

**Genetics: Science and Society  
IL0230**

**Student Devised Assessment**

**U1627341  
WBS  
2017/2018**

**Word Count: 1577**

***What are the moral and ethical implications of cloning?***

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In biology, cloning is the procedure of obtaining clones, which are defined as organisms with identical or nearly identical genetic material. It not only includes organisms created in the process of complex laboratory procedures, but also the ones created by vegetative reproduction, such as bacteria or unicellular organisms. Today, researchers have developed a relatively simple process of cloning that has enabled to clone numerous species including mice, dogs, cats, horses, etc. Scientists collect an egg from a cell of a donor, remove its nucleus and implant the nucleus of another skin cell in it. Then the egg divides and grows into a multicellular embryo that is then implanted into a surrogate mother. However, clones are not all viable and their longevity is extremely short. Owing to the increasing researches in cloning, questions regarding the final purpose of cloning, and its ethical and moral consequences arise. The interrogations include the difference between cloning of whole bodies or of specific organs, the implications of either the improvements in medicine to save lives, or the enhancement of genetic engineering to design “super babies”, and lastly the perception of clones as another equal living individual, or as we portray them in movies, as robots in clone armies. Therefore, the next step now is to define limits to cloning researches and its applications to refrain from trespassing any ethical and moral boundaries.

Individuals seem to show difficulties perceiving as real anything they cannot see, hear, feel, smell or touch with their own senses. Therefore, artists decide to portray in paintings and sketches anything that the general public cannot have access to, and that it can only imagine. In biology, especially, where research and experiments are based on organs, cells and bones, the audience is often left with numerous abstract concepts it cannot visualize nor realize. For instance, when DNA was discovered by Watson and Crick, it was not understood by the non-scientists until it became a cultural icon with Dorothy Nelkin’s double-helix representation. Art makes genetics understandable for all and portrays anything that people cannot experience. Hence, for my Student Devised Assessment, I chose to make a collage, for people who are

not scientists to visualize cloning, its history and its potential implications for future societies. By making people see and experience cloning by themselves, it raises their awareness, enhances their acknowledgment of the subject, and thus gives them more material to forge their opinion about clones. Since nowadays, cloning research is becoming more important, it is mandatory that people give their opinion about the use of these new scientific techniques.

As a business student, I soon realized throughout this interdisciplinary module that my opinion often diverged from others, exactly because of my different background and knowledge. Since I could not understand nor see concrete scientific results of the biological experiences, I forged my opinion on what I know about the consequences of these new technologies and its potential effects on our societies. Therefore, I chose to destine my collage to non-scientists who do not understand biology and its advancements, because they do not have access to scientific results. As art is free of interpretation, my design gives a mature audience all sides of the cloning history, for people to acknowledge and assess all sides of it. It might help watchers better get the slippery slope danger of cloning, and understand the thin line on which this research is standing, that can lead to important advancements in medicine as well as more significant injustices and inequalities within societies.

The aim of this collage is to show different aspects of the cloning research, starting from its discovery and the multiple experiments undertaken to put in application all the cloning theory, but also its potential positive and negative implications, the possible reactions people may have towards its advancements and how it is nowadays perceived and represented in art. In order to decline the different ideas chronologically and emphasize on what may happen down the inevitable slippery slope, the piece is shaped in a reversed-funnel form. It starts on top with the scientist who first got the idea of cloning and with the different cloned animals, then describes how it is portrayed in movies, which demonstrates how people perceive cloning and see it moving forwards, and ends with the ethical dilemmas cloning raises in societies. It thus contrasts the current reality of cloning and what scientists are already being able to do with its fictional representation and how humans imagine cloning going in the future. At the end, all the possible consequences of cloning are regrouped to show that, the risks involve both positive and negative impacts, since it derives from the same starting point and that it only depends on who has access to the technology and with what intentions.

At the top of the pyramid stands Hans Spemann, who was the first to replace the nucleus of an egg cell by the one of another cell to grow an embryo. He represents the very first idea of cloning in 1938. Underneath him is John B. Gurdon and his first cloned tadpoles from 1970,

who will never reach an adult specimen. Then follows the history of animal cloning experiments from 1981 to 2005, with first the mice of Karl Illmenese and Peter Hope. Then, the sheep of Ian Wilmut and Keith Campbell, Moran and Megan, cloned from differentiated cells, obtained through a pioneering method of nuclei transfer, and Dolly, the first mammal cloned from an adult animal's cell in 1996. It also includes the first five cloned piglets, Prometea the horse, and Snuppy, the Afghan hound of 2005. In 2009, animal cloning takes different proportions and aims at cloning, for the first time, an animal from an extinct species: the Pyrenean ibex. The use of the skin and thus DNA of the last animal alive inspired Dr. Nisar Ahmad Wani to clone from ovarian cells of a dead camel. He therefore stands in the collage approximately in the middle of the pyramid since he and his camel represent a great genetic breakthrough for mammal cloning. His portrait also stands next to Rosita ISA, the first transgenic cow that can produce human-like milk, thanks to the human genes introduced during the cloning process. The link between animal and human cloning, and hence the one between real history and imagined future, is made with the scientist Shoukhrat Mitalipov who made significant advancements in stem cell cloning, seen as the first breakthrough in human cloning in 2013.

The pictures at the bottom of the collage diverge from the history of cloning and put their interest on how societies perceive cloning and picture it in movies and art, how they apprehend these new experiments, and how they imagine human cloning developing in the future. First, the pictures of protests against human cloning with signs such as "Stem Cell Harvesters Stop Playing God", and against animal cloning led by animal activists make the transition between the reality and the fiction of cloning. The TIME magazines' covers also show how the medias are trying to get more people interested into this scientific research, notably with the contrast between the two sheep's- and the two babies' covers, demonstrating how scientists are getting closer to human cloning. The two pieces of art by Dali and Andy Warhol are two possible interpretations of cloning. Dali shows swans looking at their reflections in the lake as elephants. This painting could be interpreted as a denunciation of the potential risks of cloning, and how they may be perceived completely differently from the original individual, although clones may also develop characteristics similar to actual beings, such as feelings. I then chose to represent the two potential sides of cloning's future. On one hand, there are the "Human Organ for Transplant" image, the mammoths, and the medical sign. These elements show the positive future of cloning, how it may enhance medicine with higher rates of success regarding organ transplants and how it may even allow scientists to bring species out of extinction. On the other hand, the audience perceives cloning as dangerous with the numerous armies of clones portrayed in movies such as Star Wars, the maltreatment of clones seen as scientific products rather than human twins, or even the discrimination it raises around genetically modified individuals, in OKJA and GATTACA perhaps.

Finally, the collage portrays the numerous ethical and moral debates that cloning entails. The fear that people feel about clones, their potential power as genetically modified individuals among societies, the natural aspect of the cloning procedure, the perception of clones either as thoughtful individuals or as products of science, and thus how they should be morally integrated into the society.

To conclude, the question of animal leading to human cloning and its ethical and moral implications needs to be raised, for societies to act upon its limits and applications. The artistic representation made the subject accessible and free of interpretation for all. The goal was thus to show both the positive aspects of cloning such as the savior of endangered species, the surplus of a desired trait and the enhancement of medicine and genetic research, but also the negative side of cloning, such as the diminished variety and endangered unicity of the individual, the shorter life span and the moral concerns regarding the perception of clones. This exposure of all points of views and consequences enabled the audience to forge itself a proper opinion about cloning and think about the boundaries of science regarding ethics.

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