ORIGINAL RESEARCH PAPER

Reflection on Gene Editing from the Perspective of Biopolitics

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Abstract The study examines the creation of gene-edited infants from the perspective of biopolitics. Through an analysis at the level of "body-power", we show that the infants are a product of an advanced stage of biopolitics. On the other hand, considering the level of "space-power", we indicate that the mechanism of space deepens the governance of population through biopower, leading to real conflicts between past and future in the present. The infants can be seen as "heterotopias of mirrors", where super-reality replaces the reality, culminating in a rational dilemma. We must also consider how to maintain our self-contemplation and naturalness when faced with the physical nature of humans and how to ensure that the state is fulfilling its role in regulating the use of gene-editing technology. Ultimately, we need to engage in a deeper rethinking and criticism of modernity to safeguard our values from being lost in the tide of modernization.

Keywords Gene editing · Biopolitics · Body-power · Space-power

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Background

The announcement of the birth of gene-edited twin girls in 2018 caused a great sensation around the world and sparked a debate about the ethical implications of genetic engineering. It has been reported that one of the twins' genes has been modified so that they are naturally immune to AIDS after birth, the first case of its kind in the world. Since then, this event has generated significant attention and discussions across the world. As the issue has become increasingly complex, some scientists have advocated for a global moratorium on all genetic engineering studies involving the genes of human embryos [1]. This has been further highlighted after the sentencing of He Jiankui to three years in prison and the banning of related researchers from participating in human assisted reproductive technology services and other activities. The debate surrounding genetic engineering has raised important questions about the ethical implications of such technology and has highlighted the need for further research and discussion on the topic.

A number of ethicists have continuously launched discussions on the unknown risks and the dilemmas resulting from genetically engineering human beings, considering both ethical aspects of science and technology and social ethics perspectives. Ethicists of science have recognized its implications, emphasizing that the supervision needs to be strengthened. They also emphasize the necessity of improving relevant

laws and regulations. For instance, Xu [2] suggested that the creation and birth of the gene-edited infants show a lack of scientific, ethical, or governmental oversight, which has led to an increased discourse on global regulations of human genetic editing. Social ethicists have identified the ethical issues of genetic engineering from the perspective of the relationship between people and society and have called for an ethical manner to use the technology. Zhou et al. [3] have proposed to improve ethical norms of the technology from three aspects: establishing a sound legal system, implementing an effective public participation system, and developing a robust risk response system. Nie et al. [4] have also pointed out the lack of policies and supervision mechanisms to regulate conflicts of interest from both individual and institutional perspectives. These discussions and contributions have highlighted the need for further research and discussions on the ethical implications of genetic engineering. They emphasize the significance of establishing ethical norms and regulations to ensure the safe and responsible use of such technology.

The divergence in treating technology between science and philosophy is based on the fact that the scientific community tends to considers technology itself to be value-neutral, while philosophical scholars view technology from a meta-ethical perspective. This disparity has given rise to the critical theory of technological rationality, which aims to examine the implications of technology for human life, delving into its effects on relationships, identity, and our understanding of the world. Many scholars, e.g. from Max Weber to the Frankfurt School, have criticized technological rationality. Moreover, critical theories explore the implications of technology on our lives. A school of thought originating from the works of Karl Marx and Georg Lukács focuses on analyzing power structures and the critique of politics and economics. It is based on the concepts of alienation and materialization and is used to examine technology's societal effects. In recent times, with the increasingly serious dilemma of globalized capitalism based on neoliberalism since the 1990s, related theories of biopolitics have shed new light on the risks faced by humanity. These theories focus on the analysis of power structures and the critique of politics and economics and discuss the issues of human life more closely. They also examine technology from a meta-ethical perspective, looking at the origins of modernity and the instrumentalities of rationality, thereby providing a more comprehensive understanding of the implications of technology on our lives.

Thinkers of biopolitics theories, such as Michel Foucault, have analyzed the fact that the marriage of power and knowledge (i.e. technology) penetrates life to achieve the purpose of controlling life. Thomas Lemke has identified certain further dimensions of this research perspective, such as that scientific experts and disciplines have legitimate authority to tell the truth about life, health, or a given population; how forms of domination, mechanisms of exclusion and the experience of racism and sexism are inscribed into the body; how they alter the body in terms of its physical appearance, state of health, and life expectancy; and how people are called on, in the name of life and health, to act in a certain way (in extreme cases even to die for such goals) in view of defined goals (e.g., health improvement, life extension, better quality of life, amelioration of the gene pool, population increase) ([5], 119–120). Here, we analyze gene-edited technology based on the theories of biopolitics in order to gain a deeper understanding of the implications of such technology for our lives and to identify the ethical implications of its use.

Theory

Biopolitics is a concept that has been explored by many thinkers, beginning with the Swedish political scientist Rudolf Kjellen in the 1920s. However, it was the French thinker Michel Foucault who gave the term its modern meaning. Foucault began to explore the concept in his lectures on "Society Must Be Defended" in 1976, on "Territory, Security, Population" in 1977–1978, and on "The Birth of Biopolitics" in 1978–1979. Foucault's concept of biopolitics has been widely accepted and used to analyze the ways in which the state can use its power to control and regulate the lives of its citizens. It has also been used to explore the implications of new technologies, such as genetic engineering, on the regulation of life. Additionally, biopolitics has been used to examine the implications of globalization and the increasing interconnectedness of the world. Furthermore, biopolitics has been used to rethink the concept of "life" and to provide a suitable theoretical basis for life issues. Since Foucault's introduction of the concept of biopolitics, many thinkers , such as Roberto

Esposito and Giorgio Agamben, have explored the implications of biopolitics on life.

In his book "The Will to Knowledge", Foucault argued that since the Renaissance, biopolitics has been used to control population through strategies and propositions for life events such as birth and death, health standards, and longevity. This idea of biopolitics is an advanced thinking on power, knowledge, discourse, body, and other issues, a form of power that is not based on discipline, but rather on the regulation of life itself ([6], 108–109).

Foucault's power spectrum comprises three dimensions: a shift in the object of power from focusing on individuals to populations and their entire life courses, a shift in the form of power from monarchical power to disciplinary power, and ultimately, a transition to the theme of biopolitics. This shift in power has implications for how we perceive and interact with populations, as biopolitics represents a form of governance aimed at controlling and regulating human life through intervention, optimization, adjustment, and correction. It is a new power technology that is not based on privilege, slavery, or a universal control system but relies on self-governance among individuals. According to Foucault, the intrinsic meaning of the transformations lies in the shift from "making people die or letting people live (monarchical power)" to "making people live or letting people die (biopolitics)". As a result, this technology has enabled the regulation of human life in ways that were previously unimaginable and has opened up new possibilities for understanding the relationship between knowledge, power, and politics.

The core concept of biopolitics is centered on the notion of "make people live". This is achieved through the process of deconstructing death and accentuating its power and terror, which in turn allows for the implantation of power and knowledge into human life. Consequently, individuals, collectively referred to as "people," are shaped and transformed into subjects of power. This biopolitical approach has facilitated the advancement of medicine and science, leading to measures that stimulate birth rates, reduce morbidity and mortality, and extend human life. One of the most extreme examples of this form of biopolitics is found in Nazism. Nazism operated on the belief that different ethnic groups possess varying advantages and disadvantages concerning health and well-being. The fact that others die is

not simply that their death makes me live safer, but the death of others, the death of a poor nation (or the death of a degenerate or an abnormal person), would make life healthier in a general sense ([7], 255). Foucault's discussion of biopolitics began with the analysis of racism, Nazism and social Darwinism, and was later extended by Agamben to the totalitarian state, defining life as politicized as "naked life" in the direction of sovereignty so as to establish the "sacred man" of biopolitics. Michael Hart and Antonio Negri discussed the imperial doctrine of biopolitics on the basis of criticizing Foucault, demonstrating the legitimacy and inevitability of the imperial order and trying to take over the unfinished effort of postmodernism in an attempt to identify the human political life style, that is the reality of biopolitics ([8], 224). Slavoj Zizek called for the liberation of life, seeking to liberate people from the constraints of self-slavery, violence, exclusion, control, and other oppressive forces. Notwithstanding the differences in biopolitical theories, all of these theorists agree that biopolitics revolves around the interactions of people in which the concepts of "body" and "life" play a central role in shaping the discourse.

Body-Power: The Gene-Edited Infant as an Advance of Biopolitics

The incident of the creation of gene-edited infants in China is an example of biopolitics, where power was used to shape the "truth" and control people's beliefs and behaviors. Foucault's theory of biopower suggests that the body is used as an object of knowledge and power, which can potentially result in the erosion of human autonomy and the dehumanization of the individuals. As Foucault put it, "People are erased, just like the faces painted on the beach" ([9], 52–53). This incident serves as a stark reminder of the potential consequences of biopolitics and underscores the importance of being conscious of its implications. It is a warning that biopolitics can lead to the destruction of human nature and the creation of a new form of subjectivity, one that is artificial, manipulable, and obedient. Vigilance is crucial to prevent the further erosion of human autonomy and the loss of genuine humanity.

The advent of gene-edited infants in China has sparked much reflection and fear in society. Already films such as "Prometheus", released in

2012, and "Alien: Covenant", released in 2017 (with the former being a prequel of the latter), both directed by Ridley Scott, depicted a future where aliens are produced from human genes. Such films can serve as warnings about the potential consequences of gene editing and the need to be aware of its implications. The notion of creating a "perfect life body" with high IQ and super physical strength is dangerous, as it could lead to extreme anthropocentrism through the customization of humans. With metaphors and symbols, such films prompt us to reflect on the implications of gene editing and the potential consequences of biopolitics. With the ability to "knock out" or "insert" specific DNA fragments, human beings now start to have the power to customize humans, which may lead to anthropocentrism reaching its extreme.

The consequences of the gene-editing of infants in China are far-reaching and profound. It has exacerbated the subjective dilemma in modernity, from the twilight of the subject to the collapse of ontology, as a result of science and technology's legitimization. The technological aggression has extended from affecting "the life present" to encompassing "the life not present". This expansion has led to an increased technological aggression and closed off potential avenues for human self-rescue. Furthermore, medical power has been used to stimulate and bolster state power, further eroding human autonomy. We must recognize the potential consequences of biopolitics and advocate for the restoration of humanity, the liberation of life, and the adoption of an aesthetic lifestyle.

Space-Power: The Gene-Edited Infant as a Mirror of Utopia

Gene-edited infants raise questions in both spatial and temporal dimensions. From a spatial perspective, power transforms individual issues into population-wide problems, and the resulting subject of biopolitics is largely dependent on space, which serves as the primary mechanism. This is because individuals within a given space are not seen as diverse individuals but rather as a population of living people. Biopolitics involves the planning and governance of this space.

It can be said that human beings are always engaged in ubiquitous spatial social construction. Examples of this include family, architecture, villages, cities, nations, and countries, which serve as the objects of investigation in the field of space epistemology. French thinker Henri Lefebvre introduced the "production of space" theory in the 1970s, which highlights the interplay between space and the social, political, and economic factors that shape it, that is the "production of space". At the individual level, various spatial relationships such as hospital space, prison space, living space, and academic space are not just physical arrangements but also intricately tied to social relationships. Human beings are constantly immersed in the multifaceted interplay of spatial social construction. Lefebvre's triple-body model, which comprises space practice (perceived space), spatial reproduction/representation (conceptual space), and reappeared space (lived space), offers a profound lens through which we can better comprehend the diverse social relationships within different spatial contexts. By delving into these dimensions of spatiality, we can gain a deeper understanding of the intricate connections between society and space. Space practice encompasses not only the processes of production and reproduction, but also the spatial arrangements within a given space ([10], 33). The spatial reproduction/representation involves the deliberate reproduction of social relations related to production and reproduction with in a social space. In this conceptualization, hidden relationships may be suppressed or controlled. Social space is no longer perceived as the discovery of an external, "real" space, but rather as the overlaying of a natural space with an "authentic" spiritual space ([11], 2239). The reappeared space is characterized by a profusion of symbols and the entanglement of real and imaginary elements. It is a tangible manifestation of the social relations of production, reproduction, exploitation, domination and obedience ([12], 87). Before Lefebvre, Foucault revealed how power infiltrates society through the division and distribution of space, thus creating a disciplined society. On the basis of Foucault and Lefebvre, Edward Soya pointed out that "hidden in the modernity that is being formed is a profound spatial expediency" ([13], 34). This spatial expediency is manifested in the way that space is used to control and manipulate people and to create a sense of order and stability in society.

Seen from the time dimension, the gene-edited infants embody the tension and conflict between past and future, which becomes manifest in the present. That is, the gene-editing technology allows the

power hidden in space to threaten the space of future. The actions taken in the present through space practice leave a lasting impact on the future, essentially creating a product molded by the directives of technical experts. This future space differs from Lefebvre's heterogeneous space and Foucault's notion of "heterotopia". While Lefebvre's and Foucault's ideas can be understood, and grasped through imagination, this new future space resulting from gene editing becomes more alienated. Foucault's "heterotopia" encompasses both positive examples like libraries and museums, where different times and spaces coexist, and negative examples like madhouses, infectious wards, health centers, and prisons, which reveal social space's classification, isolation, and exclusion. With the emergence of gene-edited infants, a new type of heterotopia is created, which is different from the positive and the negative heterotopia. This new type of heterotopia represents a beautified reality rather than an idealized concept, such as Utopia, which remains unattainable. It can be described as a "mirror heterotopia", reflecting the real world and bringing to light the deformities of reality. The illusionary space created by the heterotopia is more powerful and could subtly infiltrate daily life due to its perfect, predictable, and foreseeable nature.

Modernity brings about the extension and separation of time and space. The absent things in the sense of time–space gradually replace those present, which is the production of the phenomenon of "out", as Anthony Giddens called it. Social relations are reconstrued across an infinite expanse of time and space. However, Giddens' critique primarily focused on the globalization of space; overlooking the more profound issue: the extension of time and space not only establishes a global social relationship, but also a social relationship with hyper time and hyperspace. Examples of this include the contrast between present-day natural individuals and the future gene-edited individuals, the present doctors and the future doctors, and so on. Renowned physicist Stephen Hawking warned the world: through genetic engineering "super humans" would emerge; he foresaw that the future rich would be able to edit their own and their children's DNA to enhance memory, resistance, cognitive abilities, and longevity. Unfortunately, ordinary people belonging to non-elite classes would eventually be left behind and even eliminated. New space production can thus lead to social stratification, fragmentation, and imbalance.

It appears that our critical reflection on space needs to be deepened. The path of self-rescue and reconstruction, relying on human subjectivity, has been disrupted by gene-editing technology. If we classify the technology as a new mode of production, then the modern world would become a "hyperspace" defined by Jean Baudrillard, a space filled with phantoms and simulations. The features of the "hyperspace" refer to the disappearance of the objective reality, where the super-reality replaces the real itself. The gene-edited person becomes the embodiment of the super-real, potentially leading real humans astray from reason and authentic living. This might widen the gap between the haves and the have-nots, as those with access to the latest gene-editing technology will be able to gain an advantage over others. As a result, society could become further stratified, with those who possess the technology enjoying a higher chance of success, while those without access are left behind.

Concluding Remarks

One subject we cannot ignore is the state. It is a powerful driving force for the development of science and technology, and the promoted technology, in turn, becomes a means of national governance. From the beginning of the nineteenth century, progress has been regarded as an idea of economization, industrialization, and technology; "Freedom and rationalization are regarded as allies" ([14], 154). However, Foucault profoundly revealed that modernity, despite aiming to rationally create and enhance people's lives, has had counterproductive results, leading people to become unfree [15]. This indicates that reason itself has its limitations, and people are subject to it. As Leo Strauss said, "modern rationalism has become false rationalism because it turns to itself and becomes a form of superstition" ([16], 3). Blind optimism with respect to rationality is the ruin of freedom. It is important to recognize that while technology and progress can be beneficial, they can also be used to oppress and control people. Therefore, we must be aware of the potential consequences of our actions and strive to use technology and progress in a way that respects and protects human freedom.

This raises important questions about the implications of advances in technology and their potential to be used to oppress and control people. It is essential to consider the consequences of our actions and ensure that technology is used in a way that respects and protects human freedom. Advances of gene-editing technology have united rationality and personal will, demonstrating that they are not as opposed as rationalism and voluntarism typically suggest. However, a significant concern arises as even if the will is rational, the resulting behavior or outcome may still lead to disaster. Therefore, we must also be aware of the limitations of rationality and its potential to be used to manipulate and deceive people. After the combination of arbitrary reason and free will, subjectivity would dominate the world. In the end, as Strauss pointed out, modernity introduces a new "historical concept", leading to the decline of the classical "natural justification" and culminates in complete nihilism ([16], 3). It is important to recognize that technology can be a powerful tool, but it must be used responsibly and with caution. Striking a balance between progress and safeguarding human values is essential for ensuring a positive impact on society.

The advent of gene-editing technology has indeed brought about profound changes in the world, as it has effectively erased the boundaries set by nature. This has led to a rejection of traditional values and beliefs, and has, in some cases, paved the way for nihilism. With the erasure of natural boundaries, debates on morality and ethics have been replaced by a focus on progress and the pursuit of a better future, where happiness, righteousness, and goodness are redefined. Given the far-reaching implications of this technology, it is crucial to carefully consider its potential impact before its widespread use.

As already Jean-Jacques Rousseau warned, the advancement of science and technology does not automatically translate to genuine progress for humanity. The introduction of such technologies as cloning, artificial intelligence, and gene editing could have drastic effects on the direction of human development, and if we do not take our time to reflect on our values and beliefs, we run the risk of losing our sense of morality in the modern world. This loss of morality could pave the way for the ultimate downfall of humanity. It is imperative to consider the implications of these technologies before their implementation and to prioritize the preservation of our values.

As we embrace progress, we must not sacrifice our ethical principles in the pursuit of scientific advancement. Striking a balance between technological achievements and moral responsibility is essential to create a future that benefits all of humanity and upholds our core values.

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