

Constructing Ethics: Bioart's Critical Probe into Life Manipulation and Navigating the Ethical Terrain

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Abstract

Bioart, a contemporary artistic practice that utilizes biological materials, living tissues, and scientific processes as its medium, stands at the provocative intersection of art, science, and philosophy. By transforming laboratories into studios and biological life into aesthetic material, bioart challenges fundamental conceptions of life, creation, and the role of the artist. However, this very act of aestheticizing life forces a confrontation with a complex and often contentious ethical landscape. This paper argues that bioart does not merely encounter ethical boundaries but actively constructs and probes them, functioning as a vital public forum for debating the implications of biotechnology. Through a critical analysis of seminal bioartworks—from the transgenic aesthetics of Eduardo Kac's *GFP Bunny* to the tissue-cultured semi-living of the *Tissue Culture & Art Project*—this article maps the primary ethical territories contested by the field: the moral status of the manipulated organism, the concepts of agency and authorship, the implications of public engagement, and the biopolitical dimensions of life manipulation. The paper concludes that the ethical unease provoked by bioart is not a flaw to be mitigated but its core critical function, making it an indispensable practice for a society increasingly governed by biological engineering.

Keywords

Bioart, Art and Ethics, Biotechnology, Transgenic Art, Bioethics, Artistic Research, Biological Aesthetics

1. Introduction

The 20th and 21st centuries have been defined by a series of biological revolutions, from the discovery of the DNA double helix to the development of CRISPR-Cas9 gene-editing technology. Concurrently, the domain of art has continually expanded, incorporating new media and technologies to reflect and critique the conditions of its time. The convergence of these two trajectories has given rise to Bioart, a practice where the studio and the laboratory merge, and where the medium is life itself. Artists working in this domain employ techniques such as tissue engineering, genetic modification, and bacterial culturing to create works that are often alive, dynamic, and sometimes disquietingly familiar.

Bioart's primary power lies in its capacity to make the abstract, high-stakes debates of biotechnology tangible, visceral, and public. While scientists and ethicists debate in specialized journals, bioartists stage these dilemmas in galleries and museums, inviting emotional and intellectual engagement from a broad audience. This practice, however, inevitably places bioart at the epicenter of intense ethical scrutiny. The manipulation of life for symbolic or aesthetic purposes challenges deep-seated cultural, religious, and philosophical norms about the sanctity of life, the "natural" order, and the limits of human creativity.

This article will explore the multifaceted ethical boundaries navigated by bioart. It begins by defining the field and establishing a theoretical framework for its analysis. Subsequently, it delves into specific ethical zones of contention: the moral status of the non-human and semi-living entity; the redistribution of agency among artist, organism, and scientist; the responsibilities involved in public presentation; and the biopolitical critique embedded within the work. Throughout, the paper contends that the ethical tensions are not peripheral concerns but are central to bioart's meaning and social value. By provoking discomfort and questioning, bioart performs a crucial role as the conscience and critic of the biological age.

2. Defining Bioart and Its Theoretical Underpinnings

Bioart is not a monolithic movement but a spectrum of practices united by the use of living matter as a medium. According to pioneering artist and theorist Kac (2007), a key figure in the field, bioart can range from the manipulation of genes and cells to the creation of complex ecosystems. He distinguishes between art that uses biological imagery and art that works with living biological systems in a gallery or studio context.

A crucial theoretical anchor for bioart is the concept of the "aesthetic of care," as proposed by Catts & Zurr (2008), founders of the Tissue Culture & Art Project (TC&A). They argue that working with living tissues necessitates a shift from a traditional artistic mindset of control to one of collaboration and nurturing. The artist becomes a caretaker, and the artwork's life is contingent and fragile. This directly opposes the romantic notion of the immutable art object and

introduces a unique ethical dimension of responsibility for the "semi-living"-entities that are neither fully organism nor inert object, but cultured tissues sustained by technological life support [1].

Furthermore, bioart operates within a posthumanist framework, challenging the anthropocentric view that places humans at the apex of creation. By creating works that are hybrids of human, animal, and machine, or by giving aesthetic voice to bacteria and cells, bioart de-centers the human and questions the very category of "life" as something pure and separate from technology. This theoretical positioning is what makes its ethical inquiries so profound; it is not just about what we can do, but about who "we" are in relation to the other living entities with which we co-create.

This theoretical positioning is not merely about methodology but involves an epistemological shift. Bioart compels viewers to confront a central question of a posthuman future: when life itself becomes a malleable medium, how do traditional humanist values persist? As anticipated by Haraway (1991) in *A Cyborg Manifesto*, bioart embodies this very practice of boundary-breaking—it no longer treats technology as an external tool but as a central force reconfiguring the internality of life. In this practice, artists assume the role of "boundary walkers," navigating between different knowledge systems, simultaneously challenging the insularity of scientific research and expanding the frontiers of artistic expression [2]. This cross-disciplinary practice not only generates new aesthetic forms but also creates a unique form of "epistemic justice"—allowing life forms often objectified in traditional scientific discourse (such as laboratory mice, cell lines) to gain a form of subjective representation through artistic expression.

3. Ethical Boundary 1: The Moral Status of the Manipulated Organism

The most immediate ethical challenge posed by bioart concerns the treatment of the living beings it employs. This is most starkly illustrated in works involving transgenic animals.

Table 1. Comparative Analysis of Seminal Bioartworks and Their Primary Ethical Challenges

Artwork & Artist	Biological Medium	Primary Technique	Primary Ethical Challenge(s)	Key Critical Question
<i>GFP Bunny</i> (Eduardo Kac)	Transgenic rabbit	Genetic engineering	Moral status of sentient transgenic life; instrumentalization; spectacle.	Does critical intent justify the creation of a modified sentient being?
<i>Victimless Leather</i> (TC&A)	Immortalized cell lines (mouse/human)	Tissue engineering	Status of the "semi-living"; ethics of care; the act of killing.	What are our responsibilities to the ambiguous life we create and sustain?
<i>Selective Breeding Series</i> (George Gessert)	Plants (e.g., irises)	Selective breeding	Non-human agency; aesthetic eugenics; human-plant collaboration.	Who is the author when evolution and genetics are co-creators?
<i>Free Range Grain</i> (Critical Art Ensemble)	Genetically Modified food	DIY DNA testing	Public participation in biopolitics; democratizing scientific tools.	How can art empower the public to directly engage with corporate biotechnology?
<i>Natural History of the Enigma</i> (E. Kac)	Petunia flower (Edunia)	Transgenics (artist's gene)	Blurring human/non-human boundaries; self-portraiture via other species.	What does it mean to create a hybrid of oneself and another species?

Table 1 through a comparison of five bio-art projects, reveals the complex relationship between art, science, and ethics. It reflects on: the boundaries of art in the biotechnology age; the ethical issues of "life" as a creative material; and how art can become a tool for the public to understand and question the power of science.

3.1 The Case of *GFP Bunny*

Eduardo Kac's *GFP Bunny* (2000) is arguably the most famous and controversial bioartwork. The project involved the creation of a transgenic albino rabbit, named Alba, that glowed green under blue light due to the incorporation of a Green Fluorescent Protein (GFP) gene from a jellyfish. Kac's stated intent was to create a public dialogue about biotechnology, not to produce a mere object of spectacle. He proposed to integrate Alba into his family life, framing her as a being with a social existence [3].

The ethical outcry was swift and multifaceted. Animal rights groups condemned the creation of an animal for artistic purposes, viewing it as a violation of its intrinsic worth and a potential source of suffering. Critics asked whether the potential for public dialogue justified the instrumentalization of a sentient life. Defenders, including Kac himself, argued that the artwork critically mirrored the widespread and often unquestioned use of genetic modification in agriculture and medical research, practices that typically occur away from public view. The ethical boundary here is not merely about animal welfare, but about representation: who speaks for Alba, and does her creation for a critical purpose absolve the act of its potential harm?

This controversy reveals a fundamental dilemma in the ethical assessment of bioart: do we possess a unified moral framework for evaluating the manipulation of life in art versus science? In scientific research, animal experimentation often receives ethical exemption based on reasons of "human welfare" or "scientific progress"; in agriculture, the commercialization of genetically modified organisms has been widely accepted [4]. However, when similar technologies appear in an artistic context, they provoke strong moral backlash. This differential reaction suggests that society's ethical judgment of technological application is influenced not only by the action itself but deeply by its context and purpose. The concept of "ethical choreography" proposed by Thompson (2013) in her analysis of stem cell research is particularly apt here—identical technical acts undergo completely different ethical scrutiny and public acceptance across different fields. The unique value of bioart lies precisely in its exposure of this inconsistency in ethical standards, forcing society to examine those operations of life that have become normalized in scientific and industrial domains [5].

3.2 The "Semi-Living" and the Ethics of Care

A different, yet equally complex, set of ethical questions arises from works using tissue culture. The TC&A's *Victimless Leather* (2004)—a miniature, stitchless jacket grown from immortalized cell lines (mouse and human) sustained in a bioreactor—presents a paradoxical entity. It is a "leather" jacket that required no animal slaughter, yet it is a living construct dependent on constant technological intervention for its survival.

The ethical framework shifts from one of animal rights to an ethics of care for the semi-living. As Catts & Zurr (2008) elaborate, the semi-living exists in a state of ambiguity, provoking unease about how we should relate to it. Is it an object to be displayed, or a subject to be cared for? The project's title is intentionally ironic; while no animal was directly killed, the piece relies on cell lines whose origins are often obscured, and the "life" of the jacket is entirely subservient to the artistic concept [6]. When the piece was famously "terminated" by the museum (MoMA) due to overgrowth, it forced a public confrontation with the reality of killing this semi-living artwork, an act that would normally be hidden in a scientific laboratory. This act of "killing" an art piece highlights the ultimate ethical question: what are our responsibilities to the life we create and sustain in these novel, liminal states?

The semi-living state of artworks also provokes philosophical contemplation regarding the "right to life" and the "right to death." When museum staff "terminated" *Victimless Leather*, the act was essentially the intentional destruction of a living system—albeit a simplified one. This action is technically identical to standard laboratory procedures for disposing of cultured cells, but when performed publicly in an art venue, it acquires a completely different moral weight. Zylinska (2009) argues that such public "termination" is effectively a biopolitical performance, revealing the invisible, systemic management of life inherent in contemporary biotechnological societies [7]. By bringing operations typically hidden behind laboratory doors into public view, bioart creates a simulation of biopolitics, inviting the audience to reflect: under what conditions is the ending of certain lives taken for granted, while the preservation of others is assigned high value?

4. Ethical Boundary 2: Agency, Authorship, and the "Life" of the Work

Traditional art criticism centers on the artist as the sole author and the artwork as a static product of their will. Bioart fundamentally disrupts this model, introducing a network of agencies that complicate notions of authorship and control.

In bioart, the "artist" is often a collaborator in a network that includes scientists, technicians, the biological medium itself, and the technological apparatus that sustains it. The living cells in a bioreactor grow, mutate, and sometimes die according to their own internal logic, independent of the artist's intention. This introduces a strong element of chance and biological agency. George Gessert's work with irises, selectively breeding them for aesthetic traits, acknowledges that his "co-artists" are the plants themselves, with their own genetic predispositions and reproductive behaviors.

This redistribution of agency raises ethical questions about responsibility. If an artwork (a genetically modified organism, for instance) behaves in an unexpected or harmful way, who is accountable? The artist for the concept, the scientist for the execution, or the institution for hosting it? The blurred lines of authorship can lead to a diffusion of ethical responsibility, a phenomenon already observed in large-scale scientific projects [8].

Furthermore, the artwork itself has a "life" beyond the artist's initial creation. It ages, decays, and may even reproduce. This challenges the legal and cultural frameworks of art ownership, conservation, and value. How does one conserve a living piece? Does one preserve the genetic line or the specific individual? These questions reposition the artist from a creator-god to a participant in a complex, dynamic system, with ethical obligations to all actors within that system [9].

This multi-layered authorship extends beyond the creative process to the work's continued existence and evolution. In Gessert's (2010) iris breeding project, for instance, the artist's initial selection only initiates a long process of co-creation; the plant's genetic characteristics, environmental responses, and natural variations influence the final outcome over generations. This temporal span far exceeds that of traditional art creation, making the work a veritable "living archive," whose preservation concerns not the maintenance of a physical structure but the continuity of genetic information and life processes [10]. This raises novel curatorial questions: when a bioartwork can self-replicate, which individual constitutes the "original"? Is it the artist's initial sample, or the entire genetic lineage? This uncertainty destabilizes the traditional art historical evaluation system based on uniqueness and authenticity, demanding the development of entirely new critical and curatorial frameworks to address this distributed, evolving form of art-making.

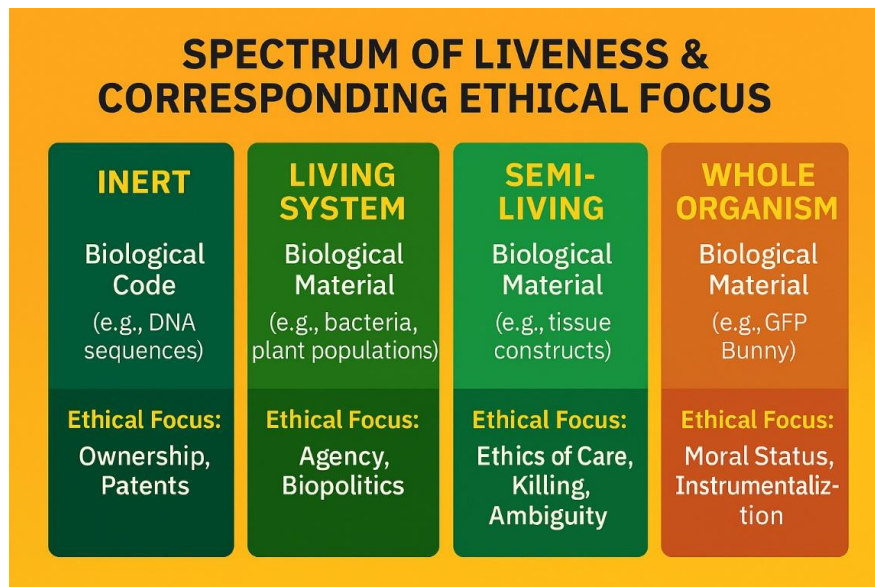


Figure 1. The Spectrum of "Liveness" in Bioart Media

Figure 1 shows the ethical questions in bioart shift significantly along the spectrum of the medium's perceived "liveness." Concerns move from legal and proprietary issues with inert material to profound philosophical questions about moral status and instrumentalization with whole, sentient organisms.

5. Ethical Boundary 3: Public Engagement and the Spectacle of Life

A core justification for bioart is its capacity to foster public engagement with science. However, the methods of this engagement are themselves ethically loaded. Presenting living entities in a gallery risks reducing them to mere spectacle, where the "wow" factor of a glowing animal or a beating heart tissue overwhelms any critical reflection.

The context of display is crucial. A transgenic fish in an art gallery may be seen as a monstrous spectacle, while the same fish in a pet store, sold as a "GloFish," is normalized as a commodity. Bioart has the potential to break this normalization by re-contextualizing the technologically altered life form as an object of aesthetic and philosophical contemplation. The ethical task for the bioartist and the curating institution is to design an exhibition framework that facilitates understanding and critical dialogue rather than passive consumption. This includes providing sufficient scientific background, ethical context, and avenues for public discussion.

There is also an ethical responsibility to avoid sensationalism. Works that use human tissues, especially those with cultural or emotional resonance, must be handled with extreme sensitivity. The use of human embryonic stem cells, for example, would immediately invoke a host of religious and ethical debates that the artwork must be prepared to engage with substantively, not just exploit for shock value. The line between provocative critique and irresponsible provocation is a key ethical boundary that bioart must constantly navigate.

6. Ethical Boundary 4: Biopolitics and the Critique of Technoscience

Beyond individual artworks, bioart functions as a form of biopolitical critique. The term "biopolitics," as developed by Foucault, refers to the ways in which political power is exercised over the biological life of populations. Bioart makes these power structures visible and subject to scrutiny.

By appropriating the tools of biotechnology—the very tools used to engineer our food, manage our health, and potentially redesign our species—bioart exposes the mechanisms of control inherent in modern technoscience. Zurr & Catts (2018) argue that by creating "uneasy" and ambiguous living sculptures, bioart challenges the dominant scientific narrative of progress and control, which often seeks to eliminate ambiguity and unpredictability.

For instance, the critical art collective Critical Art Ensemble (CAE) created works like *Molecular Invasion* (2004), which attempted to create a genetically modified crop that could resist the herbicide Roundup Ready®, not to promote

its use, but to democratize and demystify the technology, showing how grassroots groups could potentially intervene in corporate-controlled agriculture. This practice, which they call "tactical biopolitics," directly engages with the power dynamics of life science, questioning who gets to control and manipulate the code of life.

This critical function of bioart becomes especially urgent in the contemporary era of widespread CRISPR-Cas9 gene-editing technology. When scientists discuss "gene drives" or "de-extinction" in professional contexts, the public often struggles to participate in these decisions that will profoundly shape ecological futures. Bioart breaks this monopoly of expertise by translating these technological possibilities into perceptible, debatable visual forms. For example, imagine an artist creating a visual library containing DNA of extinct species, or cultivating an organism carrying ancient genetic variants. Such works would not provide technical solutions but act as catalysts for public deliberation. They raise essential questions: Which life forms should we revive? Based on what criteria should these decisions be made? Who has the right to participate in these decisions? The "posthuman future" warned of by Fukuyama (2002) is no longer a theoretical risk but, through bioart, becomes a tangible reality option. In this sense, bioart fulfills a democratic function of "rehearsing the future," allowing society to contemplate and choose its desired direction before technology irreversibly changes the world.

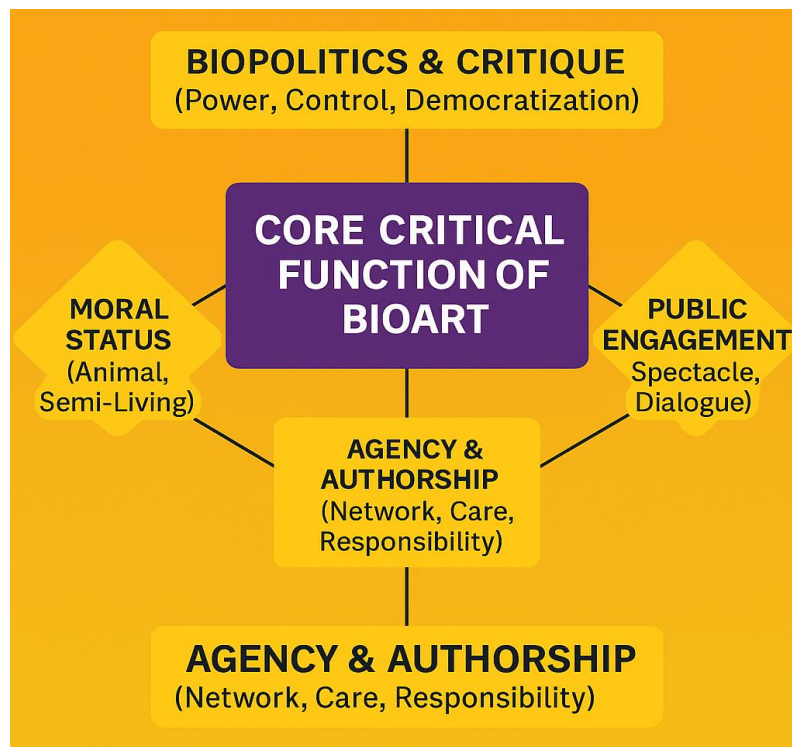


Figure 2. Conceptual Map of Ethical Boundaries in Bioart

Figure 2 explain the ethical landscape of bioart is not composed of distinct silos but of deeply interconnected concerns. The central, overlapping domain is where bioart performs its most vital work: using ethical provocation as a critical tool.

The ethical position here is one of resistance and transparency. Bioart, in this light, is an ethical imperative: it is a practice that insists on public participation in the debates that will shape our biological future, refusing to let these decisions be made solely in corporate boardrooms and closed scientific committees.

7. Bioart as Public Pedagogy and Its Ethical Responsibility

Beyond its critical and biopolitical functions, bioart serves as a potent form of public pedagogy, bridging the knowledge gap between scientific communities and the general populace. In an age dominated by rapid biotechnological advances, public understanding often lags behind technical capabilities, leading to democratic deficits in decision-making processes concerning genetic engineering, climate interventions, and other life-altering technologies. Bioart addresses this gap by transforming complex scientific concepts into accessible, sensory experiences. For instance, a project that visualizes bacterial communication through light patterns or one that allows audiences to interact with responsive fungal networks can convey principles of synthetic biology or ecological interdependence more effectively than traditional texts or lectures. This pedagogical role, however, carries significant ethical responsibilities.

Firstly, the artist-educator must navigate the fine line between simplification and distortion. While making science accessible is crucial, oversimplifying biological processes or ethical dilemmas risks misleading the public. The ethical duty here is to provide contextual accuracy—ensuring that artistic interpretations do not misrepresent scientific facts or trivialize the associated risks. Collaborations with scientists can mitigate this, but the artist retains the responsibility to present a narrative that is both engaging and intellectually honest.

Secondly, the presentation context must be designed to foster genuine inquiry rather than passive consumption. Interactive installations, accompanied workshops, and facilitated discussions can transform the gallery from a space of spectacle into a forum for dialogue. For example, a bioart piece exploring CRISPR technology could include a companion digital platform where visitors simulate gene-editing scenarios and debate their consequences. Such approaches align with Freire's (1970) model of critical pedagogy, where education becomes a practice of freedom, encouraging participants to question and co-construct knowledge.

Moreover, bioart's pedagogical dimension extends to formal education settings. Integrating bioart projects into school and university curricula can cultivate bio-literacy—a nuanced understanding of biological sciences intertwined with ethical and social considerations. Students engaging in hands-on projects, such as culturing mycelium-based materials or designing ethical frameworks for hypothetical bioartworks, develop critical thinking skills essential for navigating future biotechnological landscapes.

However, this educational potential must be tempered with ethical vigilance. Using living organisms in educational contexts requires instilling respect for all forms of life and emphasizing the principles of care and responsibility. The same ethical considerations discussed earlier—regarding the moral status of organisms and the ethics of care—apply equally in pedagogical settings. The goal is not only to inform but also to foster an ethical sensibility towards the manipulation of life.

In fulfilling its role as public pedagogy, bioart does more than disseminate knowledge; it cultivates a bioethically literate citizenry capable of participating in societal debates about biotechnology. This empowerment is essential for democratic governance in the biological century. By embracing this educational responsibility, bioartists ensure their work contributes to a more informed, reflective, and engaged society, prepared to make collective decisions about the future of life on Earth.

8. Conclusion

Bioart, by its very nature, exists in a state of productive tension. It is a practice that simultaneously celebrates the creative potential of the life sciences and subjects them to rigorous ethical and philosophical scrutiny. The ethical boundaries it navigates—concerning the moral status of life, the nature of agency, the responsibilities of public display, and the politics of biotechnology—are not obstacles to be overcome but are the very source of its critical power.

The discomfort elicited by a glowing rabbit, a living tissue jacket, or a lab-engineered plant is a symptom of a culture grappling with unprecedented technological change. Bioart gives this discomfort a form, forcing us to look directly at the future we are building. It asks us not for easy answers, but for better questions: What is our relationship to the life we can now engineer? What are our responsibilities to the new forms of life we create? And what kind of world do we want to build with our newfound biological powers?

Rather than being condemned for crossing ethical lines, bioart should be recognized for its unique capacity to draw those lines in the sand, inviting society to see them, debate them, and ultimately, to decide for itself where they should be. In an age of synthetic biology and genetic engineering, this dialogic function makes bioart not merely an artistic genre, but an essential civic practice.

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