

Crossing the Boundary

The Dialectical Relationship Between Technoethics and Contemporary Jewellery

Mingze Zhang^{1,*}

¹Royal College of Art, London, England

*Corresponding author. Email: zhangmingze2016@126.com

ABSTRACT

The development of contemporary art has made art and technology more entwined with politics and society than ever before. Throughout history, technology has provided artists with new tools and ways for expression; in turn, art has sparked new ideas and directions for technology to develop. Contemporary jewellery as a specific art form has also been strongly impacted by the age of technology, which has had both positive and negative effects. By crossing the boundary, this article is going to discuss dialectical relationship between the technoethics and the limits of jewellery. This article basically talks about the boundary of jewellery and how it relates to the modern technology, and makes the analysis from four aspects, such as "Iphone as jewellery", "Impact on the boundary", "Wearing jewellery in minds" and "Crossing the boundary". With the use of case analysis, literature analysis, comparative analysis and other methods, this article elaborates on the dialectical relationship between technoethics and contemporary jewellery. It not only analyses the concept, form and development history of jewellery to think about the main question in the previous article, but also explores the impact of science and technology on our society and art by thinking about the ethics of technology.

Keywords: art, boundary, technoethics, jewellery

I. INTRODUCTION

Since the 1950s, as economies recovered after the war and with the rapid development of technology, art movements and artists' thinking became more radical. Artists started trying to push the boundaries of art, looking outside of what is perceived as 'traditional' to incorporate other aspects into their work. Some artists started using machines and multimedia in their works. In 1960, Jean Tinguely, who is one of the most representative Neo-Dada artists, made his work *Homage to New York* on the square in front of MoMA ("Fig. 1"), he made a self-destructing mechanism that performed for 27 minutes during a public performance for invited guests. Afterwards, the public browsed the remnants of the machine for souvenirs to take home. As pioneers of Neo-Dada, Jean Tinguely, Robert Rauschenberg, Nam June Paik, John Cage and many other artists led a revolution of discussing the relationship between contemporary art and technology.

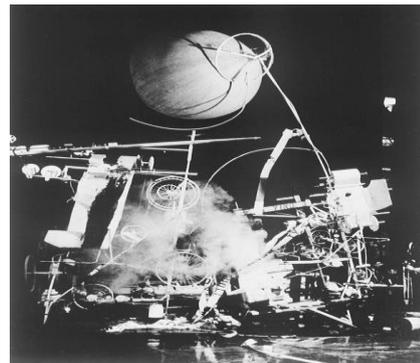


Fig. 1. Homage to New York.

^a MoMA, Homage to New York [online] <https://www.moma.org/collection/works/81174> [accessed 22 February 2018].

Similarly, the history of contemporary jewellery has its narrative as well. Starting from the 1960s, Neo-Dada not only existed in contemporary art, but also in the field of contemporary jewellery. The new generation emerging in the 1960s and 1970s questioned the nature of jewellery and its role in society and, as in other art

forms, accepted conventions were pushed aside.¹ New forms and new materials were widely used during that time, which challenged the authority of traditional jewellery.

Today, the future of society is being engineered through artificial intelligence, space technology and enhanced humans in a seemingly endless quest to conquer nature. Plato suggested that a person's soul could be divided into three parts: reason, emotions and appetites, of which appetites includes all desires for pleasure, comfort and physical satisfaction. French thinker Gilles Deleuze thinks desire is not an imaginary force based on luck, but a real, productive force. This could exactly explain why people's unsatisfied desire has fueled the development of technology.

However, sometimes philosophy, society and jurisprudence cannot keep up with the speed of technological development, which causes unpredictable outcomes. In 2015, Louis-Philippe Demer made a robotic performance work with audience participation, called "*Inferno*" ("Fig. 2"), which consisted of a series of machines that were worn by the viewer to control movement. His art reworked the idea of a cyborg robotic entity through a pastiche of the utopian concept of singularity and subordination to the machine. If jewellery can be considered as an object which engages with the body and is a wearable device, *Inferno* fits the description. Therefore, this work not only breaks the boundaries of technical design, but also makes the limits of contemporary jewellery more indistinct.

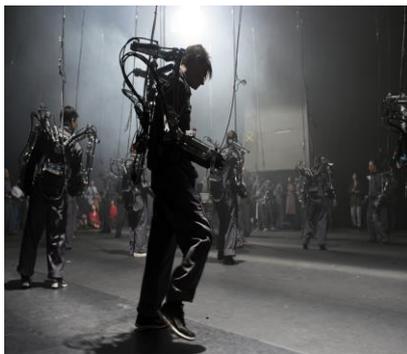


Fig. 2. *Inferno*.

^{a.} OLM OTTAWALIFE, The Mechanics of Modern Art [online] <http://www.ottawalife.com/article/the-mechanics-of-modern-art> [accessed 24 February 2018].

Based on people's unsatisfied desire and technoethics, which is a phenomena of technology impacting on the ethics, and it has made the boundary of art and jewellery more indistinct. This dissertation

¹ Janice West, MADE TO WEAR-Creativity in Contemporary Jewelry (London: Lund Humphries Publishers, 1998), p.60.

discusses how technology affects the boundary of jewellery dialectically through the following aspects:

- Reviewing the develop history of contemporary jewellery since the 1960s, first chapter mainly argues how the definition of jewellery changed, and raises the main question: Do you think your iPhone as your jewellery?
- Tools and materials are then examined with an analysis of how technology promotes contemporary jewellery in three respects: concept, form and body.
- From the starting point of people's unsatisfied desire, the third chapter discusses some negative effects of technoethics and psychological wearing.
- Finally, the indistinctness in contemporary art is examined before returning to smart jewellery, and how the boundaries between art, jewellery and technology have changed.

These days, 'transboundary' has become a popular term across many disciplines and means bringing related subjects together in order to generate more original and powerful ideas. Newman states that the study of borders has undergone a renaissance during the past decade. At the same time, 'Singularity' is no longer an entirely imaginary concept, it is coming. In the 2010s public figures such as Stephen Hawking and Elon Musk expressed consider that full artificial intelligence could result in human extinction. The consequences of the singularity and its potential benefit or harm to the human race have been hotly debated.² So under the unstoppable trend of technological development, it has affected within and without art in many aspects, one of them is making the boundary more indistinct than before, and this is a main reason of why 'transboundary' is popular in art as well.

The technology and art seem like developing narrative in their own directions, but they also interact with each other, they upward spiral and impact on each other with both positive and negative influence. This dissertation argues the dialectical relationship between technology and contemporary jewellery.

II. IPHONE AS JEWELLERY

A. Function and form

Since the 1960s, contemporary jewellery started to push the boundaries of jewellery and find more possibilities of functions and forms. Compared with other applied art, such as ceramics, glass and even

² Sparkes, Matthew (13 January 2015). "Top scientists call for caution over artificial intelligence". The Telegraph (UK). Retrieved 24 April 2015.

textiles, jewellery has more connection with the human form because without man, jewellery only partially serves its function. Liesbeth den Besten thinks that the function of jewellery can be defined as the meaning it adds to the person wearing it.³ This chapter is going to discuss the definition of jewellery from its function.

Jewellery is considered as a types of ornament to decorate the body. In this respect, jewellery has no utility because its functions are related to decoration and symbolism. Liesbeth den Besten considers jewellery to perform six functions in life: social and religious, economical, ornamental, sentimental or memorial, magical, and symbolic. Jewellery tends to be classified as either commercial or contemporary jewellery, to separate it by function. However, den Besten contends that the idea of jewellery as an art form is not shared outside the world of jewellery.⁴ Thinking about jewellery itself, despite the fact that the creative process is totally different, commercial jewellery needs to focus on the cost and customers, while contemporary jewellery talks more about personal emotions. However, their common characteristic is still an ornament, which interacts with the body. So in a broad sense, contemporary jewellery can be defined as an object that can interact with people or the body, which allows the definition to expand beyond the traditional idea of 'jewellery'. In this sense, the iPhone fulfills the definition given that for many people, it is their most treasured possession which they interact with every day and carry with them everywhere.

Using functions to define jewellery has its limitations. Given that the boundaries have been pushed further, jewellery should be defined in terms of form and scale as well. Since the 1980s, jewellery as sculpture, clothing or even performance were explored, so that it became a medium for artistic experiment rather than simple adornment. However, no matter how far we go beyond jewellery, the relationship of the body to its environment is still a permanent topic for artists. In 1982, Caroline Broadhead made a 'necklace' called *Necklace/Veil*, which is made from woven nylon and can be worn as a necklace or drawn up into an ethereal veil that plays with spatial expectations ("Fig. 3"). This work has the most representative contemporary jewellery form: large scale and new materials. The inspiration of that work comes from herself: her body. She thought that wearing larger-scale work in a unselfconscious way and where there was meaning

attached to each and every piece was exciting.⁵ After experimenting with different materials and approaches to jewellery, she has moved decisively into the realms of art and into textile art in particular. Her work is still centred on the body and movement and she has gradually moved into performance. This kind of change clearly shows the indistinct boundary between jewellery and other art form, which makes jewellery forms more and more diversified.



Fig. 3. Necklace/Veil.

^{a.} UAL, CAROLINE BROADHEAD [online] <http://www.arts.ac.uk/csm/people/teaching-staff/textiles-and-jewellery/caroline-broadhead/> [accessed 17 May 2018].

Artists like Caroline Broadhead, Susanna Heron and Julia Manheim have redefined contemporary jewellery not only from the changes of function, but also bringing new forms to jewellery. They have moved from small-scale jewellery to create larger pieces of work and to engage with art and the environment. This came at the very end of the twentieth century because it is the technological developments of this century that have had the deepest influence on contemporary art and jewellery.

B. Jewellery, singularity and technology

If the history of jewellery is imagined as space, it could be divided into three dimensions.

The first dimension is form, which includes the appearance and materials used. Throughout civilization, craftsmen have strived to make jewellery as ornate as possible, using the finest materials. Contemporary artists continue to explore the possibilities of new materials. However, if we review the history, no matter the ancient Egypt jewellery, the Middle Ages jewellery nor Qing dynasty jewellery in China ("Fig. 4": *Five-Phoenixes Coronet inlaid with Kingfisher Feathers and Jewels*), we can astonish find that jewellery has already been very delicate and gorgeous since thousand of years ago.

³ Liesbeth den Besten, *On jewellery, A compendium of international contemporary art jewellery* (Germany: ARNOLDSCHE Art Publishers, 2012), p. 11.

⁴ Liesbeth den Besten, *On jewellery, A compendium of international contemporary art jewellery* (Germany: ARNOLDSCHE Art Publishers, 2012), p. 9.

⁵ ART JEWELRY FORUM, *IN CONVERSATION WITH CAROLINE BROADHEAD* (2018) <<https://artjewelryforum.org/in-conversation-with-caroline-broadhead/>> [accessed 17 May 2018]



Fig. 4. Five-phoenixes coronet inlaid with kingfisher feathers and jewels.

^a THE PALACE MUSEUM, Five-Phoenixes Coronet inlaid with Kingfisher Feathers and Jewels <<http://en.dpm.org.cn/collections/collections/2012-10-10/1672.html>> [accessed 17 March 2018]

The second dimension is the concept of jewellery. The French theorist Roland Barthes is seen as one of the earliest pioneers of the liberalization of jewellery. He thought that it was a shame when jewellery imitates some precious substance, gold or pearls. Jewellery should be more open about itself, makes no attempt to device, only retaining the aesthetic qualities of the material it is imitating.⁶ From the 1960s, under the influence of Neo-Dada, jewellery artists started using new materials and medium to express emotions. Artists like Gijs Bakker and Emmy van Leersum led aesthetics to a conceptual level, beyond the constraints of traditional materials and functions. As an example, in 1973, Gijs Bakker made an object called *Shadow Jewellery* ("Fig. 5" and "Fig. 6"), which uses an imprint on body, to explore the new dimension of jewellery. He thought that the changed body can be more visible than the piece of jewellery.⁷ By leaving a mark on body, it breaks through the boundary between jewellery and objects and photography.



Fig. 5. Shadow jewellery.

^a Liesbeth den Besten, *On jewellery, A compendium of international contemporary art jewellery* (Germany: ARNOLDSCHE Art Publishers, 2012).

⁶ Roland Barthes, 'From Gemstones to Jewellery', in Roland Barthes. *The Language of Fashion*. (Oxford/New York: Berg, 2006), p.62.

⁷ Roberta Bernabei, *Contemporary jewellers: Interviews with European artists* (New York, 2011), p.29.



Fig. 6. Shadow jewellery.

^a Liesbeth den Besten, *On jewellery, A compendium of international contemporary art jewellery* (Germany: ARNOLDSCHE Art Publishers, 2012).

During the 1980s, artists felt an urgent need for renewal and to break with tradition. In 1985, Peter Dormer and Ralph Turner coined the notion 'the New Jewellery', which they summarise as 'What emerges is the growth not so much of an international style, as of international variety, in which ideas and themes rather than national cultures provide the common threads.'⁸ 'New Jewellery' is a typical representation of jewellery influenced by social environment, and it leads contemporary jewellery to another stage in its history. However, the concept of jewellery has not advanced in recent years because many students still imitate ideas and forms, which can be seen in international exhibitions and competitions. People are using different materials to make the 'same' objects, which has become a potential hindrance for the development of contemporary jewellery.



Fig. 7. The Instrument.

^a CULTURE.PL, *A to Z of Art & Technology* [online] <http://culture.pl/en/article/a-to-z-of-art-technology> [accessed 17 March 2018].

Apart from these two dimensions, there is one thing that all jewellers or artists could not forget, which is technology. Whether the stone hammer of the past, or the 3D printer of today, technology is one of the most significant elements in the field of jewellery. It not only includes tools that we use, but also influences thinking and creative methods. Thousand of years ago, when our

⁸ Peter Dormer and Ralph Turner, *The New Jewellery: Trends+Traditions*. (London: Thames&Hudson, 1985), back cover.

ancestors did not have pendent drill and sand paper, it was impossible for them to make a shiny wedding ring from diamonds. Hundred of years ago, people did not have etching machines so they could not use photos as an element in their jewellery. Technology has shaped the direction of jewellery development and it makes jewellery more diverse. In 1973, Krzysztof Wodiczko made an electronic device worn on the head and hands called *The Instrument* ("Fig. 7"). This wearable device allowed people to amplify or diminish the flow of sound from the environment. The wearer could collect the sounds in the city, the traffic and the conversation, making them together like an orchestra. *The Instrument* could be related with body, it could also interact with people. In some ways, it could be seen as a jewellery, although Krzysztof is not a jewellery artist, he has pushed the limits of jewellery further than before.

In conclusion, jewellery has already arrived at a singularity in a way, so jewellers and designers should be looking for the next innovation to take it into the future. In my opinion, technology is one of the most important elements. As time goes by, while technology brings many opportunities and challenges to jewellery, it may also make the boundary of jewellery more indistinct and wider. With reference to the iPhone in relation to the ideas discussed, it belongs to high-end technology, it is a wearable device and is interactive and portable so it could redefine the boundary between jewellery and technology.

III. IMPACT ON THE BOUNDARY

A. Concept and form

Every time a piece of jewellery is criticised, it is usually analysed through its concept and form, such as if the concept is neoteric enough or the form is fresh enough. In the age of technology, This chapter discusses how technology can enable contemporary jewellery to go further in terms of concept and form and redefine the boundaries.

Before people defined 'concept' in terms of jewellery, jewellery was seen as an amulet. Before the 1960s, traditional diamond jewellery dominated and even though there were some technical innovations, it was still difficult to break through the inherent frame of jewellery as an ornament and luxury. This chapter examines how technology has affected the development of contemporary jewellery since the 1960s.



Fig. 8. The bib.

^a. FEATURE SHOOT, 'MULTIPLE EXPOSURES: JEWELRY AND PHOTOGRAPHY' AT THE MUSEUM OF ARTS AND DESIGN [online] <https://www.featureshoot.com/2014/07/multiple-exposures-jewelry-and-photography-at-the-museum-of-arts-and-design/> [accessed 23 May 2018].

In 1976, Gijs Bakker made a bib printed with a black-and-white photo of his own bare chest and another with a woman's bare chest, so the wearer superimposes with a chest on their chest ("Fig. 8"). This was seen as the first jewellery that used screen printing techniques, which were also developed in the twentieth century. This work forms a new relationship between the human body and objects, whilst allowing jewellery to explore another technology and engage with photography. The bib is a representative artwork, which was influenced by technology in both concept and form.

The changes of technology also supply art with new materials. Silicone and resin, as two of the most popular materials being used in jewellery now, which play an important role in contemporary jewellery. They are widely used to make moulds or directly used as a part of jewellery. Silicon rubber was invented and produced during the Mid-20th century. While the Japanese company Shin-Etsu Chemical began mass production of silicone in 1953, Wacker Chemie had started production of silicones in Europe in 1947.⁹ However, artists did not really start using it on jewellery until this century. In 2004, Swedish jeweller Aud Charlotte Ho Sook Sinding made a series of *Animal Brooches* by using silicon, linoleum and gold plated brass (figure 9). It talks about the relationship between jewellery and wearer. Sinding gives her pieces of jewellery a truly ornamental character, and she wanted to challenge people to wear them on their bodies instead of hanging them on the wall. When people actually wear these dogs, cat's rabbits on their bodies, they become more powerful and clearly, rather than some simple hunting trophies or cuckoo clocks. Liesbeth den Besten hold the view that while people observe jewellery as an ornament, at the same time, this ornament is characterized through its own ornamentation, by motives and patterns, with the help filigree, gemstones,

⁹ WIKIPEDIA, Silicone rubber [online] https://en.wikipedia.org/wiki/Silicone_rubber [accessed 23 May 2018].

and so forth.¹⁰ Therefore, these works also break through the possibilities of jewellery by using new materials and new technology.



Fig. 9. Animal brooches.

^{a.} Diamonds&Dead things, Aud Charlotte Ho Sook Sinding [online] <https://diamondsanddeadthings.wordpress.com/2010/11/09/aud-charlotte-ho-sook-sinding/> [accessed 23 May 2018].

If the concept could be seen as a soul of an artwork, then the form could be seen as the face of an art work, which could determine if audiences are interested in seeing it and knowing more about it. In Gucci's autumn/winter ready-to-wear show, the world was surprised by Alessandro Michele's incredible imagination regarding cyborg art, which mainly examines the relationship between being and becoming. Diamanté nipple tassels, knit gimp masks, a pet dragon, a pagoda hat, models embellished with third eyes or eyes on their hands, unibrows as seen in "Fig. 10" and "Fig. 11", were inspired by Italian Matteo Garrone's fantasy film, *Tale of Tales*, in which the heroes are sorcerers, fairies, monsters and other creatures. All of these were made by a special effects company called Makinarium. It took them six months to bring these extraordinary pieces to life, using a variety of methods and materials, including silicone moulds and 3D printing. During the fashion show, these paradoxical creatures were held up by models as they walked around. For 20 minutes, they were not just ornaments; they truly interacted with people and space. Yet, they were worn by people during that time, so one could argue they belong to jewellery. By using 3D printing, which was invented in 1990s, and various other new technology, these paradoxical creatures have made the form of accessories more delicate and gone beyond imagination, which also blurred the boundaries of jewellery even further.

¹⁰ Liesbeth den Besten, *On jewellery, A compendium of international contemporary art jewellery* (Germany: ARNOLDSCHÉ Art Publishers, 2012), p. 141.



Fig. 10. Gucci's autumn/winter ready-to-wear show.

^{a.} GUCCI, FALL WINTER 2018: RUNWAY LOOKS [online] <https://www.gucci.com/us/en/stories/runway/article/fall-winter-2018-gallery> [accessed 23 May 2018].



Fig. 11. Gucci's autumn/winter ready-to-wear show.

^{a.} GUCCI, FALL WINTER 2018: RUNWAY LOOKS [online] <https://www.gucci.com/us/en/stories/runway/article/fall-winter-2018-gallery> [accessed 23 May 2018].

Therefore, because technology has influenced the tools and materials of jewellery, contemporary jewellery could developed more favoring and faster. This positive change not only is expressed in concept and form, but also in some other aspects in contemporary jewellery.

B. The body

Beyond concept and form, the body is a permanent topic in the fields of jewellery and contemporary art. One of the original functions of jewellery is decorating the body, which can be traced back thousands of years, such as the 75000-year-old shells found in the Blombos Cave in South Africa and the 82000-year-old shell beads found in Morocco. So in the age of technology, what is the relationship between body and jewellery?

On a prosaic level, as the body's largest organ, skin creates a container and a protective boundary between the world around and all that the body comprises to enable it to function as a living being. In 1975, Peter Skubic made a piece of jewellery from photography called *Jewellery under the Skin* ("Fig. 12"), which involved an operation to insert a piece of metal under the skin, which could only be seen by X-ray. As

medical technology matured, and X-rays became widely used, this artwork could be made. *Jewellery under the Skin* not only broadens the boundary of jewellery, but also creates a new relationship between jewellery and the body. In his opinion, jewellery is a kind of participation to interaction with the body.¹¹ It talks about a new wearing way — invisible jewellery.



Fig. 12. Jewellery under the skin.

^a Liesbeth den Besten, *On jewellery. A compendium of international contemporary art jewellery* (Germany: ARNOLDSCHÉ Art Publishers, 2012).

The body also has a close connection with space. Under the influence of E.A.T movement, many artists started using colour video as their forms of performance. In 1975, Rebecca Horn made a video work *Two Hands Scratching Both Walls* ("Fig. 13"), in which she constructed enormously long finger extensions that enable the wearer to reach out and scratch both sides of the room at once. By using video, she could clearly show the whole process of engaging with the space. As a kind of finger extension, these objects also could be worn on the body and interact with people. Equally, *Two Hands Scratching Both Walls* could be seen as a wearable device, or even as jewellery. This work is another engagement way between body and space. 'Somehow, because it was an empty space, I did an exercise everyday so that the space would become my own; I had filled it with my ideas, my body, my longing.'¹² she said.



Fig. 13. Two hands scratching both walls.

^a klimt02, Interview with Peter Skubic [online] <https://klimt02.net/forum/interviews/interview-peter-skubic-petra-bole> [accessed 27 May 2018].



Fig. 14. The Ægis.

^a Brooklyn Model Works, Krzysztof Wodiczko [online] <http://www.brooklynmodelworks.com/Algis-1b.html> [accessed 27 May 2018].

The speed of technological development in the twenty-first century has meant that communication between the body and its surrounding are more powerful than ever. The relationship between technology and art is also much more closer than before. In 2000, Krzysztof Wodiczko made a wearable device called *Ægis* ("Fig. 14"). The *Ægis* was the cloak of Athena, bearing a Gorgon's head that she used to protect herself and others.¹³ The instrument is a piece of equipment designed to represent dual truths, those living contradictions that define, depict, and can sometimes destroy individual existence. As a wearable device, which can interact with people, *Ægis* could also be seen as jewellery. However, it breaks through the traditional ideas of jewellery and promotes communication between the body with others. Developments in medicine allowed Australian performance artist, Stelarc, to be the first person to grow an ear on his arm, after spending ten years financing and preparing for it ("Fig. 15"). It is a milestone in the relationship between art and body. It breakthroughs the boundaries of skin and technology,

¹¹ klimt02, Interview with Peter Skubic [online] <https://klimt02.net/forum/interviews/interview-peter-skubic-petra-bole> [accessed 27 May 2018].

¹² Jennifer Blessing, *BODY OF ART* (London: Phaidon Press Limited, 2015), p. 320.

¹³ INTERROGATIVE, *Ægis* Project [online] <http://web.mit.edu/idg/aegis.html> [accessed 27 May 2018].

which makes people's body beyond the local space that it occupies. At the same time, it projects organ's physical presence elsewhere. Compared with *Jewellery under the Skin*, this work is more powerful and persuasive to demonstrate the relationship between technology and the body within art.



Fig. 15. Growing an ear on his arm.

^a CNNSTYLE, The man with an ear on his arm [online] <https://edition.cnn.com/style/article/stelarc-ear-arm-art/index.html> [accessed 27 May 2018].

Therefore, as an indispensable part of art, technology has impacted on the boundary of jewellery by many ways, the concept, the form and the body. iPhone as an outcome of the highest technology at present, it is hard to give it an accurate definition that which field it belongs to, even as another form of contemporary jewellery, it definitely makes the boundary of jewellery more indistinct.

IV. WEARING JEWELLERY IN MINDS

A. Technoethics and unsatisfied desire

People would be never satisfied with their desire. Reviewing the history, when we wanted to find a stable and powerful power, so we invented electric; when we wanted to get somewhere quicker, so cars and planes were invented; when we wanted our machines could do something like human, so AI was used on the robots. The unsatisfied desire makes people always try to invent new products to make life better. The history of technology and ethics is spiral and narrative, which means there are both positive and negative effects exist during this development. This paragraph mainly discusses the negative effects of technology.

Technoethics is a theory that talks about how technology influences our society from an ethical dimension, which also involves the ethical aspects of technology within a society that is shaped by technology. Luppicini thinks that technoethics has brought up a series of social and ethical questions regarding new technological advancements and new

boundary crossing opportunities.¹⁴ However, not all of these opportunities are beneficial. People's consciousness and conscience are not prepared for this radical change. Unsatisfied desires are limitless; blinded by material gains provided by new technology which ignore some potential pitfalls until it is too late.

The high technology includes many areas, such as artificial intelligence, space technology, enhanced humans, future society and so on. Each of them is changing the world and people's cognition fast and efficient by using their own ways. However, not all transforms could be accepted by human, and some of them even leave us an unavoidable question: What if one day their development breakthrough our bottom lines of moral? In January 2017, a baby was born to an infertile couple using DNA from three people after years of unsuccessful attempts at in vitro fertilization. 'It's like the opening of a new era,' Dr Zukin described¹⁵. They made a hybrid embryo, fertilizing the mother's egg with her partner's sperm, and then transferring the resulting pronucleus into an egg from a donor female. While everyone were focusing on the breakthrough of biotechnology, few people worried about who was this baby's father and who the baby belonged to. Coincidentally, there is a law in China, which stipulates a single woman can not freeze eggs, and a woman also can not unfreeze her eggs without a marriage certificate. The reason of the government launched this law was that if someone could unfreeze her eggs and cultivate a baby, they could not make sure who is the baby's father. This is not a technological problem, this is an ethics problem. These two examples clearly demonstrate that what kinds of negative effects that technoethics might bring to us in the future.

In *Anti-Oedipus: Capitalism and Schizophrenia*, Deleuze thinks that sometimes people are struck by the fact that all the parts are produced as asymmetrical sections, paths that suddenly come to an end, hermetically sealed boxes, noncommunicating vessels, watertight compartments.¹⁶ Therefore, as a part of daily life, it is time for us to think about if art has been influenced by technoethics so far. After The Second World War, many high technologies were invented because of the requirements of the war. There is no doubt that these technology had led our life better, as well as pushed artists starting to use them in their works naturally. In the age of technology, we should make

¹⁴ R. Luppicini, The emerging field of Technoethics. In R. Luppicini and R. Adell. Handbook of Research on Technoethics. (Hershey: Idea Group Publishing, 2008), p.110.

¹⁵ PETER DOCKRILL, World-First in Ukraine as 'Three-Parent' Baby Born to an Infertile Couple (19 JAN 2017) [online] <https://www.sciencealert.com/world-first-in-ukraine-as-three-parent-baby-born-to-an-infertile-couple> [accessed 18 March 2018].

¹⁶ GOODREADS, Anti-Oedipus Quotes [online] <https://www.goodreads.com/work/quotes/113899-capitalisme-et-schizophr-nie-1-1-anti--dipe> [accessed 10 June 2018].

sure if everyone could benefit from it; what kinds of outcomes that technoethics might cause to our daily life and art; if people going to be a slave or a master of technology; and if jewellery is also impacted by technoethics or not. These large amounts of questions are still waiting for people to figure out. But what we should notice now is that the relationship between the technoethics and the boundary of art is changing obviously.

B. Psychological wearing

Jewellery is considered to be worn physically, however, under the influence of technoethics, this concept is changing. One of the outcomes that technoethics has caused in art is on psychological level, which refers to the dependence existing between technology and people.

In 2007 Steve Jobs launched the iPhone, which he said would change the world and it did. Today, the iPhone has become one of the most indispensable devices in our lives. At the annual Macworld trade conference in San Francisco in 2007, he spoke his famous quote 'Every once in a while a revolutionary product comes along that changes everything.'¹⁷ This product not only changes our daily life, but also redefines the boundary of jewellery. So what potential changes when we scroll, tap, browse and swipe our iPhones each day?



Fig. 16. A group of people playing phones.

^{a.} WORKOPOLIS, Put your phone away and change your life [online] <https://careers.workopolis.com/advice/put-your-phone-away-and-change-your-life/> [accessed 02 June 2018]

If one day we do not bring our smartphones, he would be seen as a sign of eccentricity, marginalization, opting out or old age. Even when we sitting together face to face, the phenomenon as the picture ("Fig. 16") is also not strange for us. Our dependency is such that many of us

¹⁷ The Original iPhone Announcement Annotated: Steve Jobs Genius meets Genius (9 September 2015) [online] <https://thenextweb.com/apple/2015/09/09/genius-annotated-with-genius/> [accessed 29 August 2016].

reach out for our phones as soon as we wake and then go on to check them on, there was a report shows that people unlock their phones average every six and a half minutes over the course of a day.¹⁸ People have developed a psychological dependence on iPhones, similar to drug addiction. This is an intimate relationship between mind and body, similar to the relationship with jewellery. Could it be said that people 'wear' their iPhone on a psychological level and define this as a new way of wearing jewellery?

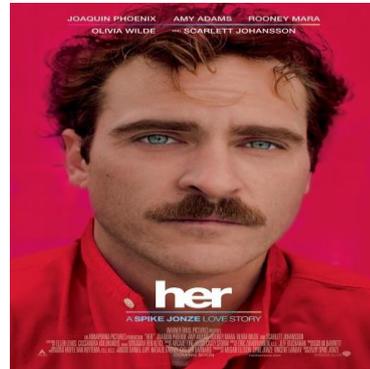


Fig. 17. Her.

^{a.} GOOGLE IMAGE [online] https://www.google.com/imgres?imgurl=http://t2.gstatic.com/images?q%3Dtbid:ANd9GcTJM7K3leZaH3UCDfARoFdfpB3Atg8pQqIgrKdIkAQHdMjBYH&imgrefurl=http://t2.gstatic.com/images?q%3Dtbid:ANd9GcTJM7K3leZaH3UCDfARoFdfpB3Atg8pQqIgrKdIkAQHdMjBYH&h=1080&w=720&tbid=TmnXsn4jFrHIM:&qq=her+movie&tbid=186&tbid=124&usg=__mCc3OobA5dSvGoYQOVuK1UMQs_Q%3D&vet=10ahUKEwjhcvejrXbAhXF18AKHYV7AFgQ_B0IlwIwDw..i&docid=8bnGCoSuqhAYDM&itg=1&sa=X&ved=0ahUKEwjhcvejrXbAhXF18AKHYV7AFgQ_B0IlwIwDw [accessed 19 March 2018].

If a tangible object could be our psychological dependence, what about a fictitious thing? In the movie *Her* ("Fig. 17"), Theodore Twombly purchases a talking operating system (OS) with artificial intelligence, designed to adapt and evolve. Day by day, their intimacy relationship becomes closer and closer and he finally falls in love with the OS, a programme called Samantha. He regards Samantha as not only a system, but depends on her completely. This kind of psychological dependence is much purer and more direct, and it is also an immediate consequence of technoethics. We could not say if it is beneficial for us or not, but as a technology itself, this would impact on the boundary between art and technology.

In contrast, in the contemporary jewellery field, the graphite and diamonds are both composed of carbon, so normally when we wear a ring which is made of graphite, we would imagine that we are wearing a diamond ring. It is a psychological wearing way. In today's digital age, we always want to take back control

¹⁸ Nir Eyal, *Hooked: How to Build Habit-Forming Products* (London 2014), p.1; and Sherry Turtle, *Reclaiming Conversation: The Power of Talk in the Digital Age* (New York 2015), p.42.

of our lives and interactions, but what we could not ignore is that our right to privacy and the nature of ownership are shifting, so it is hard to know who has access to our data and for what purpose. These are negative effects that technology brings us. At the same time, these negative effects also make the boundary of jewellery or art more indistinct. With the help of technoethics, psychological wearing becomes a common theory in contemporary jewellery.

V. CROSSING THE EDGE

A. Impact on art

The first area that was impacted by technology was not jewellery but contemporary art. As a result of the changes of contemporary art, jewellery artists were inspired by this revolution and started the history of contemporary jewellery. Therefore, this section examines how technology affected art since the second half of the last century.

To be precise, technology first impacted contemporary art after the Second World War as a result of the large number new technologies invented, such as wireless, radio, jet engine, nuclear weapon and electron microscope. Some of these inventions had made people lives easier than before. Additionally, the world had entered into a comparatively peaceful time, which gave people more time to enjoy art. Therefore, under these two basic circumstances, Neo-Dada was born and became famous for its modern materials, popular imagery and gave rise to E.A.T.

to-person contact between artists and engineers, rather than defining a formal process for cooperation. It is the first artists' organization that engages with technology. E.A.T. was first established by Billy Kluver, who was an engineer and a curator. The most famous work of E.A.T. is *9 Evenings: Theatre and Engineering*, which was a series of performances in 1966, where artists and engineers from Bell Laboratories in Murray Hill, New Jersey collaborated on what was to be the first event in a series of projects ("Fig. 18"). Billy Kluver was the first person who had the idea of one to one collaborations between an artist and an engineer or scientist, which could satisfy the artist's desire to work with the new technology and produce modes of art that could not be addressed any other way, and collaboration could also work both ways, artists projects could stimulate the engineer in new ways of looking at technology and influence technological development for the future.²⁰ E.A.T. started a new art movement that used technology to engage with art.



Fig. 19. Oracle.



Fig. 18. 9 Evenings: Theatre and Engineering.

^a ROBERT RAUSCHENBERG FOUNDATION (2018), ORACLE [online] <https://www.rauschenbergfoundation.org/art/artwork/oracle> [accessed 19 March 2018].

In 1962, Robert Rauschenberg made an installation called *Oracle* ("Fig. 19"). It is consist of five parts, with five concealed radios. It was a successful attempt to combine technology with art. When audience walked through these consoles, it felt like walking on New York's streets at night. *Oracle* broadened the boundary of contemporary art; it gives us a new possibility of using machines and new technologies. Additionally, it was also a new way to make the artwork interact with audience much more effectively than before. Machines are like a bridge between the audience and works; it not only makes this kind of interaction more interesting, but also gives more choices to contemporary art. Several years later, in 1968, Rauschenberg made another installation called *Mud Muse* ("Fig. 20"), which used bentonite mixing with water in glass vat, with sound-activated compressed-air system and control console. It is a higher standard combination between technology

^a ROBERT RAUSCHENBERG FOUNDATION (2018), POSTER FOR 9 EVENINGS: THEATRE & ENGINEERING [online] <https://www.rauschenbergfoundation.org/art/artwork/poster-9-evenings-theatre-engineering> [accessed 19 March 2018].

Experiments in Art and Technology (E.A.T.) was a non-profit and tax-exempt organization established to develop collaborations between artists and engineers.¹⁹ The working principle of this organization is a person-

¹⁹ Christiane Paul, *Digital Art (World of Art series)* (London: Thames & Hudson, 2003), p.16.

²⁰ Sabine Breitwieser, *E.A.T.: Experiments in Arts and Technology* (Salzburg: Museum der Moderne, 2015), p.102.

and art. It leads to a new aesthetic of machines. Compared with *Oracle* before, *Mud Muse* is more sci-fi and contemporary, the details and movements of compressed-air system are very delicate and incredible beautiful, and all these great changes are not only owe to the new technological development, but also to the artist's bravery of trying new mediums.



Fig. 20. Mud Muse.

^{a.} ROBERT RAUSCHENBERG FOUNDATION (2018). MUD MUSE [online] <https://www.rauschenbergfoundation.org/art/artwork/mud-muse> [accessed 19 March 2018].

E.A.T. was a beginning of revolution; a revolution of using technologies in art, and a revolution of an exchange of technology and art status. Given that both benefits and disadvantages exists in technoethics, it separated artists into two camps; some were confident with the unstoppable technology, while others focused more on its negative effects. In the following decades, this dialectical relationship between technoethics and the boundary of art became more and more complicated.

In 1992, the traveling exhibition "Post Human" included the works of such as Jeff Wall, Cindy Sherman, Matthew Barney and Damien Hirst. In the exhibition's curator Jeffery Deitch's opinion, human evolution was entering a new phase that Charles Darwin never would had envisioned, this new techno-evolutionary phase will bring us far beyond eugenics. He also thought the next generation could very well be the last generation of 'pure' humans.²¹ While some people still had a full confidence on the future of technology, Roxy Paine and Wim Delvoye offer glimpses of the possibility that machines may take on human characteristics. In 1999, Paine made his work *PMU* (Painting Manufacture Unit, "Fig. 21"), which is a computer-programmed apparatus that paints canvases in an ironic send-up of the rhetoric of individuality that surrounds modernist abstraction. In Delvoye's *Cloaca Turbo*, 2003 ("Fig. 22"), the specific human functions under consideration are eating, digesting and excreting. These two bionic artworks are more machinery and technical. They try to find a new way of combining body with technical works, and they also stretch the

²¹ Jeffery Deitch, POST HUMAN (New York: Jeffery Deitch, 1992), p.29.

boundary to explore under what conditions technology can be considered art. This kind of combination between human body and machines gives art a fertile field to explore.



Fig. 21. PMU.

^{a.} James Cohan, Roxy Paine New Work [online] <http://www.jamescohan.com/exhibitions/roxy-paine> [accessed 20 March 2018].



Fig. 22. Cloaca Turbo.

^{a.} CAPTURES, ITÉRATIONS DE CLOACA [online] <http://www.revuecaptures.org/contrepoin/itérations-de-cloaca> [accessed 20 March 2018].

Roy Ascott holds the point in *Art, Technology, Consciousness* that artists working with cutting edge technologies are frequently well informed and inspired by the exciting innovations and discoveries taking place in science.²² We are interested in what cultural critics and commentators from the humanities have to say on the meaning and impact these discoveries and innovations have on culture and society. This is the reason that artists should build a bridge to connect the technology, art and society together. Therefore, naturally, these three parts influence each other in their own way. As a result of the humanities and ethics, artists widely use new technologies to express themselves, and make the boundary of art more indistinct.

B. Smart jewellery

Smart jewellery has the closest connection with technology in recent years. As a type of intelligent wearable device, smart jewellery not only integrates high technology with traditional luxury jewellery, but

²² Roy Ascott, *Art, Technology, Consciousness* (Great Britain: Intellect Books, 2000), p.7.

also breaks through the boundary between technology and art.

Specifically, the trend of smart jewellery started becoming popular after the first Apple watch was launched in 2015. Although before it, there were already many companies making smart watches or bracelets, they did not have a strong impact on the market. The first reason is that they were not famous enough, but the most important reason is their limited functionality; in fact, most of them only had message notification. However, now, combining society's obsession with connectivity and style, smart jewellery has a totally new definition and refers to an assortment of rings, bracelets, necklaces and earrings that aim to improve health, productivity and communications, all while maintaining a fashion-first stance. It has redefined the boundary of contemporary jewellery, and strongly impacted the traditional luxury market. Looksee Labs founder Per Ljung considers that self-expression with jewellery has always been part of human culture and smart jewellery is a new concept where something 'magic' can be added to traditional jewellery.²³ This kind of 'magic' has also made traditional jewellery more contemporary, which leads a revolution in changing.



Fig. 23. Bellabeat.

^{a.} Digital Trends, Bellabeat turns over a new Leaf with smart jewellery to help you stay stress-free [online] <https://www.digitaltrends.com/wearables/bellabeat-leaf-urban/> [accessed 12 June 2018].

There are many smart jewellery companies now including Ringly, Altruis X, Mira, and Wristify which have matured and achieved scale. Bellabeat is one business offering a technology-based device with a heavy focus on aesthetics. ("Fig. 23") Introduced in 2014, Bellabeat's Leaf — a stylised-leaf pendant fashioned from wood composites and silver or rose gold-plated stainless steel — can be worn as a bracelet or necklace. The product is marketed as the 'world's first wearable that predicts stress', tracking the wearer's daily activities such as steps taken, calories burned, sleep patterns and reproductive health. Started in 2016, it has sold more than 400,000 Leafs, and it is bringing

²³ Jeweller Magazine, FEATURE STORIES, FASHION [online] <http://www.jewellermagazine.com/Article/7382/The-smart-jewellery-breakthrough> [accessed 12 June 2018].

stress tracking to the Leaf.²⁴ Bellabeat's co-founder Urška Sršen thinks that stress is very hard to control because there are internal and external triggers. We can't know if you have a stressful meeting coming up, but we can show you how you can manage stressful situations through your behaviour.²⁵ This is a new way for jewellery to engage with the body and it is no longer an immobile ornament but can truly communicate with people and bodies. With a title of 'jewellery', this smart wearable device could develop further, which could push the boundary of technology and jewellery. There is another smart jewellery company called Totwoo ("Fig. 24"), whose products could do more than health tracking and message notification. Totwoo monitors UV intensity in real-time. With Totwoo you would never need to worry about how much sun screen you need to apply. Besides, you could pair up your Totwoo with that of the special someone. And messages could be sent by simply tapping the jewellery. It keeps you connected, always. What's more, it can also help you make simple decision for a yes or no question, concentrate on the question, then gently shake or knock on the jewellery. It will give you the much needed answer instantly. Except for these two 'traditional products', there are also some conceptual smart jewellery. NECLUMI is a wearable projection using a smart phone app in a discreetly tucked pocket projector ("Fig. 25"). It displays responsive patterns of light over the wearer's neck. All these tryings and products have broadened the boundary of jewellery and made it more indistinct than before.



Fig. 24. Totwoo.

^{a.} TOTWOO, Totwoo Function [online] <https://www.totwooglobal.com/totwoo-functions/> [accessed 12 June 2018].

²⁴ Jeweller Magazine, FEATURE STORIES, FASHION [online] <http://www.jewellermagazine.com/Article/7382/The-smart-jewellery-breakthrough> [accessed 12 June 2018].

²⁵ Digital Trends, Bellabeat turns over a new Leaf with smart jewelry to help you stay stress-free [online] <https://www.digitaltrends.com/wearables/bellabeat-leaf-urban/> [accessed 12 June 2018].



Fig. 25. NECLUMI.

^{a.} Aplus, Futuristic Projected Necklaces Might Replace Material Jewellery [online] https://aplus.com/a/neclumi-future-of-jewelry?no_monetization=true [accessed 12 June 2018].

However, as the smart jewellery market is becoming bigger, companies also have met some bottlenecks. First of all, from a technical view, the integration of electronic components still cannot meet product requirements, especially the battery life. Secondly, regarding the market, the current smart jewellery features are relatively simple. Many functions are similar to wearable devices, which are both limited to mobile alerts and health levels, and this makes them easily replaceable by mobile phones. Finally, from the view of consumers, the level of understanding and acceptance in this field have not matured yet. Even the situation of wearable devices in the consumer market does not look encouraging either. A survey of the US smart wearable device market shows that until December 2016, only 15% of Americans had one.²⁶ Therefore, with these problems, smart jewellery still has a long way to go in the future and it needs to wait for technological advancements to improve.

What will jewellery be in the future? Smart jewellery is just a current outcome of the combination between technology and jewellery. Although it has made the boundary more indistinct and broader, it still has many problems, and it has not arrived a real standard of 'smart' yet. At present, under the unstoppable develop of technology, it has impacted on jewellery from both form and concept direction and advanced considerably. Equally, there are negative effects so that there is still a long way to go to discover a way to seamlessly combine technology and jewellery in the future.

VI. CONCLUSION

The development of contemporary jewellery is narrative and upwards spiral. It has its own booming period as well as bottleneck state, and technology plays an important role during this process. From Peter

Skubic's Jewellery under the Skin, to Bellabeat's smart jewellery, they all rely on different technologies to make it. From the function to form, from the concept to body, contemporary jewellery has changed a lot in the past decades. However, where would jewellery go in the future? Where will the boundary between technology and art be?

We could literally consider that iPhone is our jewellery, because it fits all the definition of being a contemporary jewellery. But on the other hand, some people hold the point that it is a sophistry. The reason is that if we think one object, which could interact with body, and it belongs to jewellery, and then everything would become 'jewellery'. For example, if we pick up a brick on the road, and then taping it with a rope so that we can hang it on our necks. When we put the brick down, it will leave a mark on our necks ("Fig. 26" and "Fig. 27"), so do you think it is jewellery? This is an experiment that I made before to explore the 'boundary'. Sometimes this boundary is very indistinct and flexible, and sometimes it totally depends on people themselves. It is a very optimistic judgement of where the boundary is. Similarly, the boundary between technology and jewellery exists same problems. Normally, we consider that technologies in jewellery field are no more than tools and materials, but actually, the truth is more than these two directions. It is much like a kind of potential which influences artists' working and thinking methods. Technology impacts artists on a psychological level, for instance, without 3D printing, artists maybe never think about making some complicated shapes or some lifelike objects, and naturally, the concept will be changed and become deeper and more powerful. This is how technology affects jewellery potentially.



Fig. 26. My works before in 2017.

^{a.} The work that I made in 2017, Beijing, China.

²⁶ Sohu, The smart jewelry has arrived a bottleneck period [online] http://www.sohu.com/a/198833897_112986 [accessed 12 June 2018].



Fig. 27. My works before in 2017.

a. The work that I made in 2017, Beijing, China.

On the one hand, the world of tomorrow is shaped by emerging design and technology of today. People always imagine where our society might be in the future. Cute but intelligent robots, massive unmanned aircraft that deliver internet access, crowdfunded buildings, tools printed in space, mysterious black boxes that understand human genetic codes, how can these objects affect the way we live, learn and love? And how are they potentially influencing art, artists and contemporary jewellery? On the other hand, technology also brings us some unpredictable ethics problems, no matter the adults who are addicted to playing smart phones, nor babies who are created by gene engineering; they are all challenging our moral bottom line. As an artist, or a jeweller, how should we deal with this dialectical phenomena is an emergence question for us. The world is changing, how should we change to survive in this world?

The dialectical relationship between technology and jewellery makes the boundary of contemporary jewellery and art more indistinct than before. Liesbeth's statement is that 'Contemporary jewellery not only involves the baubles, bangles and beads, but also photography, installations, performance, video and so on, this new freedom in jewellery should not be confused with the freedom in the visual art.'²⁷ Therefore, there are still much more things that we need to explore at the age of technology.

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