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Informational Aesthetics—What Is the Relationship between Art Intelligence and Information? †

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Abstract: The author examines the notion of informational aesthetics. The origin of aesthetics lies in Epicurus's notion of aesthesis and the integration of artistic activity within ethics and the 'good life'—as in the aesthetic theory and practice of the East. The debasement of the word 'aesthetic' reflects the increasing alienation of beauty from imagination. The fragmentation of art now packaged as media objects in our digital world is the legacy of this alienation. The author retraces the history of the concept of information aesthetics developed in the 1960s by Birkhoff, Bense and Mole and which sought to marry mathematics, computation and semiotics with artistic activity, based on Birkhoff's aesthetic measure, and to bridge the gap between science and the humanistic imagination. The failure of the cognitive school is attributed to the limitations of its data-driven view of art itself as an affordance of perception (Arnheim). The roles of algorithmically generated art and of Computational Aesthetic Evaluation (CAE) are assessed. An appeal is made to the more fertile conceptual ground of information civilization—an idea developed by Professor Kun Wu. The author introduces the concept of digital iconography and applies it to Renaissance masterpieces such as Raphael's School of Athens and Leonardo's Mona Lisa. In conclusion, Informational Aesthetics is identified as a future discipline for the Philosophy of Information.

Keywords: informational aesthetics; information civilization; intelligent society; iconography

1. Introduction

Over the course of civilization the notion of "aesthetics" has been difficult to pin down in a simple definition. A similar imprecision applies to the concepts of "intelligence" and "information". The word "art" is used in a variety of contexts and combinations proceeding from the classical idea of art as artisanship and artifact through to Renaissance artfulness, Romantic artistry and finally to the modern and postmodern world of the artwork, the arthouse and the artificial. In philosophy and society at large, the concept of "aesthetic" has fared little better in public esteem. For the Ancient Greek philosopher Epicurus, aesthesis meant a highly developed quality of the senses which enabled a person to be informed by the "good life" through the intelligent enjoyment of physical, moral and spiritual beauty. Any emerging field of knowledge, such as Informational Aesthetics, emerges and develops not by framing definitions but by the necessity of answering critical questions which define the scope and direction of the discipline. The following questions will serve to shape our investigation: How do we define information? How is information related to aesthetics? How is our intelligence formed and informed by aesthetic experience? Can there be any art without information? Is there any necessary relationship between information and intelligence? Is an informed society necessarily an intelligent or even civilized one?

2. Information Aesthetics

2.1. History of Philosophical Aesthetics

Philosophical aesthetics traditionally dates from the writings of Plato, Aristotle and Epicurus (341–270 B.C.) and has continued to attract the attention of philosophers, writers, social theorists and art historians over the centuries. A critical turning point occurred in the eighteenth and nineteenth centuries when the Romantics, particularly Burke, Coleridge and Keats combined the poetic emotions of awe and the sublime with the classical idea of beauty. Building on John Deacon's theories, Alexander Baumgarten separated art as sensual experience from the art object and limited aesthetics to the contemplation of beauty. This view was furthered by Immanuel Kant and later by the English Pre-Raphaelites, such as Ruskin, Beardsley and Wilde, under the rubric of "art for art's sake". In the modern and postmodern period, an aesthetic phenomenon ("Art") has largely come to mean, with the rise of photography, cinema and the computer, an interesting affordance of perception.

2.2. The Rise of Information Aesthetics

The discipline of information aesthetics (as distinct from the broader concept of informational aesthetics) was initiated by George David Birkhoff (1884–1944), an American mathematician famous for his ergodic theorem. In 1933 he published his book Aesthetic Measure [1], demonstrating the quotient between order and complexity and reinterpreting the concepts of symmetry, repetition and regularity as M = O/C. Order (O) refers to the regularity of elements of an image, complexity (C) refers to the number of elements that form that image. Birkhoff's work introduced the mathematic formalization of aesthetics which influenced European philosophers in the 1960s such as Abraham Moles [2], Max Bense [3] and Rudolf Arnheim [4]. This school was influenced by Shannon's Theory of Mathematical Communication and sought to develop a theory of aesthetics based on computation and algorithmic formulas. For them, the affective domains of experience, intuition and style were not central. The emergence of semiotics (Bense), Gestalt theory (Arnheim) and Perceptual Repertoires (Moles) began to place the explanation and appreciation of artistic processes under the microscope of computational analysis. For this school, the phenomenon of art becomes an intriguing affordance of perception, and the emergence of abstract artists such as Kandinsky, Escher and Mondrian, as well as the rise of photography, cinema and digital media, seemed to call for a new aesthetic theory which preferred the artificial over the artful, the computational over the emotional, the non-representational over mimetic realism. The evanescence of the Birkhoffian School, based on computation rationality and cognitive perception, was due to its inability to account adequately for the emotional, intuitive and instinctive forces which drive genuine aesthetic creativity.

2.3. Computational Aesthetic Evaluation (CAE)

Gustav Fechner, in the 1860s, introduced the neurological measurement of responses to art objects, and this field has been enhanced in recent times by the rise of psychology and neurobiology.

In 2012 Philip Galanter [5] surveyed the use of computer systems to make normative judgments on matters of beauty, taste and style, as well as to simulate artistic works. The key areas he covers are the viability of the algorithmic compositions of an artistic masterpiece, cellular automata as aesthetic phenomena, genetic algorithms as artistic expression and aesthetic forms in nature (e.g., the golden ratio in the Pyramids of Giza, fractals).

2.4. The Aesthetic Experience—Arnold Berleant

Arnold Berleant [6], influenced by the philosophy of Edmund Husserl, has sought to return to an Epicurean aesthetics which embraces the phenomenon of art beyond its status as an isolated object or performance and includes the whole "transaction" between the artist and the sensual environment of the participant in the work. In his books, Berleant explores the emotional, cognitive

and socio-political dimensions of our everyday aesthetic involvement with other people and the "life world".

3. The Interaction of Aesthetics with Social Information

3.1. Informational Thinking: Wu Kun's Information Civilization

Professor Wu Kun [7–9], from Xi'an Jiaotong University, has been one of the great pioneers of information philosophy over the past forty years. His important and intriguing concept of "informational thinking" goes to the heart of our problem and deserves much more attention from Western philosophy and information science than it has so far received. It is a measure of the difference between Eastern and Western thought that Wu places existence at the center of his philosophy rather than a teleological entity like the *Existenz* of Karl Jaspers or Heidegger's *Dasein*. In Eastern thought, right, action and aesthetic experience are integral to social life. In Western society, the quest for objective truth is paramount, while the pursuit of art and ethical behavior has become a secondary consideration. In this context, the phenomenon of information becomes the *sine qua non* of civilization, where informational thinking, not merely reductive rationality, is the driving force. In a fully informed society, the "form" in in-*form*-ation takes on both an aesthetic and an ethical character. The Anglo-Saxon notion of "good form" as tacit altruistic action captures this in language. Hopefully a future translation into English of Wu's multivolume *magnum opus* will further open his original thought to international minds.

3.2. Future Directions for Informational Aesthetics

I would like to adumbrate future directions for Informational Aesthetics such as

Design Theory, Data Visualization and Infographics;
Computer Aesthetic Evaluation (CAE);
Algorithmic Simulation of Aesthetic Phenomena;
Social and Environmental Aesthetics;
Cognitive Aesthetics and the Experience of Art;
Neuroaesthetics;
Intercultural Informational Aesthetics (IIA);
Digital Iconography

Digital Iconography

The brilliant art scholar Erwin Panofsky [10] developed the concept of iconography in the twentieth century. Following his principles, digital iconography allows us, through digital macrophotography, to focus on the minutiae of an artistic work and obtain close up information not previously available to art historians, curators and connoisseurs. It also allows us to locate hidden emblems, monograms, dates and signatures scarcely visible to the naked eye. In 2004 an optical engineer from Paris, Pascal Cotte [11], employed his multispectral 240 million pixel camera and L.A.M. scientific imagery technique to digitally restore the *Mona Lisa* and display it with its original features (Figure 1).

Figure 1. A digital facelift—Pascal Cotte's restoration of the *Mona Lisa* using L.A.M. technology.

His investigation revealed three portraits hiding beneath the surface as well as significant *pentimenti* (changes of mind) during the course of the work's creation. In my recent work [12,13], I have developed the technique of expanding a high-resolution image of a painting or sculpture and viewing it in magnified form on a 65 inch LG television screen to discover forms and patterns invisible to the naked eye. While Pascal Cotte and his Italian counterpart Maurizio Seracini use high-powered digital radiology to unmask the deep structure of a work I have focused on the surface structure of paintings and sculptures using macrophotography and magnification to explore the hidden background of works by Raphael, Leonardo and many other artists of the Renaissance. The contrast between revealed and hidden information is startling, and the process has provided intriguing data about the biography of the artists as well as the meaning, authentication and dating of their masterpieces.

4. Conclusions

Informational Aesthetics opens a new chapter in Information Philosophy, and the discipline will allow us to explore aesthetic phenomena using the resources of computation and neuroscience as well as those of human intelligence, insight and imagination within an intercultural context. The discipline aims to takes its place between such established fields as Informational Intercultural Ethics, Computational Aesthetic Evaluation and Neuroaesthetics.

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