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IS IT PROGRESS OR DYSTOPIA? ATTITUDES TOWARD GENETIC ENGINEERING IN CONTEMPORARY FILM

abstract

In this paper, I will present how film, and especially science fiction, illustrates and considers the theme of genetic engineering in its ethical implications. Drawing from the work of Thomas Wartenberg, I suggest that movies can be read as philosophy, since they present philosophical argumentations in the form of narrative. I will discuss popular science fiction films that address this theme, showcasing some of the most recurrent reflections and representations of future scientific and technological developments in the field of genetic engineering. Finally, I will focus on the movie Gattaca *in an analysis that presents its philosophical argument. Quoting Wartenberg's categories, I will argue that* Gattaca *is both a thought experiment, illustrating a possible society where it is possible to decide the genetic code of one's children, and a critique of genetic determinism.*

keywords

genetic engineering, genetic determinism, cinema, science fiction, Gattaca

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1. Introduction. Reasoning about genetic engineering through cinema

Genetic engineering is one of the most controversial themes in several disciplines, such as medicine, bioethics and biotechnology. In addition to the problems regarding the real technological and scientific possibility to modify or alter human DNA, there are a number of ethical and legal issues. While this is often subject to discussion in the scientific world, only some topics are mentioned in the media and brought to the attention of the general public. Nevertheless, new practices have social implications and frequently suggest a perspective that is dystopian, if not apocalyptic. According to Jon Turney, the myth of Frankenstein has influenced public discussions on biology, including the recent field of genetic experimentation.[1]

It is clear that most people cannot share the complete specialist knowledge of scientists. But this does not mean that they cannot reflect on the questions that are raised by scientific progress. As reported by Russell Hardin, "civilization has only continued and progressed because we do not generally demand that our knowledge meet Locke's or even contemporary scientists' standards"[2].

In this sense, cinema can tell us something about how scientific knowledge is represented in images and how wider audiences, beyond the scientific community, understand it. Cinema clearly addresses a mass audience and, as such, it divulges scientific content without however going into too much detail. After all, the main objective for a cultural narrative is not to fully report on the complexity of scientific research but to reflect on certain issues of wider significance. This does not mean, however, that at least some films are not extraordinarily capable of conveying a deeper insight, to the point of presenting philosophical arguments through their images and narration. Obviously, not all films intend to offer a philosophical reflection on a specific theme. Most of them express an opinion, but it is one thing to state a thesis and another to argue for it. Therefore – following the indications of Thomas Wartenberg and Stephen Mulhall – I shall suggest that movies only contribute to philosophical thinking

1 Turney, J. (1998). *Frankenstein's Footsteps. Science, Genetics and Popular Culture*, New Haven: Yale University Press. See in particular chapter 9.

2 Hardin, R., "If It Rained Knowledge", *Philosophy of the Social Sciences*, 33 (1), 2003, pp. 3-24:22. Moreover he writes: "I think ordinary knowledge is defensible as the best way to go most of the time, very nearly all of the time. One should not be very harsh on the lack of scientific foundations for most of our thinking because there is simply no time for us to investigate the truth of even a small fraction of the things we know. [...] Our task is either by instinct or by deliberate judgment to know when to investigate and when to go with what we already know". Ibid., p. 5.

when they do not simply express a particular ethical opinion but also argue for it, albeit in narrative form.
This article shares Wartenberg and Mulhall's view that at least certain movies are capable of philosophical intervention (§2). On this basis, it considers several movies on the theme of genetic engineering, throughout the history of cinema. By focusing on some particularly recurrent representations, fears, hopes and ethical arguments, I seek to offer a categorisation (§3). Moreover, my contribution focuses on one of the most philosophical science fiction movies on genetic engineering to date: *Gattaca*, an American film written and directed by Andrew Niccol in 1997 (§4). Based on the criteria set out in the following discussion, I aim to demonstrate that *Gattaca* not only takes a specific position on this theme, but also develops a precise argument through its narrative.[3] Finally, in the conclusion (§5), I will briefly discuss the main thesis of this movie, which is both a thought experiment – the description of a future in which it is possible to predetermine the entire DNA of human beings – and a critique of the view that a perfect screening of human DNA could imply a real and desirable genetic determinism.

2. Can movies philosophize?

From Ingmar Bergman to Woody Allen and beyond, film has always played an important role in bringing philosophical problems to the attention of wider audiences. Many philosophers have studied the relationship between philosophy and cinema from very different perspectives: Gilles Deleuze[4], Walter Benjamin[5], Slavoj Žižek[6], Stanley Cavell[7], Stephen Mulhall[8] and Thomas Wartenberg[9], among others. In *Thinking on Screen: Film as Philosophy*, Wartenberg lists several narrative techniques through which films may present philosophical arguments. Narrative itself is of course an argumentative method that is also used in philosophical writing, from Plato and St. Augustine to Friedrich Nietzsche and Jean-Paul Sartre. As Wartenberg explains, these cinematographic narrative techniques include: the explicit illustration of a philosophical theory (for example, *Modern Times*), the elaboration of a thought experiment (*The Matrix*) and the ability to provide a counterexample to a philosophical thesis (*The Eternal Sunshine of the Spotless Mind*). In addition to this list, there is also so-called self-writing, which takes its origin from an individual biographical story and draws existential conclusions about the meaning of life and human agency[10].
According to Wartenberg, cinematic thought experiments bear the same function as they would within a philosophical text, until they become true counterexamples of certain epistemological, socio-political and moral theories:

> Here, I only want to point out that thought experiments are one example of the presence of a narrative in philosophy. Even though a thought experiment tells a

3 *Gattaca* (1997, 106 minutes). Directed by Andrew Niccol, starring Ethan Hawke, Uma Thurman, Alan Arkin, Jude Law.
4 Deleuze, G. (1986). *Cinema 1: the Movement-Image*, Minneapolis: University of Minnesota Press – followed by Deleuze, G. (1989), *Cinema 2: the Time-Image,* Minneapolis: University of Minnesota Press.
5 Benjamin, W. (2008), *The Work of Art in the Age of Mechanical Reproduction*, London: Penguin.
6 See Žižek, S., *The Pervert's Guide to Cinema*, directed by Sophie Fiennes, 2006 (150 minutes) – followed by Žižek, S., *The Pervert's Guide to Ideology*, directed by Sophie Fiennes, 2012 (136 minutes).
7 Cavell, S. (1980), *The World Viewed. Reflections on the Ontology of Film*, Cambridge: Harvard University Press.
8 Mulhall, S. (2008), *On Film*, London and New York: Routledge.
9 Wartenberg, T. (2007), *Thinking on screen. Film as Philosophy*, London and New York: Routledge.
10 Mordacci, R. (2019). *Filmmaking as Self-Writing: Federico Fellini 8½*. In C. Rawls, D. Neiva, S. S. Gouveia (Eds.), *Philosophy and Film. Bridging Divides* (pp. 174-184), New York and London: Routledge. See also Russo, M. (2020), *Existentialism and Cinema: The Dialectic of Bad Faith and Authenticity in Federico Fellini's 8½*. In A. Betschart, J. Warner (Eds.), *Sartre and the International Impact of Existentialism* (pp. 363-375), Cham: Palgrave Macmillan.

> particular story, the truth that intends to validate is general, for it does not rely on the specific details of the narrative. Instead, the story is presented in order to persuade the reader of the truth of general principle of which the thought experiment's narrative is but an instance.[11]

Wartenberg does not specify in detail how it is possible to distinguish a simple thought experiment from a philosophical one. Is there a difference? In a thought experiment, one or more characteristics of natural experience are usually suspended in order to investigate what the consequences might be. For this type of imagination to be truly philosophical, the consequences must be deduced in a coherent and logical way. It is not enough to just use fantasy or creativity but it is necessary to develop this fantasy coherently through images, in a world with realistic elements. Therefore, even if many movies are based on thought experiments, only those that conduct such experiments with rigour and consistence will be considered as philosophical movies, for the purpose of this inquiry.

Many of the films discussed in this essay present numerous ethical concerns. In particular, it is interesting to note how many filmic characters hold opinions and points of view that resemble, in a simplified form, the positions of philosopher Hans Jonas. His principle of responsibility[12] tried to establish a normative criterion for an ethics of technological society, being aware of the fact that progress confronts human beings with unprecedented challenges. For the first time in history, thanks to unprecedented technological developments, human beings hold the power to destroy nature, or to imagine possible futures on Earth in ways that were not even imaginable before. In particular, Jonas focused his attention to the long-term consequences that would mainly affect future generations. In this context, Jonas appealed to the so-called fear heuristics, which basically invites humans to imagine the worst possible scenario for every circumstance, in relation to technological developments. The popular films mentioned in the next paragraph do not cite the philosophy of Jonas, with all its implications and possible objections, but they similarly imagine terrible scenarios that follow scientific and technological discoveries related to genetic manipulation.

In fact, a rather cautious attitude towards new methods such as genetic manipulation, cloning, human experimentation and so on is represented in many movies. This position seems to emerge as a reflection of what many people without specific scientific competences think: being able to intervene on human DNA is a fascinating scientific progress, but also one that can get out of hand or be used with profoundly immoral intentions. In this sense, cinema does not appear of particular interest as an object of philosophical analysis, because it tells us little about recent advances in genetic engineering. Its goal, it could be argued, is not to contribute to scientific research (although some science fiction films, from *2001: Space Odyssey* to *Interstellar* have engaged scientists both in the writing of the script and in the production of some scenes). At the same time, however, cinema (as well as literature, but probably in a more intense way) provides one of the most powerful means of elaborating fears and moral intuitions, for those who do not belong to the scientific world. Cinema therefore has much to say about how societies deal with scientific progress, and about doubts or moral resistance. In cinematographic narration, it is possible to imagine thought experiments that show what the world could become if human beings achieved a full development of both scientific knowledge and technology.

11 Mordacci, R. (2019). *Filmmaking as Self-Writing: Federico Fellini 8½*, cit., p. 36.

12 Jonas, H. (1985), *The Imperative of Responsibility: in Search of an Ethics for the Technological Age*, Chicago: University of Chicago Press.

I have chosen a particular movie, *Gattaca*, to demonstrate how film can function as a philosophical thought experiment, illustrating a society where it is possible to choose the genetic make-up of one's children and to foresee their future and talents. This movie imagines a kind of planned eugenics that goes far beyond being able to genetically intervene to cure a person or to prevent certain diseases[13]. Moreover, the film provides a counterexample to the theory according to which scientific progress can configure itself as a perfect genetic determinism and as a morally desirable step forward for humanity.
Before I discuss this film, I want to mention how similar issues are treated in other movies, many of which are mainstream commercial films without any explicit philosophical intent. I will cite these works because they are indicative of how the theme of genetic engineering is addressed in film and specifically in the precise filmic sub-genre of science fiction (sometimes political fiction), which very easily borders into fanta-horror. This suggests that fears, in the collective imagination, have exceeded hopes.
The link between science fiction storytelling and bioethical reflection has been highlighted in relevant critical literature. For example, Bert Gordjin and Henk ten Have write that

> There seem to be certain analogies between science fiction and bioethics. Both combine science and morality in thought-provoking ways. The science fiction genre, triggered by the continually accelerating pace of research and innovation after the Industrial Revolution, offers fictional reflections on developments in science and technology and their various impacts on the human condition and society, among them effects on morality. [...] After all, science fiction can be very rational and scientific whilst bioethics can be quite colourful, full of narratives and geared towards social activism.[14]

3. Movies and genetic engineering: tales made by fears and nightmares

As mentioned before, I will focus on movies as thought experiments that imagine a possible development of certain practices of genetic engineering. Based on their argumentative ability and consistency with scientific evidence, these films are clearly more interesting, from a philosophical point of view, than others, which simply exploit the science fiction theme to reach a certain target and to employ certain techniques of special effects and action.
The most famous set of movies about genetic experiments is, of course, *Jurassic Park*[15]. The first film in the series, directed by Steven Spielberg, (1993) features a scene, which illustrates a *de facto* genetic manipulation: the blood of a mosquito living in Jurassic times, imprisoned in a fossil, is mixed with the DNA of a frog to produce dinosaur clones. One of the merits of this film lies in its ability to reach a wide audience and to bring the theme of genetic engineering to the attention of mass culture. There is often a time when a theme, whether scientific or philosophical, comes out of academia and settles forcefully in the collective imagination. In this plot, the billionaire John Hammond has the plan to resurrect dinosaurs, which have been extinct for over 60 million years. It is only thanks to a cocktail of genetic combination that Mr. Hammond has succeeded in the cloning processes that result in the ability to recreate some dinosaurs on Isla Nubar, an island off Costa Rica, with the aim of creating an amusement park.

13 This distinction is presented in the entry of the Stanford Encyclopedia of Philosophy: "A common distinction in the medical world is that between 'treatment' and 'enhancement', where the general idea is that biomedical interventions that are designed to restore or sustain health count as treatments while those that go beyond restoring or sustaining health count as enhancements."
https://plato.stanford.edu/entries/genetics/#ShouGeneUtilForHumaEnha
14 B. Gordijn, H. ten Have, "Science fiction and bioethics", *Medicine, Health Care and Philosophy* (2018) 21, p. 277.
15 *Jurassic Park* (1993, 126 minutes). Directed by Steven Spielberg, starring Sam Neill, Laura Dern, Jeff Goldblum, Richard Attenborough, Samuel L. Jackson, Martin Ferrero.

The situation will get out of hand, although the franchise produces several sequels where the audience will see that some dinosaurs can develop a kind of empathy towards their human trainers.

Many other films, less known, have also dealt with this topic. In the following list, I will try to divide them into subgroups, to indicate that there are several ways to treat this theme.

1) The first group includes films that represent images of our deepest fears and depict dystopian scenarios that warn us against the pitfalls of technological development. One of the first science fiction horror films to tackle the problem of genetic manipulation with the technology of its time is a 1932 movie called *Islands of Lost Souls*[16]. In the plot, a castaway arrives on a remote island in Oceania where he meets a scientist who lives with strange creatures, including a young and fascinating woman, Lota, who only appears to be a woman. This scientist is researching the evolutionary possibilities of plants and animals trying to transform them into human beings through plastic surgery, blood transfusions, glandular extracts and X rays. The tools of his bio-anthropological research obviously do not include genetic manipulation but it is clear that the director has something like that in mind (Watson and Crick will discover the double helix structure of the DNA molecule in 1953). Lota is herself actually the result of the prolonged manipulation of a panther. The film ends with the sacrifice of this creature, in order to help the protagonist escape. This movie is classified as a horror film, and the creatures, not intrinsically evil or bad but dangerous, are depicted as the protagonists of a waking nightmare that ends only when the survivor manages to return to England and the civilized world. So, in this movie scientific progress is presented as fascinating (the protagonist is attracted to Lota and betrays his girlfriend with her), but in reality, is dangerous and can become a threat. It suggests that it is better that such fantasies remain confined to daydreams. Many years later, the 1986 film by David Cronenberg, *The Fly*[17], puts us in front of an even more distressing nightmare, which questions the very personal identity of the protagonist, in his becoming something other than himself. The scientist Seth Brundle manages to build a teleportation machine, into which he accidentally enters without realizing that he is not alone: a fly has also entered into the machine with him. Progressively, his body begins to unravel as he discovers that his DNA has been altered and mixed with that of the fly, because the teleportation machine had not been programmed to identify two creatures and thus automatically merged them together. The scientist turns into a terrible creature worthy of a body horror that ultimately made a lot of people feel sick at the movie's premiere in Toronto. In this case too, the theme of the possible modification of human DNA refers to a horrific scenario, which incarnates the worst nightmares. A total loss of humanity is expected as a result of this genetic combination, which runs counter to the laws of nature. The protagonist becomes a giant insect, bringing out the brutality of an animal with which it is impossible to reason, and which inspires only fear. So, this first group of movies includes thought experiments that describe a loss of humanity through the use of technologies that are always associated with unintended and particularly disastrous consequences.

2) A second group of movies could include films like *Blade Runner*[18] (1982), a film that radically questions the positions associated with the first group: the problem here is not that genetic manipulation creates something inhuman; rather, human beings have become inhuman in

16 *Island of Lost Souls* (1932, 71 minutes). Directed by Erle C. Kenton, starring Charles Laughton, Richard Arlen, Leila Hyams, Béla Lugosi.

17 *The Fly* (1986, 96 minutes). Directed by David Cronenberg, starring Jeff Goldblum, Geena Davis, John Getz, Joy Boushel, Leslie Carlson.

18 *Blade Runner* (1982, 117 minutes). Directed by Ridley Scott, starring Harrison Ford, Rutger Hauer, Sean Young, Daryl Hannah, Edward James Olmos.

treating the products of this manipulation as mere working tools. In this dystopian scenario, technology has exceeded all limits: we are in 2019, in a dystopian Los Angeles that looks like a visual representation of the very concept of postmodernism, where the protagonist, detective Rick Deckard, has the task of picking up some "skin-jobs". These are androids called Replicants, the last frontier of genetic engineering, who rebelled against the task for which they were programmed. Ridley Scott wonders if it is really possible to treat these Replicants as merchandise or if, instead, they are able to feel emotions (especially empathy) and pain or develop intersubjective relationships. This would make them much more like people than objects – although they carry an expiration date and are designed for specific functions. In the sequel, *Blade Runner 2049*[19], directed by Denis Villeneuve, it is even shown that a certain type of Replicants is able to conceive and give birth to a child. This would confirm the argument that Replicants should be regarded as persons and enjoy the same fundamental rights as human beings. In a different way, *Ex Machina* (2014)[20] questions the possibility of drawing a line between human beings and humanoids equipped with artificial intelligence. If a machine passes the Turing test, should we give it full human status, even if it is artificially and synthetically constructed? Or can we continue to treat it as a simple object of research, to be kept closed in a laboratory and on which to conduct experiments? This theme had already been explored in *A.I. Artificial Intelligence*[21] (2001, directed by Steven Spielberg on a subject signed by Stanley Kubrick), set in 2125, where robots practically identical to children are also able to have feelings. A little robot who has the same feelings as a human being and the same forms of emotional attachment becomes victim of bullying and strong prejudice that will lead him to be abandoned and to suffer. The protagonist of *Bicentennial Man* (1999, based on a subject by Isaac Asimov)[22] is a robot that could potentially be immortal, but who wishes to be recognized as a human being by the World Congress, at the cost of becoming mortal. In all these movies, the focus is not on the ethical limits of humanoids, but on the ethical limits of human beings. Moreover, this does not only apply to humanoids, but also to genetically modified animals. In a very realistic future, *Okja*[23] (2017), a Korean-American movie directed by Bong Joon-ho, narrates the discovery of a new race: a genetically modified super-pig whose flesh is particularly delicious. Here the dystopia is linked to the exploitation of animals for purely economic purposes. The super-pig belongs to a little girl who wants to save her at all costs, but it suffers torture at the hands of an evil corporation. First, another super-pig rapes her, then a scientist extracts a sample of live meat from her, so it can be tasted to prove to consumers that it is very good. In the end, the camera also enters a slaughterhouse where these poor animals are brutally killed and only Okja and a piglet are saved. In this case, there is no fear of the product of genetic mutation, but of human beings and their corporate multinationals, which are not at all concerned or disgusted when carrying out cruel genetic experiments out of pure economic interest and with the sole aim of further increasing their wealth.

3) A third group includes movies that consider what happens when experiments are used for

19 *Blade Runner 2049* (2017, 163 minutes). Directed by Denis Villeneuve, starring Ryan Gosling, Harrison Ford, Ana de Armas, Robin Wright, Jared Leto, Sylvia Hoeks.

20 *Ex Machina* (2014, 108 minutes). Directed by Alex Garlands, starring Domhnall Gleeson, Alicia Vikander, Oscar Isaac.

21 *A.I. Artifical Intelligence* (2001, 146 minutes). Directed by Steven Spielberg, starring Haley Joel Osment, Jude Law, Frances O'Connor, Brendan Gleeson, William Hurt.

22 *Bicentennial Man* (1999, 132 minutes). Directed by Chris Columbus, starring Robin Williams, Sam Neill, Wendy Crewson, Embeth Davidtz.

23 *Okja* (2017, 120 minutes). Directed by Bong Joon-Ho, starring Tilda Swinton, Paul Sano, Ahn Seo-hyun, Steven Yeun, Lily Collins, Yoon Je-moon, Jake Gyllenhaal.

profoundly immoral purposes connected to military strategies. For example, in *Watchers*[24] (1988) some scientists try to create humanoids that can be used as members of the army, the so-called Oxon. They are a sort of intersection between robots and hominids, which turn out to be dangerous and aggressive. A similar story is narrated in *Sharktopus*[25] (2010), a horror science fiction in which a strange creature, half shark and half octopus, causes death and destruction. This creature is the result of genetic experiments carried out by a mad scientist working for the military force in order to create a new weapon. In a predictable way, the scientific team loses the control device, and that is where the problems begin. Similarly, in *Rampage*[26] (2018), a movie based on a videogame, the protagonist has to deal with a gorilla, a wolf and a crocodile that have grown out of all proportion because of a genetic experiment that ended badly and threatened to destroy Chicago.

4) Another group of films, very similar to the previous one, explores situations where genetic manipulations are made for the good of mankind, but with apocalyptic consequences. In *Mimic*[27] (1997), directed by Guillermo Del Toro, two scientists combine the DNA of many species to save the lives of New York children by eradicating a powerful virus. Three years later, monsters that look like giant insects begin to appear on the subway in search of human beings. As the title suggests, these creatures are also capable of imitating human appearance. Likewise, in *Deep Blue Sea*[28] (1999), a team of researchers works in the middle of the sea to find a cure for Alzheimer's and uses captive sharks as guinea pigs. These sharks break free and due to the genetic manipulations which they have undergone they become as intelligent as human beings.

5) The only filmic genre in which genetic manipulation is not considered a threat is that of superheroes. In the realm of superheroes, there are several characters who have undergone genetic mutations: *Spiderman*[29], for example, is the result of the union of Peter Parker's DNA and a particular type of genetically modified spider, while the Maximoff twins in the *Avengers*[30], Hulk and Deadpool[31] are the product of a genetic manipulation that was carried out in military laboratory. Differently, the *X-Men*[32] are creatures with natural and unpredictable genetic mutations and in all the films of the saga the problem is centred on their battle for fundamental rights. The genetic mutant is here mostly used as a face of "the outcast", which is often unduly excluded from society. This idea is well represented by one of the most radical mutant leaders in the *X-Men*'s universe, Magneto, who has been a victim of Nazi persecution in the concentration camps during his youth. The theme of genetic engineering in these sagas is more than anything intended as an opportunity to invent extraordinary

24 *Watchers* (1988, 87 minutes). Directed by John Hess, starring Corey Haim, Michael Ironside, Barbara Williams, Lara Sloatman.

25 *Sharktopus* (2010, 89 minutes). Directed by Declan O'Brien, starring Eric Roberts, Sara Malakul Lane, Kerem Bürsin, Héctor Jiménez.

26 *Rampage* (2018, 107 minutes). Directed by Brad Peyton, starring Dwayne Johnson, Naomie Harris, Jake Lacy, Joe Manganiello.

27 *Mimic* (1997, 106 minutes). Directed by Guillermo Del Toro, starring Mira Sorvino, Jeremy Northam, Josh Brolin, Giancarlo Giannini, F. Murray Abraham.

28 *Deep Blue Sea* (1999, 105 minutes). Directed by Renny Harlin, starring Saffron Burrows, Thomas Jane, LL Cool J, Stellan Skarsgård, Samuel L. Jackson.

29 *Spiderman* (2002, 121 minutes). Directed by Sam Raimi, starring Tobey Maguire, Willem Dafoe, Kirsten Dunst, James Franco, Cliff Robertson, Rosemary Harris.

30 *Avengers: Age of Ultron* (2015, 141 minutes). Directed by Joss Whedon, starring Robert Downey Jr., Chris Hemsworth, Mark Ruffalo, Scarlett Johansson, Aaron Taylor-Johnson, Elizabeth Olsen, Jeremy Renner.

31 *Deadpool* (2016, 108 minutes). Directed by Tim Miller, starring Ryan Reynolds, Morena Baccarin, Ed Skrein, T. J. Miller, Gina Carano.

32 *X-Men* (2000, 104 minutes). Directed by Bryan Singer, starring Patrick Stewart, Hugh Jackman, Ian McKellen, Halle Barry, Famke Janssen, Anna Paquin, Rebecca Romjin-Stamos.

characters. Superheroes are different from ordinary people, either because they are gods (Thor, Wonder Woman, Superman), or because they have developed incredible technologies (Iron Man, Batman) or, precisely, because they are the result of genetic alterations that make them superhuman (Spiderman, Hulk, X-Men, Deadpool). Often, these superheroes make bad decisions which, in proportion to their powers, can cause particularly worrying consequences. But in most cases they are able to face dramatic situations that no one else, without their powers, could solve. In fact, the abilities of characters such as the Hulk or Spider-Man imply that even a laboratory accident can trigger incredible progress, not only from a purely technological point of view. These films support, sometimes naively, the thesis that the world needs heroes, and that science can contribute to this, even if there are both positive and negative aspects. Many of these movies face moral dilemmas, but they also express a positive attitude towards science and its future.

6) Finally, there is the genre of political fiction. *Elysium*[33] is a 2013 movie where only a few elected people on a rich space station can live in luxury and have access to medical capsules that can cure any disease by intervening on patients' genetic code. All this happens at the expense of the majority of the population on Earth, who live in terrible conditions. In this case, the dystopian vision is not linked to genetic engineering. Medical advancement is considered a very precious good, a great achievement in the history of humanity. Dystopia is brought about by the fact that this resource is not equally accessible by all people, but only to a very small minority of the population, who has moved to space. Genetic engineering for healing purposes would therefore be positive if it did not produce further social injustice.

Lastly, it is impossible not to mention a 1980 movie based on Aldous Huxley's dystopian science fiction novel *Brave New World* (1932)[34]. The themes of the novel and of the movie are eugenics and mental control, tools used to create a new model of society. The title itself means "an excellent new world": we are in 2540, in a society based on the mass production of both goods and human beings. Scientists use extrauterine reproduction managed in special factories where the very concept of family is discarded, as there are no more bonds between parents and children and natural children are avoided with a compulsory contraception. Society is divided into castes from birth: some embryos are deprived of oxygen for a certain period in order to impose mental retardation or lower development possibilities in both physical and intellectual domains. Psychophysical conditioning is then carried out through the use of continuous slogans, social coercion and control. Superficially, this fictional world appears to be a perfect society where there are no worries, but in the end we understand that it has sacrificed freedom, personal feelings, critical thought and family with its bonds and authentic relationships. *Gattaca* develops this dystopian scenario, revised in a more contemporary perspective.

4. Gattaca. Is a complete genetic determinism possible or desirable?

This film has attracted great interest.[35] It is both a thought experiment that presents many of the risks and hopes associated with genetic engineering and a critique of the idea that a complete genetic determinism would be possible or desirable. Two quotations at the beginning of the film already introduce the audience to the film's narrative: "Consider what God has

33 *Elysium* (2013, 109 minutes). Directed by Neill Blomkamp, starring Matt Damon, Jodie Foster, Sharlto Copley, Alice Braga, Diego Luna.

34 *Brave New World* (1980, 180 minutes). Directed by Burt Brinckerhoff, starring: Julie Cobb, Bud Cort.

35 See also: Baldwin, J., "Posthumanist Panic Cinema? The Films of Andrew Niccol", *Cinema: Journal of Philosophy and the Moving Image*, 7, 2015, pp. 86-106; Murphy, P., "Using 'Gattaca' to teach Genetic Discrimination", *Film and Philosophy* 13, 2009, pp. 65-76; Jeffreys, M., "Dr Dedalus and His Minotaur: Mythic Warnings about Genetic Engineering from J.B.S. Haldane, Francois Jacob, and Andrew Niccol's 'Gattaca'", *Journal of Medical Humanities*, 22(2), 2001, pp. 137-152; Palese, E., (2012). *Benvenuti a Gattaca. Corpo liquido, pedicopolitica, genetocrazia*, Milan: Mimesis.

done. Who can straighten out what he made crooked?" (Ecclesiastes 7:13) and "I not only think we will tamper with Mother Nature. I think Mother wants us to" (this is a quote from Willard Gaylin, co-founder of The Hastings Centre and a noted professor of psychiatry at Columbia University). One of the promises of genetic engineering that is presented in this movie is that parents of the future will be able to design their children, in a perfect realization of what Michel Foucault has defined as biopolitics. This is the definition offered in *The Birth of Biopolitics*:

> The theme [of the course] was to have been "biopolitics", by which I meant the attempt, starting from the eighteenth century, to rationalize the problems posed to governmental practice by phenomena characteristic of a set of living beings forming a population: health, hygiene, birthrate, life expectancy, race... We know the increasing importance of these problems since the nineteenth century, and the political and economic issues they have raised up to the present. [...] How can the phenomena of "population", with its specific effects and problems, be taken into account in a system concerned about respect for legal subjects and individual free enterprise?[36]

In *Gattaca*, humans have the opportunity to obtain a perfect body from birth, which is virtually invulnerable to diseases and a key to having a high standard of life and a leading role in society. The title of the movie takes its name from the initials of the nitric bases of DNA (guanine, adenine, thymine, cytosine). The film itself is a sort of "genetic" recombination of different genres, from science fiction to thriller, from romance to drama. Gattaca is not a utopian city (or, on the contrary, a dystopian one), but an aero-spatial entity, an important corporation. Usually, dystopia is set in a model city that turns out to be the opposite of a harmonious place, as in the case of *Brave New World*. In *Gattaca*, by contrast, dystopia is not shown through catastrophic scenes; it is embodied in the logic of a company, as to signal also the contemporary supremacy of economics over politics. The protagonist is Vincent Freeman (the surname is intended ironically): a man who is paradoxically identified as an invalid because he was conceived naturally in a world where those who can afford it program their children through a test tube fertilization, determining strength, height, virological resistance, as well as the colour of eyes and hair. According to Vincent's genes, he is likely to be very myopic, too emotional, and likely to die before the age of thirty due to heart problems. In this society, a choice is made when one wants to have a child, and this choice is clearly based on the family's economic situation. One can have imperfect children, born the old-fashioned way, or perfect and genetically modified children through the aid of a biological laboratory at extra cost. Artificial conception in genetic laboratories is regarded as the "natural" method, in a radical semantic reversal of the term "natural" itself.
What the audience sees is a world where everything is predetermined by an individual's genetic map – including their chances of finding a job and being hired. These are the premises to the argument which *Gattaca* develops. Given these conditions, several questions arise:
1) Is it really possible to determine a person's life, without leaving the slightest room for contingency, unpredictability and free will? 2) Are we sure we can only achieve better results by programming genetically perfect individuals? 3) Is it morally desirable not to leave room for chance or for the individual's capacity to improve on the basis of their own experiences and willpower?
The movie starts with Vincent inside of Gattaca: he is one of the company's most prestigious

36 Foucault, M. (2008), *The Birth of Biopolitics. Lectures at the Collège de France, 1978-79*, Hampshire: Palgrave Macmillan, p. 317.

employees. The director of his space mission was killed, and finding out who did it is one of the film's narrative mechanisms. Vincent is suspected for this murder, even if he is innocent. Moreover, the detective on the case discovers that he is Vincent's brother, Anthony, a brother whom he has not seen in years. From the very beginning, Vincent proclaims in a voiceover that he is not what others expect him to be:

> The most unremarkable of events. Jerome Morrow, Navigator First class, is only days away from a one-year manned mission to Titan, a Saturn's satellite. Nothing so unique in that. Last year over one thousand citizens from every walk of life embarked on some space mission or other. Besides, selection for Jerome was virtually guaranteed at birth. He is blessed with all the physical and intellectual gifts required for such an arduous undertaking, a genetic quotient second to none. No, there is truly nothing remarkable about the progress of Jerome Morrow, except that I am not Jerome Morrow.

Vincent Freeman is an "invalid", but in order to enter Gattaca, he pretends to be Jerome Morrow, a "valid". *Gattaca* is a society where maximum happiness corresponds to having a product without errors, flaws, or surprises. From the very beginning, the film is based on the contrast between Vincent and his double, who is often also a nemesis. This role is occupied alternately by his perfect brother Anthony and the real Jerome Morrow, who lends him his identity. This real Jerome ended up in a wheelchair due to an accident and needs food and shelter: this is the pact between the two men, who in fact live together. Vincent refused to accepted the fact that his fate was already written in his DNA. After having beaten his "perfect" brother in a swimming competition one day, he decided that nothing is impossible, refuting the biological determinism that dominates the logics of his society.
Vincent decides to become a genetic pirate, making a deal with the "invalid valid" Jerome. Through this exchange of identities, Vincent succeeds in realizing his dream. His job interview is held in a place that seems perfectly sterilized: an environment that seemingly does not accept imperfections. After the laboratory technician has tested Jerome's urine, we witness the following dialogue:

> TECHNICIAN (reading off the profile): Congratulations.
> JEROME (perplexed): What about the interview?
> TECHNICIAN (referring to the cup): That was it.

Clearly, genetic planning meets certain market needs. A company like Gattaca cannot risk hiring someone who may not be able to accomplish their task: it would be a bad investment. Economy is a more important decision-maker than politics. In the world of *Gattaca*, there is the crime called "genoism" – discrimination on the basis of genetic code – but this is simply ignored by corporate policies. Genetic tests, in fact, are presented as similar to anti-drug tests. We are not in the *Brave New World* universe, where politicians scheme to create the perfect society even if turns into a dystopian. Differently, at the centre of this society lies the relationship between business policy and consumers. They can choose whether to employ private economic means to guarantee their children a better future (there is nothing like "the common good", or "the future of a better community"). Genetic engineering is more related to a capitalist system than to Nazi eugenics: there is no idea of race and no discrimination based on ethnicity or gender. The real discrimination that humans have to deal with have an economic basis. In the background, of course, there is the imperative of greater productivity, which has been analysed by Marxist thought and the Frankfurt School, and in particular by

Herbert Marcuse[37] through his idea of the dominance of the performance principle. In the capitalist system, productivity and performance become a priority even over the primary needs of man – which begin to be manufactured according to productivity itself: this is the self-referential system that creates needs and desires.
In this movie, individuals treat their bodies like merchandise, but in doing so, a paradox emerges: human beings are deprived of their potential development in order to perform as a very functional item. Blood, urine, hair and skin residue from Jerome are the accomplishments that Vincent presents to get into Gattaca. This biological material is the symbol of Jerome's identity. They are partial objects but, even if detached from the body, they are supposed to preserve the identity of the subject. At the same time, Vincent needs to eliminate his biological residue, because he cannot exhibit but must hide his authentic identity. However, just like Vincent's surname, Freeman, has its own meaning, so the name that is given to the real Jerome when he gives up his identity has a specific connotation: Eugene, which indicates a good gene– here too, there is an ironic aftertaste. In fact, although the real Jerome was endowed with every possible genetic advantage, he did not live a happy life without any kind of accident.
So, the film asks: does human DNA fully predetermine a person's identity? This is the thesis of the director of the company, who is questioned by the police and asked to find the culprit for the murder of his colleague. Referring to his genetically over-qualified staff he says:

> DIRECTOR JOSEPH: "They are bodies adapted to the minds. This is increasingly essential now that we push ourselves further and further. [...] No one exceeds their potential."

However, the director's argument is denied by Vincent's very existence. *Gattaca* can therefore be read as a counterexample to the thesis according to which no one exceeds their genetic potentialities because everything has already been decided in a sort of genetic determinism. Moreover, the director adds,

> DIRECTOR JOSEPH: "[...] or we failed to measure their potential."

The director means this literally: he refers to the technical measurement of blood or urine. However, his phrase has a double implication: it can also mean that using genetic mapping to measure an individual's potential is epistemologically wrong. Just as there is no gene for destiny, there is no gene than can predict the real potential of an individual. As underlined by Jon Baldwin,

> The film can be seen to pose ethical questions around biological materialism and the concept of the human genetic determinism. It explores the use of biometrics to construct the ideal human and the elimination of otherness by way of the eradication of 'in-valids' – or as they are also called in the film 'de-gene-rates' – susceptible to genetic 'disorders'. This is the cognitive and nanotechnological-neurological future. The advertising strapline of the film indicates where it sits in the posthuman debate: 'There is no gene for the human spirit.'[38]

37 See Marcuse, H. (1974), *Eros and Civilization: A Philosophical Inquiry into Freud*, Boston: Beacon Press; Marcuse, H. (1991), *One Dimensional Man: Studies in Ideology of Advanced Industrial Society*, Boston: Beacon Press.
38 J. Baldwin, "Posthumanist Panic Cinema? The Films of Andrew Niccol", cit., p. 92. He adds in his conclusions: "Cloning and generic engineering (*Gattaca*) are to be faced with a notion of the human spirit that is not reducible to materiality". Ibid., p. 102.

This aspect is not even understood by the police, whose investigations are exclusively genetic. The irony is that they are so focused on genetic mapping that even when Vincent's photo appears on the computer screen – he is the primary suspect since his authentic biological material was found near the crime scene – no one recognized him because everyone sees him as Jerome. There are no interviews, but only continuous scientific testing of hair, eyelashes, blood and urine. The whole identity of human beings is in fact completely flattened on the biological one.
In one of the last scenes, Anthony understands that his brother Vincent is not to blame for the crime, but the two have a new confrontation, which again becomes a challenge of courage and physical endurance. They throw themselves into the open sea again, and again the miracle happens: in testing their bodies, the "invalid" exceeds the genetically valid younger brother. Consequently, the first time Vincent beat Anthony cannot be seen as a case of pure luck.
In the final scene, Vincent is about to leave for his mission to space, but one last unexpected test finds him completely unprepared. The lab technician Lamar tells him the truth about his son while he examines his test:

> LAMAR: "Did I ever tell you about my son, Jerome? He's a big fan of yours. He wants to apply here. [...] Unfortunately, my son is not all that they promised. But then, who know what he could do."
>
> Even though he discovers Jerome's true identity (and perhaps he always knew it), Lamar lets him free to go on the mission with the following words:
>
> LAMAR: "Have a safe trip, Vincent."

5. Conclusion: (Vincent) Freeman against genetic determinism

Gattaca certainly shows that genetic programming involves a social injustice: only some people can access this service. Consequently, a new type of social status is generated within this kind of society. However, this is not the only thesis supported by this film, which can make us reflect by imagining a hypothetical future in which humans will have complete control of their genetic heritage. Perhaps, a total and infallible prediction of one's own possibilities from DNA is impossible, because people's real commitment and free will mean something. Obviously, this film does not criticize a specific current position of the scientific community (i.e., a naïve determinism), but a possible drift that is philosophically well argued and developed coherently from credible premises. What emerges from this philosophical thought experiment and counterexample is that human beings, both in their physical and mental abilities, do not totally respond to the technological calculations of genetic engineering. Genetic mapping is not, as *Gattaca*'s scientists would claim, capable of mapping human beings and of predicting them completely, but it is only a scientific instrument.
Finally, the other aspect that clearly emerges is that a complete genetic programming does not necessarily produce a better life: the real Jerome attempted suicide (the accident that forced him into the wheelchair was not accidental at all), because he was not able to become a swimming champion even if he had every genetic predisposition. His sense of failure is enhanced by the perfection of his genetic map. And it is no accident that he finally lets himself die in a terrible way: inside an incinerator, like waste (even though, from a narrative point of view he does so not to put Vincent in trouble, to leave no trace of his biological material). Therefore, according to *Gattaca* – which is one of the most profound and philosophical filmic representations of genetic engineering – scientific progress does not strip human beings of their own secrets and mystery, which is perhaps also the mystery of the universe. The film ends in space, in a sort of second birth for Vincent (the tunnel which he enters to access the

shuttle seems to recall the exit from the womb). The last suggestion that *Gattaca* makes is a different image of the totality of human beings: not the perfect body of genetic engineering which raises important ethical questions and implies inevitable dilemmas, but the reunion with the true totality: nature, space, universe.

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