

- Moravec, H. (1988): *Mind Children – The Future of Robot and Human Intelligence*. Cambridge(MA): Harvard University Press.
- More, M. (1993): *Technological Self-Transformation – Expanding Personal Extropy*. In: *Extropy* #10, 4(2).
- Price, J./ Shildrick, M. (eds.) (1999): *Feminist Theory and the Body – A Reader*. New York: Routledge.
- Randall, L. (2005): *Warped Passages – Unraveling the Mysteries of the Universe's Hidden Dimensions*. New York: HarperCollins.
- Schiebinger, L. (1999): *Theories of Gender and Race*. In: Price, J./ Shildrick, M. (eds.): *Feminist Theory and the Body – A Reader*. New York: Routledge, 21-31.
- Schiebinger, L. (2000): *Taxonomy for Human Beings*. In: Kirkup, G. et al. (eds.): *The Gendered Cyborg – A Reader*. New York: Routledge, 11-37.
- Singer, P. (1975): *Animal Liberation – A New Ethics for Our Treatment of Animals*. New York: New York Review.
- Turkle, S. (1984): *The Second Self – Computers and the Human Spirit*. New York: Simon & Schuster.
- Vita-More, N. (2004): *The New Genre – Platform Diverse Body / Substrate Autonomous Persons – (e.g. Primo Posthuman)* (Presentation at Ciber@RT Conference, Bilbao). <http://www.natasha.cc/paper.htm> (accessed August 3, 2013).
- Warwick, K. (1997): *The March of the Machines – The Breakthrough in Artificial Intelligence*. London: Century.
- Warwick, K. (2004): *I, Cyborg*. Urbana(IL) et al.: University of Illinois Press
- Woese, C. (1998): *The Universal Ancestor*. In: *Proceedings of the National Academy of Science of the United States of America* 95(12), 6854-6859.
- Yancy, G. (2008): *Black Bodies, White Gazes – The Continuing Significance of Race*. Lanham et al: Rowman & Littlefield Publishers.



This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License. You must attribute this work to the Original Author as part of the Present Collection, in the manner specified by the Editor in the Colophon of this Publication. To view a copy of this License, visit <http://creativecommons.org/licenses/by-nc-nd/3.0/> or send a letter to Creative Commons, 444 Castro Street, Suite 900, Mountain View, California, 94041, USA.

Bioart

Andy Miah

For over a century, science fiction has gripped the attention of audiences worldwide, with some of its most successful achievements furnishing the world with utopian and dystopian narratives about the progress of science and the limits of humanity's ability to understand its own complexity and place in the world. However, it is only in the last 30 years that ideas of transhumanism and posthumanism have become part of the intellectual influences of various *other* art forms that engage with similar subject matter. It is even more recent that posthumanist and transhumanist scholars have interpreted the work of many pioneering artists and designers as manifestos for their ideas, or as rejections of the possible futures their ideas imply. This is not to say that transhumanist and posthumanist thought is absent from art works that precede this period, but that the explicit link between theories of post- and transhumanism and such artwork has only recently been made.

This chapter makes explicit the association of certain art forms and art works to trans- and posthumanist ideas, which have become constitutive of the political, cultural and philosophical differences and similarities that exist between these concepts. It discusses a range of art practices with a view to identifying themes within trans- and posthumanist art, while also articulating some of the foundational contributions in this field. It begins by advancing a definition of bioart to capture the common ground between transhumanist and posthumanist art. It then considers interpretations of such works and rejection of their collective definition, by drawing attention to their socio-political and bioethical context. Finally, I consider how one may read bioart from the perspective of transhumanist and posthumanist thought. Throughout, some of the defining artists in the fields of transhumanist and posthumanist art are considered.

Defining Bioart

Over the years, posthumanism and transhumanism have enjoyed slightly different intellectual trajectories (see Miah 2008) and this is true also of how their ideas are present or absent within certain forms of work that may be collectively defined as *bioart*. To this extent, it is misleading to claim that artists, whose works may be interpreted as either trans- or posthumanist, have intended to make any explicit connection with these concepts. Indeed, these terms are two, among many others, that are engaged within artwork that explores how scientific and technological changes may alter the nature of biology. For instance, the pio-

neering work of Stelarc is visibly engaged with the concept of the cyborg, at least as much as it is concerned with the idea of the posthuman. As an artist, Stelarc's work is exceptionally useful to theorists since he also provides written accounts of his ideas, which allow greater insight into his influences and intentions as an artist (see Stelarc 1997; 2005). Yet, it would be difficult to claim that Stelarc's work can be neatly described as typical of either trans- or posthumanist thought. Equally, it is untrue to claim that those artists whose work may be associated with trans- and posthumanist thought are necessarily engaging with them as separate, unrelated concepts. Rather, when examining bioart, one is quickly made aware of how these two concepts are intertwined, if not through the artist's intentions, then through the many interpretations that follow from it.

For simplicity, I propose that art practices which advocate the transgression of biological boundaries as more typical of transhumanist art, while those work focuses on scrutinizing biopolitical relationships are more characteristics of posthumanist art. The common ground that is occupied by each of these terms may be the only justification for unifying such artwork under the common banner of *bioart*. Indeed, it may be the only justification for utilizing the term bioart at all. In this respect, the crucial difference between transhumanist or posthumanist art is that the former is focused on provoking debate about the merit of disrupting biological continuity via science and technology and the latter is interested in expressing the socio-political consequences of such changes.

My explanation of their difference also helps to explain why they are often conflated within the literature. In this respect, the moral philosophical issues arising from transhumanism are often subsumed within debates about the political implications of such transformations. Nevertheless, both concepts are united in their interest to consider what may change about humanity – and the broader biosphere that people inhabit – if people develop and accept a range of technological modifications. This interpretation may betray a *prima facie* explanation of their meaning, as ideas that are simply focused on either a) states of human transition (transhumanism) or b) defining the conditions of our species, once the concept of *Homo sapien* ceases to have meaning (that is, once we have become posthuman). Indeed, this more literal explanation of their meanings is also a reasonable indication of how many artists have engaged with them through their work. Thus, some art is more simply preoccupied with imagining a future where the category of the human species ceases to exist – once humanity has transcended its species-typical functions, either through becoming enhanced or by developing new capacities. For example, Dunne & Raby's *Foragers* (2009) imagines how humans may redesign themselves biologically to “maximise the nutritional value of the urban environment”, in a world of nearly no resources and an inability for governments to resolve. Alternatively, Michael Burton's

(2007) *biophilia clinic*, builds on scientist Edward Wilson (1984) and James Lovelock (1989) to consider what kind of attachment people may have to the experience of illness, in a world where all disease has been eradicated. He imagines that people would check-in to such clinics, just to undergo an experience where they are made more fragile and need to experience the otherwise absent forms of suffering that would describe future of humanity. Such examples often make no recourse to either post- or transhumanist thought, but the ideas presented by them are certainly related.

Yet, this view of trans- and posthumanism also neglects a final interpretation, which focuses on the concept of *humanism*, rather than the *human species*, as the primary site of contestation. In this case, the interest is less about exploring the implications of an evolutionary break from the category of *Homo sapien* and more about how one might regard the state of being human without recourse to ideas that defined the age of humanism. In this respect, post- and transhumanism are unified in their intention to scrutinize humanism and challenge its integrity as a valued interpretation of the human condition.

Given these conditions, one may define bioart as a set of hybrid practices that 1) have drawn on both trans- and posthumanist thought, 2) explore biological boundaries, and 3) involves the manipulation of biological matter through scientific or technological means. Such art work is often made possible by collaborative endeavour and the utilization of mixed media, a further *modus operandi* of the media art genre to which many contributors in this field are most closely associated (see Hauser 2008; Miah [ed.] 2008). Moreover, each of these definitions of the distinctions between trans- and posthumanism may be found in varying degrees between artistic genres and even within the life's work of any artist.

A good example of how artists operate across the spectrum of such definitions is, again, Stelarc, an Australian artist whose work has spun such a range of performances that it would be challenging to limit the boundaries of his work to either one particular form or another. His early works included body-hook suspensions and, while challenging the limits of the body's resilience to pain and undertaking a modification to his body by inserting hooks into his flesh, one could not really claim that the work explored new scientific knowledge or technologies. Admittedly, this may yet be a controversial claim, since one could argue that constructing an architecture of suspension hooks that can perfectly balance a human body in a specific position also requires a playful encounter with physical principles, mathematics, and an understanding of the limits of biology. Yet, this early work is very different from his more recent *Extra Ear* (2008) project, which involves partly using stem cells to create an artificial ear on his arm created from his own tissue. The career of such artists as Stelarc may also be

seen has having defined the field of bioart. Thus, while his earlier works may not be seen in this way, they may be explained as steps towards defining a now reasonably clear set of practices that bioartists undertake in their work.

Rejecting Bioart

Despite these conditions, many contemporary artists, whose work has been characterized as bioart, also reject this term for a variety of reasons. First, one may argue that the concept of bioart fails to acknowledge the multi-faceted social roles that artists and artists' works play. For instance, limiting the definition of a bioartist's contribution to just art, may overlook the broader function of art and artists within political debate about the teleology of science, or may fail to recognize the way that an artist's practice can advance scientific understanding. Second, this definition of bioart fails to acknowledge that what defines bioart may be less the employment of biological matter within the work – some artists do not use biological matter at all, but still express ideas associated with bioart – and more about the interest to explore the technical and cultural boundaries of biology.

A third rejection of bioart is expressed by Eduardo Kac, who instead utilizes the term *transgenic* art to describe his work, considering the concept of bioart too generic to capture any unique contribution made by artists who actually disrupt biology, rather than just contribute to its visualization (see Kac 2000). Perhaps the most well known exemplar of Kac's transgenic art is *GFP Bunny*, also known as *Alba*, which was an albino rabbit born via transgenic expression that created a fluorescent quality to its skin. When placed under fluorescent light, the rabbit would glow in the dark. In this example, it is the specific biotechnological practice of transgenesis that defines the work, rather than any broader categorization as bioart.

A fourth, more general, rejection of the term bioart is that it neglects to consider the broader conditions that define the work of such artists, which are more adequately described as *new media art* – created by artists whose practice is defined largely by the desire to experiment with new artistic media. On this basis, what defines this artistic community is less the category of biological matter or its transgression through scientific or technological means and more its currency as a medium through which to create artwork. Thus, such artists as Stelarc or Kac may be defined more adequately as new media artists insofar as their career has been defined by an on-going experimentation with new forms of media. On this basis, the consequent interpretation of work as trans- or posthumanist is merely incidental. In the past, while such artists might have relied on developing

sophisticated robotic devices or artificially intelligent prostheses, their more recent work uses the newest biotechnological methods through which to explore the boundaries of the body and mind.

To this end, the value of defining bioart may be limited, especially since some artists – whose work it is supposed to describe – reject the term. However, I will yet argue on behalf of its use, as a way of delimiting art that engages with trans- and posthumanist ideas, more focused on interpretations of individual works than defined as a set of practices or ways of working. In so doing, this definition also requires that such work actively engages with the relocation of biological matter within the art, either through its being performed, manipulated or re-situated. In this respect, the present definition would encompass Kac's bunny, Stelarc's ear and may even encompass Stelarc's body suspensions. However, it would not include artwork that engages people with ideas about biological transgressions, without undertaking a biological transaction within the work itself. In this respect, it is sufficiently broad to encompass such works as Jenny Saville's photography, Damien Hirst's dead animals in formaldehyde, and perhaps even Bill Viola's still life, slow motion video art. However, it should be narrow enough to not encompass Lucien Freud's portraiture, even though it is part of a history of artistic practice that has reimagined ways of seeing our humanity. The term transaction here is admittedly fuzzy, but would principally involve work that invites interpretations that have to do with questioning biological boundaries.

In short, the term bioart may be utilized to distinguish any artistic practice that involves the *resituating of biological matter* to create works that are principally forms of artistic practice. While one may argue that many forms of human-centred art work involves a biological transaction of some kind, or a resituating of biology so as to provoke thoughts about biological transgressions, for present purposes, bioart involves either the physical alteration of biological matter or situating an artist's physical presence within the art work so as to engage such ideas.

While bioart often involves the disruption of some biological boundary – and thus may be seen as trans- or posthumanist – this need not always mean the alteration of biological matter. For instance, in Kira O'Reilly's *Falling Asleep with a Pig* (2009) – her performance involves co-habiting with a sheep for some days – spending every minute of the day side by side in a gallery – literally a “companion species” (see Haraway 2003). Her work provokes onlookers to consider their relationship to non-humans and animals, a prominent theme within posthumanist literature and an increasingly pertinent biotechnological theme as pig organs are used increasingly to help humans survive. Yet, it also reminds urban dwellers of the intimacy between shepherds and their flocks that continues

to exist, along with foregrounding life within more rural environments. Other artists, such as Catts and Zurr have scrutinized the need for humanity to farm animals, at a time when environmental activists point out the vast amount of energy needed to sustain one animal life and the harmful gases generated by such life forms. As an alternative, they have developed *victimless meat* (Catts/ Zurr 2008) a new kind of food grown from cell cultures, which has the neat consequence of also attending to animal rights concerns, since there is no sentient life to speak of that is harmed by the consumption of such products.

In closing, there is also often a performative dimension to bioart, notably where the artist plays a crucial role in its physical manifestation, either as the canvass of the work itself or as the facilitator of critical engagement with the artwork. For example, the French performance artist Orlan undergoes cosmetic surgery to alter her appearance in a way that challenges the commercial industry of body modification. In creating non-standard modifications to her body, she invites onlookers to consider how else we might imagine our bodies to look, outside of standard notions of beauty that are typical of the fashion industry. Alternatively, John O'Shea's work on *Pig's Bladder Football*, envisages the possibility of creating sustainable leisure technology by cultivating football bladders made from his own cell tissues, so as to combat the reliance on synthetic materials. In contrast, Gina Czarnecki's *Palaces* project considers the wasted biological materials that people discard, but which may be useful to people for research, repair or exhibition. In this case, milk teeth donated by children – including teeth from her children – are used to build a “tooth fairy palace”. *Palaces* reveals how bioart need not involve utilizing body modification or technology at all, but simply utilizing biological matter that naturally separates from us. In each of these works, it is unclear that either trans- or posthumanist ideas has shaped the vision of the artist, but the interpretation of their work may certainly find itself closer to either one or the other of these ideas.

Interpreting Bioart

Given the blurred boundaries around the definition of bioart, identifying how transhumanism and posthumanism may have shaped such work – or, in turn, how it may be shaping these ideas – also requires acknowledging how other disciplines of creative expression have contributed to these works. For it is unlikely that contemporary manifestations of bioart can be divorced from the broader media culture in which they are created. Consider Orson Welles' radio play *War of the Worlds*, which was a hoax public broadcast designed to convince listeners that aliens were coming to Earth. Compare this with a more recent public broad-

cast hoax, this time propagated by a Dutch broadcast called *The Great Donor Show*, a programme that purported to be auctioning a human kidney in a live reality television format where viewers would vote to decide which of the contestants who were in need of a kidney was most deserving to receive it from the donor on the show.

While these examples may seem to stretch the above definition of bioart too far – perhaps instead towards “mediated spectacle” (see van Dijck 2003) – they are part of the public context within which contemporary forms of bioart take place, as practices that have become mechanisms of public engagement with science and technology and the moral predicaments that arise from (the promise of) new innovation. Indeed, *public engagement with science* has become a research discipline of its own in recent years and is a crucial dimension of what many bioartists do when performing their work for an audience. This is made evident by the way that scientific and medical research organizations like the UK's Wellcome Trust fund such work. On this basis, bioart allows scientists to relocate their research into an accessible, public space. Moreover, art utilizes of a non-scientific language as a device through which to engage people with the implications of innovation, which – when done well – serves an important translational role from science to a wider public. This is not to say that such public engagement work is principally about promoting understanding of the science, but that it often endeavours to engage people with the practice of science and its relation to broader society. By implication, given the interest of science to promote public understanding and, by implication, public compliance with the progress of science, one may also recognize a potentially challenging role for artists, many of whom may not align their work with such goals.

While some artists embrace this public communication task and have capitalized on occupying this translational social function, others have interrogated their role as mediator of scientific knowledge and have engaged with playful public deceptions through, often, satirical creative projects. For example, biodesigners James Auger and Jimmy Loizeau created a prototype called *Audio Tooth Implant*, which was reported on the cover of TIME magazine in 2002. This telephone tooth implant resembled a conventional cavity filling and its function would be to allow a user to permanently be connected to their mobile device. The project may be interpreted as a critique of pervasive mobile culture, but it also alludes to the transhumanist theme of integrating biology and digital technology. Moreover, their interventions may be seen as a critique of how the media engage with science and technology, both calling to attention the inadequacy of some forms of scientific journalism and the need for wider debate beyond newspaper headlines and sensationalized reporting. After all, these design-

ers had no intention of producing the technology, but convinced others that it would soon be widely available.

This theme also finds a place within the field of artificial intelligence, another area that is at the border of bioart. Composer and scientist Eduardo Miranda (2011) has developed artificially intelligent robots that teach each other to sing, thus perhaps extending the idea of manufactured music to its logical end. Miranda's work addresses the last bastion of human relevance; after having successfully automated physical and intellectual labor, Miranda's robots suggest how human creativity and the capacity to make art may also be automated. To this end, his work provides insight and meaning that forces people to consider what matters to us about being human (see Miah 2011). In a world where the creation of music may no longer require participation from humans, then humanity must accept that its unique selling proposition has been compromised, save perhaps for the capacity to care and express emotions. Miranda's work also engages with the ideas of transhumanist scholars such as Ray Kurzweil (2005), perhaps the most famous transhumanist proponent of the *singularity* – a moment when computer intelligence overtakes that of the human species. In this respect, one may interpret it as a form of transhumanist art. However, far from envisaging a future that is absent of humans, Miranda's compositions provide reinterprets the future, suggesting how creative collaboration between machines and humans may provide a new chapter in our thoughts about artificial life forms and inter-species co-habitation.

Miranda's work may be seen as a critique on society at large – and on transhumanism – but many artists find their contributions subject to vehement criticisms from the popular press who are confounded by their propositions, labeling them as “sick” or a waste of “tax payers money” (see Daily Mail 2006). Such public disdain for art is sometimes directed at the worth of art generally, but especially conceptual art that challenges such fundamental values as the sanctity of life. Consider Guillermo “Habacuc” Vargas's *Starving Dog*, which consisted of a live, stray dog which was caught and situated in a gallery accompanied by the text “Eres Lo Que Lees” (“You Are What You Read”). The achievement of this work was forcing on-lookers to confront their feelings about the limits of artwork and what art galleries ought to exhibit. It also reminded people of how animals are exploited across society in various ways, either through domestication which can be to the detriment of an animal's general health, or through humanity's consumption of animals to fulfill various, non-necessary human needs.

Reactions to this work were aggressively angry towards the festival, which chose to exhibit the dog. Yet again, the curators were deliberately attempting to provoke thought via the ambiguity of perceptions that people experience when

confronted with any artwork. Thus, despite the outward appearance of this exhibit, the gallery's director stated that the dog was, in fact, not starving at all and was adequately cared for during its exhibition. While its emaciated condition led viewers to express outrage at the work and to campaign for its removal, this was a staging effect. In this example, we see the crossover of bioart, performance art and live art. The work may also be seen as a commentary on society's neglect for animals or the contractions in their treatment. Moreover, like Kac's fluorescent rabbit, bringing the starving dog into a gallery space is less about objectifying life and more about placing viewers in an uncomfortable position, reminding them of what is happening outside of the gallery space. Exhibiting such work takes the risk of being subject to public outcry and facing widespread political condemnation, while also succeeding in making artwork reach populations that, without the controversy, would be completely unaware of what takes place in novel edge art practice.

There is also a broader political interpretation to the work of many bioartists, which is that it forces a reconsideration of how original knowledge should be created and valued within society. Artist collectives such as SymbioticA (Australia), The Arts Catalyst (UK), Dunne & Raby, enact a form of biopolitics that is focused on creating collaborative relationships between scientists and artists/designers. An integral part of this praxis has been the infiltration of scientific laboratories by artists, in pursuit of creative expression and the development of new knowledge about the boundaries of biology. Yet, it is not just natural or physical scientists whose work may engage with bioartists. For instance, the work of designers Dunne & Raby undertakes a sociological survey of the future, by working with groups to imagine what kinds of decisions they would make about their lives if certain technological opportunities were available to them. This is true of their *Evidence Dolls*, which involved participants considering how genetic testing would influence their decisions over romantic relationships (see Dunne et al. 2008). This work asked people to consider whether the ability to genetically test their potential partners for a range of characteristics would lead to its use as a condition for entering into a relationship. By envisioning new forms of biological transformation and utilization, artists' ideas become constitutive of the landscape in which debates about biological change take place. However, by utilizing sociological methods, their work demystifies the idea that insights for artistic practice rely solely on individual creative vision. Admittedly, the example may reveal the difference between how artists and designers work, but the crucial point is that bioart often involves similar kinds of consultation and empirical inquiry to inform the work. Equally, a number of bioartists are active within the field of bioethics and regularly write for ethical periodicals. This includes Natasha Vita-More (2010) whose own theorizations on transhu-

manist art are inextricable from the ethical contexts where decisions about their legitimacy take place.

To this end, bioart, body art, and biodesign also scrutinize contemporary bioethical issues and scientific practice, such as the utilization of embryonic stem cells, or the development of transgenic species. However, it is unclear whether all artists intend to resist such processes. Indeed, some are seeking their propagation in order to make their art possible. For example, Stelarc's own body modifications convey the body's obsolescence in an era of synthetic biology and stem cell regeneration (see Smith 2005). The use of stem cells within his *Extra Ear* project is still not the end stage of the work, which next aims to implant an auditory device within the ear and for it to be remotely connected to the internet, so web browsers can hear what the ear hears creating a distributed auditory system. If this were not enough evidence of how bioartists may sometimes celebrate the transformative aesthetic potential of biotechnology, then consider Julia Reodica's collection of synthetic hymens, which go beyond genital piercing and tattoo, but which resonates with these similar tribal motifs. This work invites us to consider the role of virginity and its loss in the 21st century, a theme that may be interpreted as intimately connected to the biotechnological era, as the contraceptive pill is one of the most transformative technologies of the late 20th century.

Some aspects of bioart are not especially new; biology has been a medium for artists for some time. Everything from saliva to human excrement has entered the play space of artists over the years. The differences among many of these new works is that artists are only now beginning to experiment with cutting edge scientific applications, such as stem cells, cosmetic surgery and biotechnology generally to produce work. Such biological matter is a medium that is generally inaccessible for the non-specialist to use without suitable qualifications and the artist's use of it disrupts the boundaries between science and society. Indeed, the struggle of many artists to exhibit their work in galleries speaks to the inadequacy of social regulations to permit such biological matter to exist anyway but a laboratory. For instance, bioartist Tagny Duff was unable to get her *Viral Tattoos* work into the United Kingdom from Canada as part of the International Symposium of Electronic Art 2009. Alternatively, at the Foundation for Art & Creative Technology Liverpool, the *sk-interfaces* exhibition (see Hauser 2008) was unable to exhibit living genetically modified matter as part of Jun Takita's transgenic piece *Light, Only Light* (see Miah [ed.] 2008). Indeed, the exhibition of such content requires a license from the UK's Human Tissue Authority. These examples remind viewers of the political nature of the work. By testing the readiness of society to create opportunities for public engagement – for, without the gallery, there is nearly nowhere that such work could be seen

– artists, curators and gallery managers are party to a new kind of ethical terrain, which may be called public bioethics.

Additionally, the work of bioartists may be seen as an attempt to disrupt the knowledge economy, as many such artists are not interested simply in their creative means drawing on the work of scientists or revealing its beautiful complexity. Rather, the expectation is that the artist will become co-creator of original knowledge, a genuine research partner in the design and undertaking of scientific studies, to such a degree that some intellectual property over new discoveries or insights may be attributed also to the artist. In this sense, the gradual occupation of artists in labs raises important questions about how society is organized and understand our own humanity. For instance, why do societies privilege scientific knowledge over, say, aesthetic, as is evidenced by the way in which funding is skewed in favour of the former? Would humanity have been better off over the last 100 years or so if it had dedicated more of its resources to the so-called softer sciences, arts and humanities? Would societies have asked different questions, or sought different solutions to difficult problems? Admittedly, societies might have produced fewer technologies that would save lives and, perhaps would have failed to reduce suffering as effectively as they have through medicine, but then with fewer people on the planet, it might have been more effective at distributing goods more evenly. These are impossibly speculative questions, but which nevertheless expose the claim that hierarchies of knowledge systems affect the overall wealth in the world and that the scientific method need not have produced the least amount of suffering in the world.

By implication, one may argue that these collaborative bioart works should also be credited to the scientists involved and, indeed, they often are. While this may beg the question over ownership and the right to commercialize the work or benefit from its syndication in exhibitions or private sale, like all collaborative works, decisions about this are for the artist and scientist to negotiate in advance of and during the collaboration process. There are no fixed rules about who ought to be principal author, but equally it is often true that the scientist's terrain and the artists are distinct enough for all to benefit. Indeed, in the same way that an artist is unlikely to be in a position to capitalize on the scientific work, the same is true of the scientist in relation to the artistic presentation.

The work of these bioartists and designers also raises difficult ethical questions. For instance, it requires society to consider by what codes of ethics such work should be governed? This is often the initial response of critics who find such work disturbing, offensive or potentially illegal: how could a society permit the playful use of transgenic science simply to create a new aesthetic artefact? Many people might consider this to be a trivialization of scientific research and its proposed end goals to alleviate human suffering. However, there are good

reasons for refraining from such judgments and this is because the aesthetic content of such works is only one way of evaluating their worth. The more relevant ethical view to take reveals itself when inquiring into some of the challenges that such artists have faced in the pursuit of their work. For instance, in 2004, US bioartist Steve Kurtz was pursued by the FBI under suspicion of bioterrorism, after petri dishes with biological matter inside them were found in his home (see Annas 2008). Such artists would want us to see them as acting on our behalf to make science more accountable to a broader public and for their work to engage us more fully on its long term goals and aspirations. Equally, some artists aim to highlight that the presumed end goals of such research for human benefit are often not present at the crucial, experimental stage. In this respect, experimental science can be considered similar to experimental art.

Conclusion: Bioart as Trans- and Posthumanist Thought

In conclusion, bioart aligns with transhumanism insofar as such work pursues the disruption of biological boundaries and this encompasses experimentation with many new scientific techniques, such as stem cell or genetic manipulation, or even the creation of new life forms. Yet, in so doing, such art also engages with the posthumanist critique of humanity's presumed omnipotence within the natural order and invites alternative questions to those that underpin scientific research. Thus, technological development to improve humanity's resilience or lifestyle is not the premise on which bioart may be justified. Rather, the value of such work is found in its capacity to generate new insights for humanity that may inform the kind of science humanity pursues and in the intrinsic value of creating new aesthetic encounters that may alter our appreciation of the world around us and humanity's role within it.

Yet even here, elements of posthumanist thought are apparent. Consider again Kac's fluorescent bunny, that concerns particularly a non-human life form. In this case, Kac's aspirations are to locate genetic engineering "within a social context" (see Kac 2000; Osthoff 2008). Moreover, Kac comments on the inadequacy of using such technologies to satisfy human desires, thus critiquing the transhumanist notion of humanity's entitlement to pursue modifications that it deems to be valuable:

"The question is not to make the bunny meet specific requirements or whims, but to enjoy her company as an individual (all bunnies are different), appreciated for her own intrinsic virtues, in dialogical interaction" (Kac 2000).

Thus, the transgenic art of Eduardo Kac asks us to consider the limits of "Playing God" and he is quick to point out that scientists have already undertaken

such experiments, we just do not hear very much about it, or it is cloaked in some vaguely communicated remote chance that the experiment will lead to knowledge that will assist humanity in some specific way. While *GFP bunny* reveals something about what is going on within experimental research that may have implications for humans, Kac's contribution is to reveal how advances in science occur via the sacrifice of non-human animals.

It is no coincidence that the rise of transhumanist and posthumanist art occurs alongside the rapid growth of biotechnology and the public anxieties over bioethics. Indeed, to the extent that artists often undertake work as a commentary on contemporary issues or an engagement with new media, the rise of bioart is intimately connected to this trajectory. However, it would be wrong to suggest that such art forms are principally supportive of the ways in which humanity may be reimagined and reconstituted by technological change. Moreover, it is not even clear that either trans- or posthumanist artwork aims to engage people with the range of ethical narratives that surround such developments, though some do. Rather, the biological medium is often principally a material device through which artists have explored aesthetic qualities associated with the idea of life after *Homo sapien* – and the presumed relationships with other species that this definition implies.

Bibliography

- Annas, G.J. (2008): Bioterror and 'Bioart' – 'A Plague O' Both Your Houses'. In: Miah, A. (ed.): *Human Futures – Art in an Age of Uncertainty*. Liverpool: Liverpool University Press, 100-111.
- Burton, M. (2007): Biophilia Clinic. <http://www.michael-burton.co.uk/> (accessed July 22, 2013).
- Catts, O./ Zurr, I. (2004): The Ethics of Experimental Engagement with the Manipulation of Life. In: da Costa, B./ Philip K. (eds.) *Tactical Biopolitics – Art, Activism, and Technology*. Cambridge(MA): MIT Press, 125-42.
- Daily Mail (2006): It's Art, Says the Naked Woman Who'll Hug a Dead Pig on Stage. <http://www.dailymail.co.uk/news/article-401165/Its-art-says-naked-woman-wholl-hug-dead-pig-stage.html> (accessed July 22, 2013).
- Dunne, A./ Raby, F./ Miah, A. (2008): Screening for Undesirable Genes – The Evidence Dolls Project. In: Miah, A. (ed.): *Human Futures – Art in an Age of Uncertainty*. Liverpool: Liverpool University Press, 62-75.
- Dunne, A./ Raby, F. (2009): Foragers. <http://www.dunneandraby.co.uk/content/projects/510/0> (accessed July 22, 2013).
- Haraway, D. (2003): *The Companion Species Manifesto – Dogs, People and Significant Otherness*. Chicago: Prickly Paradigm Press.
- Hauser, J. (ed.) (2008): *Sk-interfaces*. Liverpool: Liverpool University Press.

- Kac, E. (2000): GFP Bunny. <http://www.ekac.org/gfpbunny.html#gfpbunnyanchor> (accessed July 22, 2013).
- Kurzweil, R. (2005): *The Singularity is Near*. New York: Viking.
- Lovelock, J.E. (1989): *The Ages of Gaia*. Oxford: Oxford University Press.
- Miah, A. (ed.) (2008): *Human Futures – Art in an Age of Uncertainty*. Liverpool: Liverpool University Press
- Miah, A. (2008): A Critical History of Posthumanism. In: Gordijn B./ Chadwick, R.F. (eds.): *Medical Enhancement and Posthumanity*. Dordrecht: Springer, 71-94.
- Miah, A. & Rich, E. (2010): *Bodies, Health & Illness*. In: Albertazzi, D./ Cobley, P. (eds.): *The Media – An Introduction (Third Edition)*. Harlow: Pearson Education Limited, 485-504.
- Miah, A. (2011): Foreword – New Forms of Music. In: Miranda, E.R.: *Mozart Reloaded*. Sargasso Publishing.
- Miranda, E.R. (2011): *Mozart Reloaded*. Sargasso Publishing.
- O'Reilly, K. (2009): Falling Asleep with a Pig. <http://www.kiraoreilly.com/blog/?cat=30> (accessed July 22, 2013).
- Osthoff, S. (2008): Eduardo Kac – A Conversation with the Artist. In: Miah, A. (ed.): (2008) *Human Futures – Art in an Age of Uncertainty*. Liverpool: Liverpool University Press, 146-51.
- Smith, M. (2005): *Stelarc – The Monograph*. Cambridge(MA): The MIT Press.
- Stelarc (1997): Hollow Body/Host Space: Stomach Sculpture. In: *Cultural Values* 1(2), 250-251.
- Stelarc (2005): Prosthetic Head – Intelligence, Awareness and Agency. In: CTHEORY. <http://www.ctheory.net/printer.aspx?id=490> (accessed July 22, 2013).
- van Dijck, J. (2002): Medical Documentary – Conjoined Twins as a Mediated Spectacle. In: *Media, Culture, and Society* 24(4), 537-556.
- Vita-More, N. (2010): Aesthetics of the Radically Enhanced Human. In: *Technoetic Arts – A Journal of Speculative Research* 8(2), 207-214.
- Wilson, E.O. (1984). *Biophilia*. Cambridge(MA): Harvard University Press.

New Media Art

Evi Sampanikou

In 1940, the founder of iconology, the study of the symbolic meaning of artistic images, Erwin Panofsky published his famous essay *History of Art as a Humanistic Discipline* (1955), suggesting modern approaches and new theoretical directions for art history that had just been accepted as a vast, independent, synthetic, research field, much broader than connoisseurship, seeking for a distinct place among humanities. Based on the study of the Renaissance, Panofsky had underlined the strong relationship between art and classical humanism, making interdisciplinary cultural crossovers among literature, philosophy, history, poetry and music.

By the end of the 20th century, in the nineties and more specifically in 1995 and 1996, new theories on art, based on the emerging example and the possibilities of the new media, started to emerge. Erki Huhtamo (1996, 296-303; 2007), Peter Weibel (1996, 338-351; 2007) and Friedrich Kittler (1996; see also Gane 2005) among others, underlined the fact that there was a strong need for new directions and inclusions for the field of art history that had surpassed its humanistic period and limits and was seeking for a contemporary identity as both humanism and modernism belonged to a past that could not reproduce itself anymore. I have to underline here the great importance of one of the most influential for the 21st century books on new media in 1996 that also marked a continuity between new media and what was known as conceptual art, placing the new notion of art history somewhere between media studies, New Aesthetic Philosophy and new media theories (see Druckrey 1996). The eternally doubtful term “postmodernism”, greatly served by well-known scholars as Arthur Danto (e.g. 2003, 103-124), offered a solution for some decades, it was however clear that it was never enough. Contemporary scholars and philosophers as Slavoi Žižek (1996), Jean Baudrillard (2001) and Paul Virilio (1991, 72) offered some additional help for the inclusion of art history into the field of both cultural studies and opened the doors to new emerging philosophies and media theories. During the last years and under the prism of the works of Lev Manovich (2001, 129-135), Oliver Grau (2003), Frank Popper (2007), Anne Friedberg (2006, 231-244) among others, a new shape of things has started being formed, whispering the notion of the end of postmodernism, while other scholars and artists as Louise K. Wilson (1996), Victoria Vesna (see Popper 2007, 322-324), Maurice Benayoun (see Grau 2003, 237-240; Popper 2007, 201-205) and others, although not stating it at all, led art to the path of posthumanism. Therefore, what can be accepted as a state of the art nowadays is that new media art – actually the continuity of conceptual art including performance, video and video installa-