservative religious group. He also finds out that his sister had her child implanted into her at a fertility clinic in Italy run by Dr. Ignazio Baresi, which has also recently been burned to the ground. Lassiter meets with a priest in Baresi's hometown and finds out that before he died, Baresi was planning to clone Jesus Christ. He had been a geneticist and researcher of religious relics before becoming a doctor, and had extracted likely samples of the DNA of Jesus. Using the scientific process of reverse

differentiation that he had developed, Baresi cloned Jesus and implanted him into seventeen mothers. After finding this out Lassiter goes on a hunt to save the mothers and their children while being hunted by Umbra Domini.

After Lassiter finds out about work Baresi was doing in genetics he meets with a genetics expert in order to fully understand the science behind what Baresi was working on. The scientist explains the basics of genetics to Lassiter and then begins to explain cell differentiation, how we begin with one cell and then they begin to divide and after a while begin to take on specific roles instead of being just being embryonic cells. He then explains that to clone an animal you need to extract one of the embryonic cells before it differentiates and then implant it into an embryo that has had its genetic material removed. The scientist then goes on to hypothesize that all of Baresi's work was going to toward the area of reverse differentiation or making any type of cell return back into an embryonic cell.

The science in *The Genesis Code* is actually fairly accurate up to a certain point. It does a very good job of explaining how cloning works and is easy to understand for someone who does not know about genetics. However, like almost all fiction stories involving cloning, it makes up some scientific process which allows cloning to happen easily. The process of reverse differentiation does not currently exist for turning an ordinary cell back into an embryonic cell. This technology at this point in time is a very unlikely possibility and will probably never be discovered. Another problem with the science in this story is that in current cloning technology, it is necessary to have living cells in order to clone an

animal. So it would not be possible to get cells from a dead person like Jesus and then produce a clone of them.

Religion plays a major part in *The Genesis Code*. The story begins with Doctor Baresi confessing to his priest that he has done something unnatural and needs to tell someone before he dies. The priest then reports this to his cardinal who took charge of the situation. "He worried about Man. He worried about God. And he worried about himself. What was he to do? What could anyone do?"<sup>68</sup> From this statement it is very clear how serious of an issue cloning is to the people in the religious community, especially in the case of cloning Jesus Christ. They believe that God created man, and man creating God is an extremely horrific sin. The cardinal then goes to a special ultraconservative sect of the church called Umbra Domini and speaks with their leader Della Torre who says he will take care of the problem. Della Torre then hires a hit man to travel around the world and kill all of the clones of Jesus Christ that were created.

While in actuality the church is opposed to cloning, and surely would be opposed to the cloning of Jesus Christ, the book takes the religious aspect to an extreme. It is hard to believe that a cardinal would actually have people sentenced to death. You can not say that the Umbra Domini group speaks for the whole church, but they are a certain sect that feels strongly enough to where they act for the entire church. They also go to severe lengths to cover up everything they have done and wind up killing anyone who finds out about their plan including the main character Joe Lassiter. The Umbra Domini group also has an extreme amount of power in the book that it is hard to believe is possible

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<sup>68</sup> Case, p.39

in real life. At one point Joe Lassiter wants to go the embassy in Italy, but fears that Umbra Domini is tied with the government and he will be caught. The arsonist who was caught after setting fire to Lassister's sister's house was freed from the hospital by a nurse who is a member of Umbra Domini, and later escaped under supervision of an FBI agent who was also a member of Umbra Domini. Overall it seems that the church represented by Umbra Domini is too powerful, does not act the way it would in real life, and is portrayed in a very negative light.

### **3.8 *The Secret***

Cloning is seen as being taboo, or perhaps evil and twisted, was shown through the relationship of a mother and daughter in the novel *The Secret* by t. The cloning of the daughter, Iris, was kept secret for years until Iris became a teenager. She then fled home, away from her mother to whom she was formerly attached and devoted. Iris loses her sense of identity and worth, and begins to hate her mother and herself, who was now a "monster." She hunts down her grandparents and aunt to gain understanding and a sense of belonging. She finds rejection and confusion.

In this novel it seems as if cloning is portrayed in a stereotypical "sci-fi" manner where it is futuristic and odd. The book doesn't show cloning in a scientific manner, but it shows it as a result of human experimentation. Elizabeth uses cloning to have a child. It shows Elizabeth as a slightly selfish and unruly woman for participating in something as extreme as cloning. Iris is deceived and forbidden from discovering this "secret" and begins to feel much betrayed. She

didn't have her own appearance, her own thoughts, or even her own identity.

Cloning made her life worthless.

This novel shows how the cloning of humans could raise issues concerning the investigation of identity, oedipal complexes, social problems, and moral crises. Iris seems to suffer from a downward spiral in emotions and mental state, due to her status as a clone. Cloning is capable of ruining lives and destroying relationships. A soul cannot be duplicated in the cloning process, and it is therefore genetically and morally incorrect. Cloning is a taboo thing of the future and is a dark and socially unaccepted thing, according to the novel *The Secret*.

In the novel *The Secret*, Iris develops a strong desire for a relationship with her father "figure." After having an oddly intimate maternal relationship, Iris is estranged from her mother. Years later she encounters one of her mother's former lovers. They have a brief courtship and engage in sexual intimacy. Iris develops an intriguing desire in the only substitute she had for a father. Cloning created a family that wasn't complete, that was lacking a balance between mother and father. Iris rebelled in a sexual manner to fill this empty void.

It seems almost paradoxical the way a human clone might feel, such as Iris from the novel *The Secret*. She feels like an outcast, a veritable "monster" at times because she is a strange, odd replication of her mother. However, at the same time she lacks any sort of identity or character to make her different or distinguished.

### ***3.9 The Cloning of Joanna May***

The Cloning of Joanna May by Fay Weldon revolves around a couple and their interaction, or rather, lack of. The narration switches back and forth from a 3<sup>rd</sup> person narrator to the title character, Joanna May. The reader almost immediately discovers that Joanna has clones; however, she does not know this. While Joanna is under anesthesia, for what she believes is a miscarriage, her husband Carl May, orders one of her eggs removed for a scientific experiment about cloning. “While she was opened up we took away a very nice ripe egg; whisked it down to the lab: shook it up and irritated it in amniotic fluid till the nucleus split, and split again, and then there were four. Holly thought we could have gotten it into eight, but I said no.”<sup>69</sup> In the real scientific world, this would never be possible.

To an uninformed mind, this all may sound realistic and therein lies the danger of how literature portrays the different aspects of cloning, in particular the scientific aspect. By using the language that Weldon uses, for example word choice such as “whisked” and “shook it up”, cloning is portrayed as if it’s so easy to do, which is not the case. In reality more than 90% of cloning attempts fail. Weldon (from the antagonist character, Carl May’s point of view) also describes the implanting scenario in very laid-back terminology and even remarks “We kept it quiet. So quiet one of the mothers didn’t even know we’d done it. What passive creatures women are: they just lie there, trusting, and let the medical professional do what it wants.” (Weldon, p. 34) This type of statement could cause fear in an unaware mind. ‘If it really is so easy to be implanted with a clone, especially when women don’t even notice, could this happen to me?’

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<sup>69</sup> Weldon, p. 34



*The Cloning of Joanna May* not only touches on the scientific aspects, but the psychological aspects. Much of the time, psychological research is focused on how being a clone will affect a person, but the cloned also gets impacted. In this book, the original being cloned has no idea that she has clones. When Joanna learns of this, she had a thought: "Perhaps what Dr. Holly took away from me at the Bulstrode Clinic was not so much my identity, as my universality. He made me particular, different from other women: he turned me into someone of scientific interest. Worse, he stole my soul..." (Weldon, p.202) Joanna feels as if an entire life has been taken away from her, by her ignorance of having clones.

The clones, naturally, also had some psychological impact thrown on them because they found out they were clones. "You have made orphans out of us,' they said. 'Snatched away the ground from beneath our feet. We are unnatural, and all you can do is talk about yourself.'"<sup>70</sup> This is probably how anyone would behave, in this situation. Once a person finds out they're a clone, their entire history is gone. Their parents aren't even their parents. These are obviously both negative, but realistic, portrayals of cloning.

One assumption that people may have about cloning is that the clone will be completely like the original, which is a stereotype that is demonstrated in *The Cloning of Joanna May*. The book goes into a little history of these four clones and the original, and each of them have a lot in common. Of course, they all look alike, and are intelligent, however, in two cases, the families encouraged the daughters to read, and become educated. Hence, in these cases, the women were more goal oriented, with futures and careers in mind immediately. The other

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<sup>70</sup> Weldon p, 234

girls get married out of high school, as encouraged by their parents. However, they eventually ruin their own marriages when they discover they want something more in their lives.

Not only in their careers are they similar, but also in their relationships. Each of the clones, as well as the original has a tendency for infidelity. Carl May, the creator of the clones, was spying on the clones to see what they were like. He discovered this tendency for infidelity. "The capacity for infidelity, Carl May suspected, ran in the genes; it could not be in the rearing --for surely Joanna had had a calm, tranquil and orderly rearing..."<sup>71</sup> Joanna herself had cheated on Carl May, and all four of the clones had exhibited similar behavior.

"The clones of Joanna May would have been faithful if they could, but fate was against them. Like their master copy, Jane, Julie, Gina and Alice, for good or bad, were of a nature which preferred to have the itch of desire soothed, settled and out of the way, rather than seeing in its gratification a source of energy and renewal."<sup>72</sup> Joanna May feels as if she doesn't have her own identity anymore, and feels as if the clones should be "hers". The doctor who did the operation struggles with his own ethical issues versus his scientific training. Joanna's husband is a good example of power gone badly. He tries to get the doctor to do other sorts of genetic engineering experiments and bribes him into doing cloning research.

This sort of literature gives a very wrong impression of what being a clone would entail. It is stressed over and over in non-fictional writings that a clone is

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<sup>71</sup> Weldon, p.77

<sup>72</sup> Weldon, p.81

not a replica of another person, but a unique personality enveloped in the same DNA fabric. This would be an example of the long running feud, Nature vs. Nurture.<sup>73</sup>

Ethics is a very important part of cloning. Ethics are basically what is keeping cloning such a highly controversial issue, and one of the biggest ethical concerns is the "What ifs?" What if Hitler could be cloned? What if some evil genius wanted to create the perfect army? What if someone wanted cloning for their own selfish needs to create the perfect spouse? In *The Cloning of Joanna May*, the man responsible for the clones certainly contemplates all these types of scenarios:

Carl May thought if he had Bethany cloned, he could perhaps undo the effects of her upbringing. If he had Holly to remove one of Bethany's eggs, fertilized it in vitro with any old semen, removed the resultant nuclei and reinserted the nuclei of any one of Bethany's DNA-bearing cells (which the new dehydrating technique had made just about possible), and then had the egg implanted in a womb as stable and orderly as that of Joanna's mother-and such wombs could be found, now and then; their owners crying out for implantation-why then Carl May might create a perfect woman, one who looked, listened, understood and was faithful.<sup>74</sup>

What Carl could do, what Carl might well do, for Carl controls the scientists, since Carl has the money, is a mix up some of my chromosomes with those of some other creature and set it growing, and know more or less what would get born, forget a fingernail or two. He could snip out the section that decrees I have long legs, and snip in a section from someone else's DNA, someone with short piano legs, the kind without ankles.<sup>75</sup>

...and all of a sudden, Carl May was back again, having met up with Isaac King, requiring that Holly drop everything and search the gut of an ancient Egyptian body, dehydrated rather than mummified, which he just so

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<sup>73</sup> Previously discussed in the Fact section under Psychology.

<sup>74</sup> Weldon, p. 78

<sup>75</sup> Weldon, p.157

happened to have in his possession , for cells with sufficient intact and living DNA for nuclei transference to be possible.<sup>76</sup>

This kind of talk may also scare people who are not fully informed about the full ramifications of cloning and lead them to believe that only mad scientists want to further the technology and if only that type of person wants to clone, cloning is a bad thing.

### **3.10 *The Third Twin***

*The Third Twin* centers around a group of people who are all interested in genetic research, however, for completely different reasons. The main character of the novel, Jeannie Ferrami, is interested in seeing how criminals become criminals, whether it's a genetic trait or a mutable trait that can be changed by nurturing. In her search for identical twins, one of whom was a criminal, one of whom was an upstanding citizen, she stumbles upon more than one, but weirdly, they all have different parents and different birthdays. She soon discovers that they were all born on army bases and got fertility treatment from the same clinic. Twenty years earlier, a group of men got together to attempt to form a perfect army by putting an egg and sperm together of people who have all the characteristics of a perfect soldier and splitting the embryo in eight. These embryos were then put into unknowing mothers in a fertility clinic, creating eight clones. However, these men didn't realize that the genetic make-up of the "perfect" army also contained criminal behavior, leading almost all of the eight clones to commit various crimes. It turns out, that her boss was involved in an

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<sup>76</sup> Weldon, p.95

experiment to create the perfect soldier. This book, not only touches on the ethics and what ifs that people are so afraid of when it comes to cloning, but also the psychology of one of the clones whom becomes close to the Ferrami, as well as the science.

Creating a perfect soldier is just the scenario that people are afraid of. The kind of mind sets that people who would want to do this have scares a lot of people. The character in *The Third Twin* who begins this research has this kind of frightening mind set:

Berrington was gratified to hear his own voice sounding mellow and reasonable in reply. 'I'm trying to say that the political decisions should be based on sound science, Larry. Nature, left to itself, favors good genes and kills off bad ones. Our welfare policy works against natural selection. That's how we're breeding a generation of second-rate Americans.'<sup>77</sup>

He goes on to mention the wrongness of having civil rights, having schools that don't discriminate, and having Medicaid. The book mentions that the Soviets had a plan to create the perfect army, however, in the novel, the United States beat them to it, illegally. The key traits they wanted to replicate were aggression and stamina. Aggression is not one of the more admired characteristics in people, hence, the world would become a totally different place if any of this occurs in reality. The majority of people in society doesn't think this way, and so are scared when they think that people would be like this. This is the kind of thinking that could completely ban cloning and stop any advancement in genetic therapy.

The science in this novel is on target up to a point, as most novels about cloning seem to be. The technology that already exists, of course, would have

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<sup>77</sup> Follet, p. 38

the correct technology in the novel, such as a DNA test. In *The Third Twin*, the entire methodology behind DNA tests is explained.

This book portrays cloning as a negative phenomenon. Not only do bad people try and manipulate genetic blueprints for a bad purpose, but they hurt and change the lives of people by not even telling them what was happening. Plus, their ideal plan was completely screwed up, and created more criminals because they didn't check the criminal backgrounds of the people they cloned.

### ***3.11 Where Late the Sweet Birds Sang***

This is a fictional book by Kate Wilhem about the world coming to an end and a family that is trying to provide for their future despite the impending disaster. The economies around the world are crashing and there are new diseases destroying entire countries. The family, the Sumners, start their own medical research company to try and find a way to survive. The Sumners live in a valley in Virginia, and while doing research for the new company, discover that every man in the valley is infertile, making human reproduction impossible.

Life in the area had been reduced to 122 people and everyone was sterile or infertile. The family that occupied the area started a research hospital once they began knowing the world was going to end, despite the government's denials and started doing cloning research. People continued to die and finally they managed to use fake placentas and grew babies in tanks by cloning the 122 people they had left. They continued cloning and made 5 generations, which eventually made the ratio of "originals", or what they called elders, to clones 1:11.

Once they hit the 5<sup>th</sup> generation of clones, they had a high chance of being fertile, and they started sexual reproduction again. However, the clones stopped listening to the elders and had begun their own research. They decided that diversity in the human race wasn't necessary and kept making clones. They slowly stopped sexual reproduction. Once the main elder, David got wind of these plans, he told others and they brushed him off, so he tried to stop them himself. Finally, one of the leaders of the hospital, an elder, saw what was happening, but was too sick to do anything and the clones just killed him. Once David saw what was occurring, he tried to turn off the electricity so no more research could be done, but the clones somehow knew about it, and banned him from their community and sent him down a raft with some food. The second section is from the point of view of a clone, rather than an elder. A few of the clones had gone to see if they could find any resources left in the area and clones were separated from each other, which was very rare because the clones only hung out with their "sister or brother" clones. Once separated, these clones began changing psychologically. Typically the clones were described by the elders as "a clone with something missing", with more missing as the generations continued, however once separated, they became less detached and more feeling.

Most of the scientific information that is contained in this novel is more highly developed than where cloning currently is today. Technology has not progressed to the point where clones of clones of clones are being created. In this novel, the clones are regulated all by computers that can sense whenever

anything is needed by an embryo to survive. Perhaps one day, technology will progress to this level. However, just as cloning 20 years ago was only science fiction, this novel could predict the future.



## *Section 4 - Conclusion and Personal*

### *Commentaries*

#### **4.1 Science - Krisha Murthy**

Not only in the scientific community, but also in the public, therapeutic and reproductive cloning are major issues. With so many possible benefits, it seems impossible that so many would want to stop the development of the field.

Research in therapeutic cloning is purely for the investigation into the whys of how certain diseases work to help banish them forever. This issue needs to be taken care of as soon as possible, however, in examining the history of cloning policy, it seems unlikely that a verdict will be reached until a huge breakthrough scares people into a decision. This is never the best way to do things. Almost every opinion written says that reproductive cloning should be banned, but instead of making a decision, that issue is also at a standstill.

My personal opinion stands as a future biomedical engineer and a scientist. I believe that therapeutic cloning research should be regulated and submit for approval by a special committee until the technology becomes more reliable, and not be declared illegal. In certain opinions, therapeutic cloning is believed to be murder; however, this all depends on at what stage is that embryo believed to be a person. I believe therapeutic cloning has amazing potential to cure disease and is the reason I became interested in the field of biomedical engineering. With reproductive cloning, there could be benefits in repopulating

nature with endangered or even extinct animals, however, I don't believe parents should be given the option to give birth to a clone.

## ***4.2 Government and Religion - Christopher Tereshko***

Cloning, and stem cell research in particular, is one of the most hotly contested topics on Capital Hill, and the international community as a whole. Opposed most vehemently by religious institutions, and religiously minded politicians. The Catholic Church and President Bush together are the leading the campaign against what they view as a gross violation of human rights, and the sanctity of life. In the face of such powerful opposition the immediate future of therapeutic cloning indeed seems dark. The United States government has passes legislation that strongly limits the growth of the technology, and the United Nations has passed nonbinding banns on all forms of human cloning. Pope Benedict VIX seems set to have the Church continue with many of the same conservative views held by John Paul II, leaving little promise for a blessing on stem cell research.

It is my belief, however, that cooler heads will eventually prevail, and the science will be allowed to start a new revolution in the health care industry, and the way that diseases and accidents are treated will be greatly improved. The more liberal states in our country, such as Massachusetts and California have proven that they are anxious to move ahead with research. There are many reasons to believe this science will not be allowed to fall by the way: the resounding support for the research to continue from both the house and senate in Massachusetts, easily overcoming Governor Romney's veto; the strong

support of Governor Schwarzenegger; together with President Bush's admission that the research holds very great potential for cutting diseases like Parkinson's, and treatment of spinal cord injuries; that his only objection to the science is the intentional destruction of a human embryo. When the current conservatives in our government are replaced with more forward thinking politicians of younger generations it seems that much of the moral objection to many of today's hot subjects like cloning and gay marriage will crumble. There are also countries allowing the immediate continuation of the stem cell research today. India recently opened a cord blood bank, with the intention of using these stocks of blood for stem cell research. Pressure from countries like India that have vastly differing opinions on the research, coupled with fast growing economies and infrastructures may also help to put pressure on the conservatives in the United States, who are quick to sacrifice morals for money and national pride.

The church certainly has great influence in politics, and has a long history of being very slow to change. I fear that the church will still have strong negative influence in the international community, and a great ability to sway voters of the United Nations. However, religion is less and less important in developed nations with each passing generation. I believe that as the science is understood by a greater number of people, as people understand the fine line of human life cloning operates on, that the objections they now have will dwindle. Much like the Church's opposition to birth control, opposition to cloning may further weaken the Church's influence on how people lead their daily lives, and indeed weaken the people's belief in the organized Catholic faith itself.

### ***4.3 Ethics - Daniel Caloia***

My belief is that cloning technology can be used effectively when if it is done safely. At the current time it is not safe and more research needs to be done in order to ensure that babies born through this process. I feel that there are many benefits to both therapeutic cloning as well as reproductive cloning. As long as therapeutic cloning is not taken to extremes it could be useful in saving many humans lives. Reproductive cloning could help heterosexual couples who are infertile and homosexual couples have children which are genetically related to the one of the parents.

I also believe that many of the fears that people have about cloning will never happen if cloning on humans is ever used. There is no reason to believe that a clone army will be created or political figure will be cloned and have a negative impact on the world. Current technology would not allow these theories to happen and in the future if they could happen there is no reason to believe they would succeed.

### ***4.4 Psychology - Amy Borges***

I personally believe that the issue of cloning is a Pandora's Box. I do not think that human beings have the right to control or augment what is originally created by nature. The grave consequences that a cloned human being would have to deal with are unfair and unjust. I believe it is wrong for a person to decide the genetic fate of another human being. Cloning would create an unbalanced sense of family ties and would weaken the ties that each human child has with his or her mother and father. Psychologically a clone would suffer

from many identity crises and have sociological torment. It would be difficult for a clone to understand his or her genetic origin and it would be difficult for him or her to assimilate into society. I believe that there is a God-given and nature-given right to all humans to have genetic uniqueness and an inimitable sense of distinctiveness.

Despite my aforementioned beliefs, there are many scientific benefits to genetic engineering, such as stem cell research, donor tissues, etc. The scientific advances that cloning is capable of instilling in the field of biology and medicine could save lives and could bring a betterment of society. Because of this fine line between harm and benefit, cloning can often be misinterpreted and thus misrepresented. A lot of literature and film create a bias in the American people by distorting the factual and beneficial aspect of genetic engineering. As stated in my research section, cloning could have serious psychological harm; however it is sometimes abused and distorted with such themes as a completely cloned society with a brainwashed sense of belonging, or an attempt to recreate the holocaust with the cloning of 94 Hitlers.

When people learn about cloning solely through fictional novels or film, their feelings toward the field of genetic engineering may become biased. Thus, one needs to fully understand the effects that cloning may have on the social and psychological aspects of human beings, however it cannot be taken too far to the extent that it is dramatized and ill-portrayed. Although there are many misconceptions about cloning, we as a people of the 21<sup>st</sup> century need to understand that it is a powerful and potentially destructive mechanism. Cloning

could have severe effects on the human psyche, but could also save millions of lives.

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