Bioart towards a New Concept of Identity

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Bioart towards a New Concept of Identity

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Abstract

The speed made by science and technology in recent times, especially in biotechnology and genomics, has urged a lot of specialists in several areas, including the sectors of culture and science as well as artists, to respond to those changes. Which brought a significant cultural change changed our traditional understanding of civilization and our coping with it under the scientific and cultural amalgamation, in turn, resulted in changing the concept of art and its philosophy and aesthetics. Accordingly, a need for an artistic formulation has become urgent that could express the impact of technology on restoring the formulation of ideas related to human personal identity.

Blood type, skin colour and personal features are no longer the symbols of modern identity. The DNA has replaced them in carrying and transferring the personal identity of individuals. A new scientific method has become available to commemorate a person, which contains his physical presence with all his details, genetic history, not just his external image only. This resulted in the introduction of new terminology in Art such as “bio”, “genetic”, and “genetically modified”, and artworks became a laboratory product that converts the articles of life itself into an artistic medium using scientific techniques.

This research aims to track the change in the concepts of Identity within the context of Bioart through two main entries: first, biotechnology as a raw material to form a work of art; second, How Bioart introduced a new concept of Identity.

Keywords: Bioart, Biotechnology, Identity, Sci/Art, Bio identity, Interdisciplinary

Introduction

Bio-art is a relatively new development in contemporary art, it represents a crossover of art and the biological sciences, in which life can be used as a raw material for artworks, such as genes, cells, tissues or animals, using biotechnological methods (Stracey, 2009).

New developments of Biotechnology imply binaries such as natural/unnatural, living/semi-living Human/Hybrid, Biotechnological art also has its categories, and terms such as Genetic, Transgenic, and Bio (Number of Authors, 2008a,b).

This new media required a new understanding for the artworks and its esthetics, which leads as well to a contemporary understanding for the culture, “since Bioart refers and may bring attention not just to biotechnology as a problematic but to wider bio political issues such as human beings’ relationships With other living things” (Vaage, 2016), as artists engaged with new visualization techniques and tools (such as MRI, DNA, etc.) as ways of representing bodies, identities and contemporary portraits” (Zurr and Catts, 2004).

The language of the life sciences—broadly speaking, and including its symbols, protocols, and objects—ofers a rich communication tool...
for artists to use in probing our shifting ideas about Identity.

This Research Paper propose to study the works of Bioart as a field meant by conceptualization of contemporary Identity, and it seeks to highlight how these works allow to question the self-identity and define it through monitoring Conceptual changes, and it is questioning how the use of Biotechnology applications in art affected the concept of Identity?

Methodology

This Research follows the Theoretical method using the following Procedures:

- *Theoretical Framework:*
  - Through discussing two main points affected the concept of Identity
  - Biotechnology as raw material to form a work of art.
  - Bioart introduced a new concept of identity.

Studying a number of Bio artworks have been chosen according to the following criteria:
- Contribution of the work to the new concept of Identity.
- Show the extent and diversity of the notion of Identity in Bioart.
- Artworks adopted various processes.
- Artworks produced from 1994 to 2014, and some works are still ongoing.

Biotechnology as a Raw Material of Art

Advances in Biotechnology are rapid and alerts our relationship to the world, and it is no longer reserved for scientists, contemporary artists are contributing as well by exploring this permeability between disciplines.

Works of art made from living and semi-living materials — so-called bio art: Bio is extended to include organic life with the root being the Greek bios, that is ‘the course of life’, thus our understanding of biology as the ‘science of physical life, dealing with the morphology, physiology, origin and distribution of animals and plants’. Biology as the organic world includes our own bodies. ‘Bio art’ has been mooted as an instructive umbrella term in which an artist utilizes emerging biotechnologies from the scientific and medical fields in the creation of an artwork (Byerley and Chong, 2014).

Bioart according to its roots had derived from Environmental art and Land Art, and it includes a number of subcategories, The most Comprehensive is Biotech – Art, and falls under it the Genetic Art that uses the DNA as an art medium, and Transgenic Art which use genetic modification and cloning.

Bioprocesses considered the main approach for Bioart, in which it's all components contains a living Element, it is a process that uses complete living cells or their components to obtain desired products, and it was used in art to create a living artwork depending mainly on the process rather than the final product, and as stated in “Fig. 1” it consists of two basic pillars on which Based on:

a. *Bio Techniques:*

It is scientific techniques specific to some branches of biological sciences, the more related to Bioart is the microbial culture technique used in Microbiology, Genetic Modification and tissue culture used in genetic engineering.

b. *Bio Materials:*

It is a number of living materials used as art mediums such as (Microorganisms, living Tissues, DNA).

The Concept of Identity in Bioart

Biotechnology had extended the concepts and techniques of art, and also led to expressing concepts about self and identity untraditionally, since it was developed systems that can identify

- Fig. 1. A diagram made by the researcher shows the components of the bioprocesses in Bioart
and differentiate persons seek out some biological quality that is not easy to modify and to read. A variety of technologies have been investigated to form “Biometrics” which was defined by the magazine Biocard International as “automated methods of verifying or recognizing the identity of a living person based on a physiological or behavioral characteristic.” Such as (the vein pattern in the back of the hand, the vein pattern in the retina, Voice verification, facial thermogram, and facial-feature recognition) (Willson, 2002).

This change had affected the self-identity concept in art, which was represented by the facial features using traditional art mediums, then digital mediums, Bioart introduced new approaches to express the concept of identity, rather than the traditional visual one, and redefined concepts concerning “Self” in which the finger prints, blood type, and skin color are no more the more of Contemporary Identity, after art is made in test tubes inside laboratories, and the artist is able to see the self through its genes, cells tissues and its complicated biological mechanism, so it moved from an outer context to its very unique internal one.

In this context artist “Gary Schneider” said that “even the picture looks vague and does not give any impression of privacy in terms of shape, age or race, but it represents the most private parts inside me that cannot be similar to anybody else, for me it is my very own Identity”, Schneider has created a very personal illumination of how our individual identity is so closely linked to our broader understanding and use of the information contained in the human building blocks of our DNA, he reveals that while we may always want to think of ourselves as more than the sum of our parts, our real promise might be found in looking at the 99 percent of ourselves we have in common with everyone else (Gary Schneider - genetic self-portrait, 2021).

To explore how the concept of Identity had changed in Bioart we will study some artworks which moved from the traditional visual form of identity to the conceptual one using life as an art medium (Davis, 2021) to introduce a new understanding of the human self-identity through 5 main Bioart Forms:

1. Microbial Culture
2. Bio Sculpture
3. Genetic Art
4. Medical Imaging
5. Bio Performance

Microbial Culture

Microbial Culture means “the propagation of microorganisms in a growth medium” and it is considered one of the simplest methods that Bioartists used to produce living artworks using Microbiology, it was first used by “Alexander Fleming”, who discovered penicillin in (1928), he created what he called “germ paintings,” it is, images drawn with invisible bacteria directly on paper, soaked in the culture medium and grown in an incubator. After growth, the invisible bacteria became colored lines and surfaces and thus revealed the painted images (Kac, 2007). “Fig. 2”.

Artist “Sabrina raff” used the bacterial cultures as well in her work “Breath Cultures”

![Fig. 2. Alexander Fleming, germ paintings, Alexander Filming laboratory Museum, London, 1882.](image-url)
(1999), to introduce the idea of Bio existence, in her interactive work she asked the audiences who enter the gallery to breathe inside a Petri dish contains a nutrient media, in which their microorganisms grow forming what she called “biological fingerprint” for each individual and she pictured them under the microscope and made Biological Portraits contains each person’s unique microbiome. “Fig. 3”.

The Petri dish has provided a canvas for many artists, but perhaps the largest example of this technique is featured in “Oversized Petri dish” “Fig. 4” project by “Sonja Bäumel” (2009) in collaboration with the Wageningen University in the Netherlands, in which she made one half-body Petri dish to grow an image of her own body's bacteria.

She said about this project “a part of me was living and growing without my body on an external medium” (Goodchild and Hilten, 2015). She took pictures of the living and growing part of her body from day 0 until day 44 and documented the changes, she observed the transformation of invisible skin bacteria into a living organism on external material. Our body does not end with our skin; it rather extends into the room in an invisible way. The skin border blurs and presents new views.

In (2012) she made another project “Expanded Self” “Fig. 5”. She uses a gigantic Petri dish as canvas and the bacteria living on her own body as color, her whole body imprinted on agar in a huge Petri dish (210 cm x 80 cm). After a few days, a living landscape was growing consists of a unique mixture of life forms on Bäumel's body. Expanded Self, the living and growing picture of a body, was photographed and documented on the seventh day of growth. This imprint of a...
Human body is a kind of metaphor for new points of view of our person. Every one of us is so much more than we think. If we merge the genetic material of all our inhabitants it comprises ten times more information than our own DNA (Bäumel, 2021).

"We are made of many things, and many types of things. Most of these things are alive, and not human. Our human and non-human selves coexist, collaborate, compete or ignore each other" said Joana Ricou about her work "Other Selves" "Fig. 6".

In this series she explored the human microbiome as another self. She swab different parts of her body (head, face, and hands) and of her environment (the lab: the table, the air, the famed door handle to the room, the cell phone). The swabs were placed in petri dishes and were allowed to grow in an incubator without interference (37°C). Then individual bacterial colonies and samples of different fungi were carefully picked off each plate and grown separately, in liquid agar, to create a palette of living colors. The cultures were used as common paints, to make two compositions on a series of petri dishes using traditional brushes. One composition was a self-portrait. Cultures from the forehead or chin was used to paint those areas of the face; cultures from the environment were used for the background. The second composition was symbolic, a filled circle surrounded by a ring, symbolizing the person and the environment, respectively. In this case, human paints were mixed in the center, and environmental paints were used in the ring.

Comparing the concepts of identity in art and biology and how our understanding of ourselves evolved. Identity as defined in biology mostly limited itself to polemic, taxonomic descriptions of the human species until the 20th century, with the discovery of DNA and the uniqueness of the genetic fingerprint. Several discoveries in biology, such as the microbiome, have fundamentally challenged our notions of identity. Researchers determined that the human being not as a single organism, but as a diverse ecosystem. And since our microbiome stems from our environment—the air we breathe, the food we eat, the objects we touch—it connects us to our environment directly and blurs the most fundamental boundary of individual identity: skin (Ricou, 2015).

Bio Sculpture

Bio sculpture depends on direct formation of the artwork using living or semi-living materials such as blood, cells, and tissues to create forms that remains alive by technological means instead of the natural biological processes inside the living bodies to question the concepts of life, self, and identity.

One of the significant artworks introduced this topic "Self" "Fig. 7" by "Mark Quinn".

This self-portrait is cast with 4.5 litters of Quinn's frozen blood. It was taken during 5 months. Described by the artist as a 'frozen moment on life-support', the work is carefully maintained in a refrigeration unit, reminding the viewer of the fragility of existence. The artist makes a new version of "Self" every five years, each of which documents Quinn's own physical transformation and deterioration (Number of Authors, 2008a,b). The first version of "Self" was made in (1991) and the work still
in progress and ends by the end of the artist's life giving a new vision of Immortality, and states that the existence of a person ends by his physical end.

“Gina Czarnecki” used her own daughters’ cells to create unique pieces of art. In her project “Heirloom” “Fig. 8”, exhibited at Medical Museum of Copenhagen and created in collaboration with “John Hunt” from the University of Liverpool, cells that have been cultured from a single sample taken from their mouths in (2014). They grow on delicate glass casts of their faces in the life support system (Bioreactors) that provides the best conditions for growth, outside the lab. The cells fill out the casts as they grow over time. While visitors contemplate the pieces, thin layers of human skin grow on the three-dimensional scientifically accurate portraits, bringing them to life. The pieces, constantly changing and evolving, will be on tour until (2018) (Czarnecki, 2018).

Heirloom plays on notion of the portrait and personal identity, by capturing bodily material and physical appearance separately and reassembling them, the artwork questions the scale at which identity is located (Whiteley et al., 2017).

Genetic Art

It is the process of art which use DNA as an art medium to translate the artist concept about life and self into a genetic code, identity is a major concept of the genetic art as the DNA carries the inner identity of persons which does never change, and in terms of material there are two kinds of genetic art, non-living and living, living works may be organisms, or installations that have both living and non-living components (Number of Authors, 2008a,b).

Artist “Inigo Manglano Ovalle” explored recent developments in the genetic sciences and their potential effects on the universal representation and portrayal of individual identity in his work “The Garden of Delights” “Fig. 9” (1998), it comprised of forty-eight life-size photographic prints of DNA information, the work creates an immense, vibrantly colored field of abstraction. In which empirical scientific information is analyzed for purely aesthetic purposes, and abstraction is employed as a means of individual representation; and a historic model of hierarchical racial taxonomy is used to suggest more expansive models for individual and communal identities, using the late seventeenth- and eighteenth-century Spanish colonial genre known as “caste paintings” Commissioned by Spanish officials in Spain’s New World colonies, they were presented as sixteen scenes on separate canvases (or occasionally on one canvas) that illustrated the result of the intermingling of the three major races that inhabited Spain’s colonies in the Americas: Indians (Native Americans), Spaniards, and Africans. Each scene portrays a man and woman of different races with one or two of their progenies, accompanied by text that identifies the racial mix depicted (Winston, 1998).

In the same context “Xavier Moher” stated that “tomorrow’s identification card is not to be found in psychological projections or within social categories but in the genes. Unique to each of us, the whole of our identity is contained in the genome” he introduced a new definition of human identity in his “Genetic Portrait” “Fig. 10” (1998), The artist draws a sample of blood from his model, has it analyzed by a laboratory and obtains a graphic of an isolated sequence representing his genetic code; he then reproduces it in acrylic on large format.

This method for the “genetic portrait” enables the artist to leave the world of imitation and to explore another problem which is: Art as a tool
Fig. 9. Inigo Manglano Ovalle. The garden of Delights, 1998.

Fig. 10. Xavier Moher genetic portrait, 1999

Fig. 11. Marc Quinn genomic portrait of Sir John Edward Sulston, 2001
for Communication. Indeed, art seldom imitates nature, it retranscribes its' language and its’ essence (Fulcher, 2018).

In (2001) the British artist" Marc Quinn” exhibited his “Genomic Portrait” of the Nobel laureate “Sir John Edward Sulston” “Fig. 11”, a leading figure in the Human Genome Project at the National Portrait Gallery of London (Thomas, 2009). This portrait was created using standard methods of DNA cloning. DNA was extracted from a sample of Sulston’s sperm and replicated in an agar culture, resulting in transparent colonies of bacteria, each grown from a single cell containing part of the full genome of John Sulston. The final image consisted of a piece of polycarbonate agar jelly, bacteria colonies (from cloned human DNA) and a gel cell all enclosed in a refrigerated, stainless-steel frame, making it suggestive of a sterile, ‘scientific’ environment.

The genetic reductionism of Quinn’s model of identity is matched at its pictorial level. Without informative labels, this abstract image would not be readable as a portrait, according to Quinn. Using DNA to replace skin, hair color and other broader cultural signals as the repository of markers of identity, he described it as the ultimate ‘realistic’ portrait, unveiling the hidden genetic blueprint not only of Sulston but also of his parents and every ancestor he ever had back to the beginning of life in the Universe. This implies that not only is a single self or identity discernible from genes alone, but so too is all of human history (Stracey, 2009).

The artwork “Transformers” “Fig. 12” (2002–2003) by “Justin Cooper” combined between art and science methods and presented a series of abstract layers of identity, woven together to create an “identity chamber”. Visual translations of identity are projected inside the chamber’s walls. A metaphorical recombination takes place in which identity becomes an elastic (en)coded building process, the artist collected physical evidence of identity from twelve subjects; fingerprints, photographs, hair, from which DNA was extracted and sequenced, and more intangible and cultural identifying information, like personal histories. Combining the tools of science—scanning electron microscopy (both stills and video) and DNA sequencing—with the construction of identity as a rhizomatic experience, to retain the elasticity of the subjects’ identities and therefore reflect on who we are and what we can become (Sparks, 2009).

The Interdisciplinary artist “Heather Dewey-Hagborg” is also committed to utilizing scientific tools to explore current cultural trends including Identity and genetic ownership using more advanced technology, in her artwork “Stranger Visions” “Fig. 13” (2013), she made a series of 3D portraits using DNA from chewing gum, cigarette butts and hairs she found on the streets and in the subways. She took these to a lab where she separated gene sequences herself, and then sent sections away to another lab for DNA analysis. This analysis helped her determine a number of traits including sex, ethnic background, eye color, hair color, height, likelihood of freckles and propensity for obesity.

She has developed custom software that then generates a 3D model based on these genes, which she printed on a 3D printer to achieve a life-size portrait, she displayed the portraits together with a little box containing information gleaned about the person from the DNA testing, the original piece of chewed gum or cigarette butt, and a photograph of the spot.
where she found it (Hagborg, 2021). “Stranger Visions” not only highlights the Amount of DNA that is easily available, but the ease with which the genetic surveillance and privacy infringements could occur.

She addressed the issue of genetic privacy again in project “Invisible” “Fig. 14” (2014), but from the angle of protection, after she showed that we leave our DNA everywhere we go, she produced with BioGenFutures company a genetic safety kit to protect individuals against potential screening discrimination, as a product for sale at the new museum store in New York, includes two sprays labeled “Erase and replace” in which an individual can erase their DNA trace and then replace it with a scrambled sample to ensure complete untraceability, she stated that DNA is not only an Individual’s barcode but it also contains information about a person’s ancestors and health Risks (Myers, 2015).

Medical Imaging

For years artists have attempted to illustrate not only people’s appearances, but also their essential nature. Science has developed powerful tools to image the interior of the body, since the discovery of X-rays, we have begun to be able to see what is hidden behind the skin. Today, new imaging technology allows better visualization of both biological morphology and function. The technique of functional Magnetic Resonance Imaging (fMRI) has been developed to determine which regions of the brain are activated while a subject performs a given task (Kac, 2007), by using these methods artist was able to produce art forms related more deeply to the human and his identity.

Artist “Patrice Caire” underwent a full-body MRI (magnetic resonance imaging) scan. Based on this information, she created “Cyberhead... Am I Really Existing,” “Fig. 15” (1994), which allowed the audience to take a virtual reality tour through her head using MRI Images in the real time (Willson, 2002).

“Trap, self-portrait” “Fig. 16” is created from MRI scans as well taken of head and hands of the artist “Justin Cooper” 1998, respectively. To view structuring of his body, the viewer has to move around the work and reconstitute the single slices back into a unified space. Pieces show how the translations/transformations it is possible to put ourselves through emblemize technology’s ability to impact and shape our conceptions of space. At the point of imaging, solid organic tissue is transposed into an ephemeral digital language of zeroes and ones,
in much the same way a cipher uses substitution to encrypt information. The resulting physical work retains some of the ephemerality of that digital translation and some of the obscurity of the cipher, while offsetting them against the tangibility of the body. Instead of a simple dichotomy between invisible and visible, virtual, and physical, continuity and displacement, a less distinct or concrete disclosure is made where the gap becomes the viewer's space (Sparks, 2009).

Also, artist “Marta de Menzes” showed part of her identity as an artist in her work “functional portrait: self Portrait while Drawing” “Fig. 17” (2002), this series of fMRI digital images shows increasing brain activity as the artist becomes involved in the process of drawing. The red areas shows the fMRI device's detection of high oxygen usage in certain parts of the brain, which researchers attribute to higher level of activity there. De Menzes sees this series as a contribution of the attempt by portraits to capture personality as well as surface appearance (Willson, 2010).

**Bio Performance**

In Bioart surgeries, which use local anesthetic, Blood, cell, Tissue Donation become public performances and are recorded on video (Willson, 2002).

Brazilian Artist “Eduardo Kac” explored another aspect of the post-human future in his performance “Time Capsule” “Fig. 18” (1997). He had a microchip contained identification digits that could be read by transponders implanted in his ankle. The installation space was set up to resemble a hospital operating room, and pictures of Kac's family were placed on the wall for individuals whom the artist never had the chance to meet, but who were responsible for the “implantation” in his body of the genetic traces he has carried from childhood and that he will carry until his death.

The event was broadcast on TV and Webcast on the World Wide Web. It also explores and questions the idea that eventually we may all become dependent on memory prostheses, for example, the microchip might one day substitute for the family photos posted on the wall, as a sign of a biological mutation that might eventually take place, when digital memories will be implanted in our bodies to substitute for our own memories. Will we in the future still carry these traces with us irreversibly or will we
be able to replace them with artificial genetic traces or implanted memories (Willson, 2002).

While The French Artist “Orlan” had introduced a new understanding for the self-identity and its relationship with the external self that might be deceptive and fake has undertaken a multiyear project (1990–1995) “Fig. 19” in which she uses cosmetic plastic surgery to transform her face to resemble a series of faces from the history of art—the Mona Lisa and the old masters’ renditions of Diana, Psyche, Europa, and Venus.

She chooses these because each represents character traits that she finds interesting. The surgeries, which use local anesthetic, become performances, and are recorded on video. She reads a text during each surgery, of which the following is an excerpt: “The skin is deceptive, one is never what one is/you can have the skin of a crocodiles and/actually be a small dog/you can have the skin of an angel and actually be a jackal.” one of Orlan’s main agendas is to reduce the distance between the external and the internal, to bring them together. Also, she claims that the project is feminist because she is determining the direction; she is not an object (Willson, 2002).
The artwork “Ergo sum” “Fig. 20” (2013) was a new form of Portraiture in which the artist “Charlotte Jarvis” represent herself through tissue samples grown from her own stem cells, she donated blood, skin, and urine to the stem cell research laboratory at the University of Leiden. These donations have been transformed into stem cells, which in turn have been programmed to grow into cells with different functions such as heart, brain, and vascular cells.

The result is a biological self-portrait; a second self; biologically and genetically 'Charlotte' although also ‘alien’ to her – as these cells have never actually been inside her body. Copies of Charlotte's stem cells are being stored for an unlimited period, making them immortal. Charlotte uses herself – even her physical body – to initiate further discussion of stem cell technology and to challenge prejudices and misunderstandings.

Result and Discussion

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Result and Discussion

The development happened in Biotechnology by discovering the DNA Structure and understanding the genetic code, and sequencing theses codes in the Human Genome Project, resulted in a new global understanding about human Identity, and about what we are and how we are related to our ancestors and to the whole human race, then the discovering of the x-rays and the other medical imaging techniques as the “MRI” (Magnetic Resonance Imaging), and the “fMRI” (Functional Magnetic Resonance Imaging), atomic force microscopy, electrophoresis, gene sequencing and PCR technologies. Images of chromosomes, body scans, genotypic and phenotypic variations, allowed us to see and observe our inner selves and its components and functions, then trying to produce new forms of ourselves and others, by using new methods aroused as incorporation of 3D computer modelling software, 3D Printing, artificial life, robotics, biodegradable scaffolding and an interest in emergent theories of life as subject matter for new media installations, rapid prototype sculpture and algorithmic codes. The inclusion of wet laboratory practices such as tissue engineering, cloning, ecological investigations, transgenic microorganisms which have become significant material sources for artists, designers, and scientists. Bacteria has become a prime ingredient in photography, fashion design and synthetic biology “Fig. 21”.

All these processes made artists know more about the inner selves and get more connected to the inside, with a new understanding to Identity, they used the bio-processes, and linked it with other technologies, to propose a unique and innovative vision of Identity as one of its central themes, by introducing a range of new conceptual and technical approaches led to a change in esthetic concepts.

Concept of Identity has moved from the external shape to the internal components and functions, and it was express in Bioart conceptually rather than visually, and it substituted the features, Gestures, and skin color to DNA,
Blood, Cells, and Functions of Organs as Art Mediums, which summarized the current conceptual state of Bioart in this paper from its sold principles of practice questioning the real current state of Bioart as a new media art and encouraging further research about what Bioart had become within the context of new media?

**Conflict of interest**

There is no conflict of interest.

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