Things Theory of Art Should Learn from Natural Computing

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Abstract. In this paper, we first depict a short history of arts and make clear that current critical artworks are not successor to original fine arts. Then, we acknowledge that some key points of fine arts remain in natural computing, especially in the idea of ‘harnessing.’ Finally, we re-evaluate artworks from the point of view of natural computing, especially from the idea of ‘harness’ in natural computing. We further suggest the possibility of making a new lineage, for example, from horticulture in the 18th century through land art to the idea of harnessing in natural computing, and to expect new successors to fine arts in extension of this lineage.

Keywords: theory of art, natural computing, harnessing, history of art.

1 Introduction

The idea of natural computing gave me a shock because there I saw a phantom of fine arts that was already lost. They forced me to reconsider what fine arts originally were and where they are now. In my presentation below, I would like to make clear the following: 1) current critical artworks are not successors to original fine arts; 2) rather, the idea of natural computing shares key points with the original idea of fine arts. 3) In addition, it is possible to reevaluate artworks from the point of view of natural computing. Through this presentation, I would like to show that the theory of art must learn from natural computing.

2 Critical Artworks

2.1 Critical Artworks Irritate Me

Artworks irritate us because they do not satisfy our curiosity; rather, they force us to find lessons to learn, in other words, they force moral knowledge in us. Take Cannacher’s *Addict to Plastic* for example. I saw a still of this video at the exhibition of Ars Electronica in 2010. The still consisted of two things: a heap of trash and a TV set frame. The frame of the TV set lost its tube, so the heap of trash could be seen through the frame.

As usual, it irritated me because it made me think of the meaning of this work. I imagined that the frame of the TV set is the symbol of mass media. In its lifetime, this TV set showed us glittering fictions through its tube. But now, it lost its tube and reveals the real world, that is, a heap of trash. The frame itself is a part of a heap of trash. Therefore, the lesson which we must learn from this artwork might be, for example, ‘do not trust the mass media, it is trash, and it conceals the truth behind its tube.’ However, in comparison to the title of this work, “Addict to Plastic,” my interpretation seems to miss the point. So I am forced to watch the whole video and to reconsider what the lesson of this artwork is. That irritated me again.

Nevertheless, whatever the lesson may be, it is certain that we regard criticism as one of the important functions of artworks. Artworks reveal the invisible truth to us.

2.2 Where Are the Fine Arts?

Frankly speaking, I feel disgusted with the flood of such critical artworks. People say artworks tell the truth we do not know, but is it true? I do not think so. More than fifty years ago, Beardsley (1958) logically negated artistic truth. What are we so ignorant about that we need to receive lessons from artists? Of course, sometimes we can learn something from artworks, but we can learn more lessons from other sources without visiting museums. Finally, should artworks be critical? My answer is ‘No.’ I believe such critical artworks completely differ from the original concept of ‘fine arts.’

Then, is the legacy of fine arts completely lost? Is there any possibility to find it? In order to answer these questions, we turn our eyes to natural computing because some of the key points of the original concept of fine arts seem to remain in natural computing. I think theory of art can learn something from the idea of natural computing, especially from the idea of ‘harnessing,’ which natural computing proposes.

In the next chapter (Chapter 3), we look back to a short history of arts with the help of previous studies. Through this short history, we would like to extract some of the key points of the notion of ‘fine arts’ and to confirm the fact that critical artworks deviate from fine arts (Chapter 4). Then, we point out that natural computing shares some of the original key points of fine arts. Finally, we would like to find another lineage of artworks that has been overlooked so far (Chapter 5).

3 A Short History of Arts

3.1 Traditional Distribution of Arts

Probably we all know about the traditional distribution between liberal arts and mechanical arts. Hence, I would like to begin my talk with this distribution (Figure 1).

liberal arts	-	mechanical arts
[intellectual]		[manual][repetitive]

Fig. 1. Traditional distribution of arts

The Encyclopedia by Diderot and d’Alembert (1751) introduces the reason why people distribute arts into these two categories: liberal arts are produced more by the mind than the hands, while mechanical arts are produced more by the hands than the mind (p.714). The latter arts are manual and must be repetitive. Though Diderot and d’Alembert criticize this idea because it results in false disdain for manual labor, we can accept this division as a starting point.

3.2 Reorganization of the Distribution in the 18th Century: Machine Arts and Fine Arts

According to Otabe (2001), in the 18th century, this traditional division was forcedly reorganized by the appearance of new kinds of arts (pp.4-14). They are ‘machine [machinal in French]’ arts and ‘fine arts [beaux-arts in French].’

The Preliminary Discourse to the Encyclopedia by d’Alembert (1751) explains the reason why they are called ‘machine [machinal]’: they automatically operate by themselves without dependence on human hands [*operations purement machinales* in contrast to *operation manuelle*] (p.xij). This independence from human hands Otabe (2001) calls ‘dis-habitation’ of arts (p.11) and sees in this dis-habitation a germinate tendency to technology. Figure 2 shows the relationship between the traditional division and machine arts.

Fig. 2. Reorganization of traditional division of arts in the 18th century (1): machine arts

In the 18th century, ‘fine arts’ were recognized as new kinds of arts. Included in fine arts were music, poetry, painting, sculpture, and dance. Concerning fine arts, there are at least three important points (Battuex 1747, pp.27-28, d’Alembert 1751, p.xxij): 1) fine arts have ‘pleasure’ [*plaisir, agrément*] for their object; 2) fine arts are the imitation of nature (Battuex 1747, d’Alembert 1751, see also Panofsky 1968); 3) according to d’Alembert (1751), fine arts belong to liberal arts and the practice of fine arts principally consists in an ‘invention’ of genius. Otabe (2001) sees another ‘dis-habitation’ in fine arts (pp.12-14): the rules of fine arts are invented by geniuses and hence cannot be produced by routine habit. Therefore, the rules of fine arts, though they are called ‘rules,’ seem unforeseeable for ordinary persons with finite intelligence. In this sense, fine arts are likened to having a complex nature; they also make us feel the infinite beyond us. Anyway, in all three points, fine arts were different from previous arts. This urged the reorganization of arts. (Figure 3).

Fig. 3. Reorganization of the traditional division of arts in the 18th century (2): fine arts

3.3 Fine Arts as the Intersection of Nature and Arts

As we saw before, fine arts are the imitation of nature. But, what and how do they imitate? In this context, the famous sentence about fine arts [*Schoene Kuenste*, German translation of *beaux-arts*] by Kant (1790) is quite important. Kant says, “An art is fine art, in so far as it appears, at the same time, to be nature” (the title of SS45). To be nature means that it must not seem to be an artifact. Then, how can arts appear to be nature? The answer is as follows: If we feel pleasure [and purposiveness] from arts without awareness of the maker’s intention and of their simple accordance with

artificial rules, then they could appear to be natural and hence called fine arts. On the contrary, if we see the maker's intention in arts and feel that they are apparently subject to artificial rules that were established beforehand, such arts can never be fine arts, they are only mechanical arts.

Therefore, it seems quite natural that many thinkers (Shaftesbury, Addison, Burke, Kant, etc.) in the 18th century mentioned horticulture, the so-called English garden (see Otabe 2001, p.148ff.). 'English taste in gardens,' in contrast to the artificiality and 'stiff regularity' of French gardens, 'pushes the freedom of the imagination' because of their complexities (in Kant's words, 'nature which is extravagant in its varieties to the point of opulence,' SS22). Horticulture is at the intersection between nature and arts, and it was thought to be representative of fine arts.

3.4 Summary of This Chapter

From our discussion above, we can extract the following as the key points of fine arts (Figure 4): 1) fine arts are different kinds of arts that caused the reorganization of the traditional division of arts; 2) the principal object of fine arts is pleasure; 3) fine arts are the imitation of nature in its complexity; and 4) they are products of invention and make us feel the infinite.

Fig. 4. Summary of Chapter 3

3.5 Important Note (1)

Though in the 18th century's discourse the rules of fine arts are said to be unforeseeable, the makers of fine arts completely grasp what these rules are. Of course, in the process of making a work of art, there are the moments when the unforeseeable invention suddenly comes to the maker. For example, in making innumerable sketches, Raphael suddenly found a completely new, but optimal composition for the altar. However, it does not mean Raphael made his work without knowing what he did (Wendler 2008). Generally speaking, since the object of fine arts is pleasure, the maker must design his/her works so that the viewers surely experience pleasure (if not, the maker loses his/her job). Even when the painting has multiple meanings (open-ended), the maker must carefully design it so that the painting would surely have multiple meanings (open-ended). Multiple meanings must never be the result of a haphazard job. Therefore, in turn, if an art, which is made with deliberate design, seems to be natural, in other words, if the viewer feels the splendiddness of it but does not perceive the traces of deliberate design, the art belongs to fine arts and brings the viewer pleasure. In case of horticulture, we can say the same thing. The maker of fine arts is responsible for the result of his product.

4 “Art” Deviates from Fine Arts

As we saw above, the original fine arts are completely different from contemporary art we mentioned in Chapter 2. In this chapter, we briefly trace when and how such deviation from fine arts occurred.

Everyone can agree that the definitive diverging point was brought about by the appearance of photography. As the title of an exhibition catalogue says, photography is not ‘a new art,’ but ‘another nature’ (Kunsthalle der Hypo-Kulturstiftung Muenchen 2004). Specifically, the appearance of sequence photographs of Eadweard Muybridge and Etienne-Jules Marey turned artists away from the task of traditional fine arts, which is the imitation of complex nature. In the beginning of the 20th century at the latest, Futurists released a manifesto (1909, 1910) and praised machines, depicted technology beautifully like Giacomo Balla's *Arc Lamp* (1913), and Richard Mutt aka Marcel Duchamp failed to exhibit a ready-made urinal named *Fountain* (1917).

Andy Warhol's *Brillo Boxes* and Campbell's *Boxes* (1964) might imitate industrialized and popularized society and Damien Hirst's *Away from the Flock* (3rd version, 1994) might criticize our natural and artificial environment (see Godfrey 1998). However, they have no relation with the task of fine arts, which is the imitation of complexity in nature. They are ‘against nature’ or ‘against science and technology.’ (Figure 5)

from the 19th century to the 20th century

Fig. 5. Art deviates from fine arts

Photography forced us to rethink the division between machine arts and fine arts. Furthermore, it brought radical change to the concept, ‘scientific objectivity’ (see Daston & Galison 2007). On the contrary, art is isolated both from other fields of art and from nature. Even if we add more works such as Sherry Levine’s *Fountain* (1989) to the list of art, nothing happens. It is only a comment to Duchamp’s precedent within the closed area called ‘artworld.’

Someone might argue that Balla, for example, tried to depict the speed and complex movements of swallows (1913), so art does not lose its relation to nature. Even if so, however, his paintings had no power to cause reorganization between arts. They only followed the formal appearances of movements, which were already recognized in photographic sequences.

5 What and How Should We Evaluate? Lessons from Natural Computing

In this chapter, we will try to point out the following: natural computing shares some key points of fine arts, though, of course, it is not fine arts, but science. Then, we would like to suggest, from the point of view of natural computing, what we should consider as possible successors to fine arts.

At the end of chapter 3, we already extracted the following as key points of fine arts (see Figure 4): 1) fine arts are different kinds of arts that caused the reorganization of the traditional division of arts; 2) the principal object of fine arts is pleasure; 3) fine arts

are the imitation of nature in its complexity; and 4) they are products of invention and make us feel the infinite. We begin with the first key point.

5.1 The Idea that Computation and Algorithm Caused the Total Reorganization of Arts

From the 19th century to the 20th century, science and technology, which developed from liberal arts and machine arts, caused the drastic reorganization of arts in general. In this reorganization, ‘art,’ a deviated form of fine arts, is isolated from other fields. Furthermore, in the latter half of the 20th century, the development of computer science again caused the reorganization of arts in general. Through the concept of cybernetics, it surpassed in a sense the limit between nature and artifacts.

Furthermore, the idea of computation and algorithm, which is fundamental to the idea of computation, caused the total reorganization of the arts. Normally, algorithm is thought as a process or set of rules that must be followed in calculation. So we misunderstand that algorithm only relates to arithmetic or computer science. But, Yasuhiro Suzuki, one of the most important advocates of natural computing, reinterprets algorithm as ‘the order of movement and its timing’ (Suzuki 2012, p.5). We can find algorithm as such everywhere: in liberal arts, machine arts, and mechanical arts as well as in artifact and in nature. Therefore, it could cause the total reorganization of arts (Figure 6).

Total reorganization of arts from the late 20th century

Fig. 6. The idea that computation and algorithm caused the total reorganization of arts

5.2 The Idea of ‘Harness’ in Natural Computing Imitates Nature in Its Complexity

It is quite clear that natural computing tries to imitate nature. According to the website of natural computing, one of the missions of natural computing is to ‘explore computational processes observed in nature, and human-designed computing inspired by nature’ (Springer’s website).

Furthermore, the idea of ‘harness’ in the sphere of natural computing clearly shows that natural computing tries to imitate nature in its complexity. In the original sense, the word ‘harness’ means “a set of strips of leather and metal piece that is put around the horse’s head and body so that the horse can be controlled and fastened to a carriage, etc.” (*Oxford Advanced Dictionary*). In natural computing, harness denotes an alternative means of control. Suzuki (2012) explains it by way of comparison with the traditional method of control (pp.7-8). Imagine a shepherd whose task is to move a flock of sheep from here to a pen. In order to control a flock and achieve his task, the shepherd has two alternatives. One is to hold each sheep directly and individually move each sheep to the pen. The other is to walk behind a flock of sheep only with a picture of a wolf in his hands. The former is direct control. The latter is ‘indirect’ control, and it is this indirect type of control that natural computing calls ‘harness’ and tries to imitate.

But, why do we say that to imitate this indirect type of control, that is, harnessing, is to imitate the complexity in nature? We answer this question in the following manner: just as a shepherd, who does not know the entire mechanism of such indirect control, can move a flock—a complex natural system—only by using one picture—a minimum artifact—, so natural computing operates a complex natural system by using minimum artifacts. For example, Shinya et al. (2012) report that they found the possibility to utilize the data of synchronized pattern of functional gene clusters—minimum artifacts—by harnessing the disrupted condition of the influenza virus towards normal homeostatic flow—a highly complex natural system (p.2).

If we can apply the distinction between ‘constructive’ computation—of which we can explicitly show every step— and ‘oracle’ computation—of which we cannot explicitly show every step—(see Suzuki (forthcoming)) to the definition of harnessing, then we say that ‘harnessing’ provides an alternate means of control which operates ‘oracle’ computation by using the products of ‘constructive’ computation. It concerns complexity—which people in the 18th century called ‘the infinite’ – in nature.

5.3 Important Note (2)

In order to preclude misunderstandings, here we emphasize that scientists must have good prospects of the result of harnessing if they do it. If someone projects any artifact into a natural system without knowing what results come from the projection, we never think of it as harnessing. In a natural system, such as in an oracle computation, scientists cannot make every step completely explicit; however, they know what happens if they throw artifacts (constructive computation) into the natural system. They indirectly but almost perfectly ‘control’ it (cf. 3.5 above).

5.4 Other Key Points

Just as every achievement brings us pleasure, so achievement in natural computing brings us pleasure. As for invention, researchers in the field of natural computing discover algorithms in nature, and their discovery probably results from their inventive devices. Discovery also brings us pleasure, and it makes us aware of complexity in nature.

Our goal here is not to decide whether natural computing is the genuine successor to fine arts or not, but to make clear that the idea of natural computing shares some key points with the original idea of fine arts. In the final section, we would like to suggest from the point of view of natural computing, especially from the point of view of ‘harnessing,’ what artworks we can evaluate as possible successors to the original idea of fine arts.

5.5 What Should We Evaluate?

If we look back to past artworks from the point of view of natural computing, can we find possible successors to fine arts?

Take Walter De Maria’s *Lightning Field* (1971-77) for example, though it is one of the most famous artworks in the 20th century and it has never been overlooked. However, while this work has been interpreted in the context of conceptual and critical art (Godfrey 1998, Kastner 2010), we can reconsider it from the point of view of ‘harness’ because this work operates a larger system (the weather conditions which cause lightning) by using minimum artifacts (stakes made by stainless steel deliberately put on the field). Its significant difference from other land and environmental art is that the maker indirectly, but completely, controls what happens (cf. 3.5, 5.3).

From horticulture to this work, we can assume an imaginary lineage. In addition, as an extension of this lineage, we can expect the appearance of new successors to fine arts.

In this context, a series of activities by the following artists come to mind: Yasuhiro Suzuki and Rieko Suzuki (for example, Face Therapy), Junji Watanabe and his colleagues (for example, Saccade-based Displays), and Hiroya Tanaka and his colleagues (for example Fablab Japan). Even if each of them has already been highly appreciated in the field of facial massage, device arts, and media arts—and it is probably enough reason—, we would like to propose that we could think of their activities as successors to the original idea of fine arts. This is not only because their activities are realized through the idea of computation, which brought about the radical reorganization of arts in general (cf. 5.1), but also because they ‘harness’ human perception as a natural system with minimum artifacts (cf. 5.2) and furthermore they are completely responsible for the results of their works (cf. 3.5, 5.3).

6 Concluding Remarks: What Theory of Art Could Learn from Natural Computing

In this presentation, we looked back to a short history of arts. Through this reflection, we made clear that current critical artworks are not successors to original fine arts. Rather, we find that the idea of natural computing, especially the idea of ‘harnessing,’

shares some of the original key points of fine arts. Then, from the point of view of natural computing, we could reevaluate artworks and propose to make new lineages, for example, from horticulture in the 18th century through land art to the idea of harnessing in natural computing. We further suggest that we could expect new successors to extend this lineage from fine arts. We have learned these things from natural computing.

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