
Framing Artistic Visualization: Aesthetic Object as Evidence

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Abstract

This paper identifies several meta or high level assumptions from art history about how to interpret the artifacts produced by creative processes, and shows how these assumptions influence our approaches to understanding new aesthetic technologies like Artistic Information Visualizations.

Keywords

Information
Visualization (InfoVis),
creativity, aesthetics,
originality.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g.,
HCI): Miscellaneous.

Definitions

Creativity is defined here as the forces by which novel and unique artifacts are brought into being by humans. Applicable to a wide range of human making, creativity has been most often associated historically with the arts including fine arts, folk arts, poetry, and music.

Aesthetics refers to qualities of sensual perception, and often contains implicit connotations of pleasure and beauty. To avoid defining subjective components, aesthetics denotes here theory around the reception of man-made artifacts by the spectator-participant.

Introduction

Computing-related fields that were once relatively "pure" in objective are increasingly seeing an influx of interdisciplinarity, in the form of theory and objectives. The NSF-sponsored Creativity Support program is just one example of a growing awareness in scientific fields of the need for a cross-disciplinary tool set when it comes to theory around creative processes [16]. One particular field in which such a trend is occurring is Information Visualization (InfoVis). Today, InfoVis

practitioners include former artists and others with backgrounds in fields in which artifacts associated with creativity and aesthetics are more widely accepted and discussed.

With the influx of artists as practitioners, the field of InfoVis has seen the production of a greater range of artifacts. Theory can be helpful in explaining the new role of the visualization artifacts. Critical theory has a growing presence in InfoVis as well as related fields like Human Computer Interaction [2, 18], and has been called the missing link between InfoVis and art [9].

Traditionally, critical theory for understanding the artifacts of creativity is the domain of art history. As InfoVis artifacts become more ambiguous and the interactions they support less defined as well, art history can provide the sharper critical tools needed for understanding these interactions, through its developed interpretive methods for man-made visual signs.

However, there are two types of issues that arise in developing critical theory in InfoVis by appropriating ideas from established critical fields. One is the danger associated with taking concepts piecemeal, as they may be misconstrued when re-applied to technological artifacts, noted by [2]. A second, equally pressing issue lies in the contradictions, pluralities and flawed assumptions that exist "below the surface" in many critical fields, and in particular in art history, as a result of the ambiguity of artifacts of creative processes.

To steer clear of these quandaries, some researchers in InfoVis avoid delving into philosophical or epistemological matters. In coining the term Artistic Visualization, Viegas and Wattenberg directly state

their preference to avoid such issues through a simplified definition [19].

While awareness of the risks of engaging philosophical debates is expedient, it is not a viable long-term solution. To aid future researchers in aesthetic technologies, and specifically Information Visualization, and prevent foundational issues from being transferred into new fields, this paper identifies several major foundational assumptions from art history that govern the interpretation of aesthetic objects. Theories of Artistic Visualization can be shown to be subject to the same inconsistencies around the correct way of interpreting artifacts. This paper seeks to 1) point to potential benefits of applying art historical theory, such as awareness of the influence of the spectator-participant or the interaction itself on interpretation of meaning of the artifact, while 2) generating critical awareness of how inconsistencies in art history related to the interpretation of aesthetic artifacts can adversely affect InfoVis theory.

The paper is laid out as follows. First, a background is given on InfoVis and in particular the subset of visualization called "Artistic Visualization." In the Method section, benefit of aesthetic theory are discussed along with foundational assumptions inherent in art historical theory about the interpretation of the artifacts of human creativity. The assumptions are applied to theory around Artistic Visualization, in an effort to show how tacit beliefs about how to interpret art objects can lead to disagreements on the interpretation of new forms like Artistic Visualization. Finally, conclusions are drawn on how future of work might apply art historical theory to aid understanding of new types of artifacts of creative.

Background

Information Visualization

Throughout history graphics have been used to help communicate information. As a field of scholarly research, visualization has a much shorter history, with a formational period drawing to a close near the end of the 20th century. At this time, in order to differentiate InfoVis from artistic graphics, static information graphics, or visualization of concrete data as found in scientific visualization, Card et al defined Information Visualization as the use of interactive graphics representing abstract information to amplify cognition [4].

Initially, the field of InfoVis associated itself with what can be called Analytic Visualization: work and goal-oriented visualization objectives, such as gaining insight into the relationships within a dataset, decision making, prediction of future states, and understanding causal relationships [13]. Researchers have responded to the appearance of new forms of information visualization by broadening of the definition of InfoVis. describing new forms of "Casual InfoVis:" Ambient Visualization, Social Visualization, and Artistic InfoVis [13]. The constraints on interactivity and amplification of cognition are often relaxed in these descriptions. Compared to Analytic InfoVis, these forms can include different user groups, data, usage patterns, forms of insight, and less defined, often personally or socially relevant objectives.

Despite a growing awareness of the need to broaden definitions of information visualization, the theories around specific new "Casual" forms of InfoVis remain vague, making classification of new applications

difficult. More importantly, however, is the fact that the points of view from which the meaning of the visualization artifacts are interpreted are sometimes contradictory, depending on the definition one uses.

What exactly is Artistic Visualization?

Defining Artistic Visualization to describe information visualizations that incite our sense of what is artistic or aesthetically pleasing has proven particularly problematic. Definitions have been submitted by various researchers in the field of InfoVis, but do not necessarily agree on the correct classification of an InfoVis artifact.

Viegas and Wattenberg, who coined the term Artistic Data Visualization, choose an approach designed to sidestep any philosophical concerns. Their understanding of artistic visualization contains several requirements: 1) artists must create the works, 2) they must be based on real data, and 3) the works are distinguished by the way they embody the artist's forceful point of view.

Similar to Viegas, Pousman cites the way that data-driven artworks challenge our notions of visualization and computer-mediated understanding, our ideas of what constitutes data, and even the infrastructure of computer systems [13]. His definition stops short, however, with a reference that the visualizations are "artistic in their orientation and framing."

Kosara introduces a bipolar scale based on the visualization attribute of Readability and Recognition, with Artistic Visualization being defined by a lack of Readability or Recognizability [9]. The quality of the

sublime, defined as "that which inspires awe, grandeur and evokes a deep emotional and/or intellectual response," is cited as an important aesthetic criterion in his model.

Kosara's work is informed by Sack's model of information aesthetics [16]. Sack refers to art critics' interpretations of conceptual art as a struggle with the "aesthetics of administration," the means and materials of bureaucracy. He argues that contemporary aesthetic information visualization can be understood this way, as computers are an outgrowth of bureaucracy.

Artistic Visualization as Aesthetic Object

The ambiguity around Artistic Visualization leads to discrepancies in how to classify specific visualizations. Each of the authors mentioned cite examples in their work of Artistic Visualizations, but some examples are not unanimously classified. To Viegas and Wattenberg, for example, the visualization in Figure 1, which depicts data around the usage patterns of numbers in a search engine, is an artistic visualization for its surprisingly meaningful depiction of numbers. To Kosara, this would not be characterized as artistic, for the design employs a bar chart, among other recognizable conventions. Similarly, Viegas and Wattenberg cite "They Rule," a readable and recognizable network diagram created by Shojo, as Artistic Visualization.

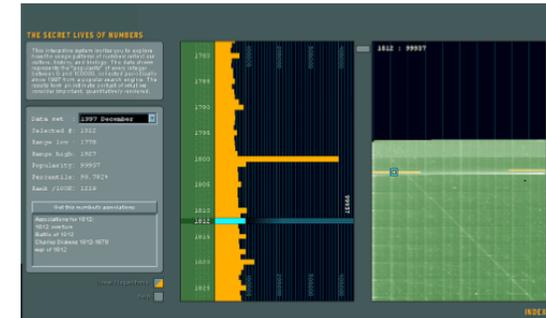


Figure 1. "The Secret Life of Numbers" by Garin Levin et al visualizes usage patterns of numbers.

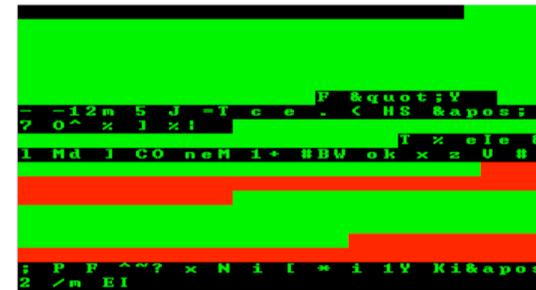


Figure 2. "Carnivore" is a network visualization project by the Radical Software Group (RSG).

Sack's model refers to the "Carnivore" visualization of network traffic as a powerful visualization that is subject to his art-based theory. However, the system's analytics objectives, and fact that many of its visualizations were not created by artists, makes it doubtful whether other authors would classify it as Artistic Visualization.

The basis of the disagreement of definitions rests in the natural ambiguity of artifacts of creative processes.

Like creativity itself, ambiguity is a concept more at home in arts fields than it has been in computational ones. *Aesthetic computing* is the general term that has been used to describe research that applies theory and practice from art to computing to understand how qualities like ambiguity come into play with qualities of computation, like determinateness [12]. Yet the logic of the mode of interpretation used often remains unreferenced, even in applications of specific art historical theories to computing technologies.

Dealing with meaning-making despite the ambiguity inherent within aesthetic artifacts is the purvey of art historians. As the field of art history moves toward a more dynamic, participative notion of spectatorship, the potential contributions that art history might make to InfoVis and related fields become even more relevant. Yet ambiguity describes more than just the artifacts of creative processes; it is (not coincidentally) also a mark of the very practice of art history. As a result, seeing through theories that describe Artistic Visualization requires, to some extent, "seeing through art history" [14], by acknowledging art history's weaknesses, particularly its methodological contradictions around the interpretation of creative artifacts.

Method - Art Historical Perspectives

A primary macro or high level foundational dilemma in the field of art history relates to the role aesthetic objects play in reflecting and maintaining our individual and collective identities. In art, we see aspects of ourselves, the work's creator, and our collective histories in a way that feels quite natural, though we never stop to consider how a single object can represent many things at once, or whether "reading" might be negated by another.

The myriad levels of meaning within a single object contributes to discrepancies in theory around Artistic Visualization. Different authors see different points of view as primary, depending on underlying assumptions of how aesthetic artifacts should be read.

There are three primary levels of interpretation of artworks, not necessarily congruent, which see the artifact of creativity as "evidence" of forces not necessarily present upon its viewing. Understanding that these three levels exist as common approaches to interpretation in art history will help in showing how they naturally affect our interpretations of new forms of creative artifacts, such as Artistic Visualization.

1. The Trace of Developmental History

Assumptions of causality contribute to many art historical arguments [14]. Form is inherently supportive of many meanings [12], but tends to be forgotten in the wake of historical readings, leading to a general approach in which art works are "evidence" and the practice of art history a decoding of sorts in a game of hide and seek with historical truth. The artifacts of creative processes fall into our existing understandings of "art" as natural components locatable in a system of chronological orderings. Historically, the method of finding truth through comparative ordering of the artifacts of creativity of diverse populations was greatly helped by the invention of photography. The mass production of images made possible the endless comparisons and combinations of modern art historical analysis, which find their mascot in the slide projector.

Today's art museum is the ideal place in which to engage in or observe the form of analysis supported by

art history books and classrooms. The museum as a cultural place has been a place for "reading" objects since its first appearance [1, 14]. Often the key organizational elements include the culture and the time period of the work's creation. Given this persistent tendency to locate a work by culture and era, it makes sense that as information visualization artifacts begin to appear in museum settings, they are interpreted as artifacts evidential of specific social and cultural phenomena in a linear trajectory of history. We see this in Sack's view of information aesthetics within a larger, linear history of art, as well as attempts that have been made to explain aesthetic computing through historical connections between aesthetics or art and determinate or empirical fields like mathematics [5, 11].

2. The Trace of Being Human

The viewing of art throughout history has tended to be a passive activity; the book *How to Visit a Museum* instructs the viewer of art to "do your best at all times to let the work of art speak directly to you, with a minimum of interference or distinctions" [6]. A conventional assumption is that in facing an artwork, we see actualized for our realization an immanent meaning in the object, made visible by the artist's manipulation.

The successful communication of the meaning of a work to a viewer is understood as based in the artist's creative process. The initial inspiration or idea from which the work is constructed acts as a collection of stimuli, "to be registered on the conscious mind of the artist," who processes outside material in order to allow the viewer to experience a transcendence effect mirroring their own conscious operations [8]. This

communication between artist and viewer, through the artifact of the creative process, is possible due to an assumed "universal basis of communication."

This universality that founds our ability to enjoy artworks, and our perception that we understand and are even capable ourselves of their creation, is perhaps the most necessary support of the institution of art. It is what allows us to create definitions of new forms of aesthetic objects today, like Artistic Visualization, using terms like "statement" and "message." It supports beliefs that artworks are subject to universal attributes like "beauty" or "the uncanny."

In recent decades, participatory art forms called dialogical aesthetics have sought to increase the interactivity of the work, and reduce its role in realizing some static meaning for a passive spectator [8]. Instead, meaning becomes located in the exchange that takes place between the artist and spectator-participant. These novel aesthetic theories could potentially benefit understanding of Artistic Visualization, and are discussed further below.

3. The Trace of the Artist

Facing the viewer in the "mirror" of the work stands the artist. A common alternative approach locates meaning in the artist's identity, rather than the viewer's realization. One art theorist describes modernist art history as "a history of the proper noun," in which the names of famous artists are attached to works without meaning as signs outside of labels [12]. Within this assumption, the artist is assumed to be in a position of permanent proximity to his/her work, regardless of the time that passes since its creation.

Critics of labeling practices claim that reducing meaning to the artist's identity serves to support a larger "discourse of originality." This discourse may uphold the institution of art collecting, but reading the work through the artist's supposed traces has yet to be proven as a significant or superior way to interpret aesthetic value.

We can see a similar assumption at work in several examples of Artistic Visualization. The Kandinsky system [7], and Klein clock [15] are based on the assumption that style is directly linked to the persona of the artist. The systems seem to take on value as unique, artistic creations simply by virtue of these labels; however, the connections between the systems' attributes and the painters whose names they bear are discussed briefly or not at all.

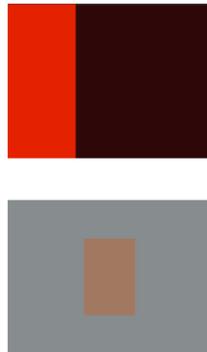


Figure 2, 3. Redstrom's Klein Clock (left) visualizes time, inspired by the monochromatic paintings of artist Yves Klein. Fogarty et al's Kandinsky system (below) employs a template to generate interesting visualizations of data.

Application to Artistic Visualization

Awareness that the artifacts of creative processes can be seen as three different forms of evidence informs the reading of theories of Artistic Visualization, and may help reconcile differences.



The assumption that art acts as evidence for the viewer's realization of a universal meaning is most present in Kosara's definition. The work alone provides the information needed to interpret it as a creative artifact, outside of supplemental information such as the identity of the artist or association with specific culturally-motivated historical movements.

Underlying Kosara's theory is a notion of the sublime that is presented as a definable category universal to all humans. Yet each of the components of the sublime, such as awe, grandeur, or emotional or intellectual response, remain equally difficult to define, as does beauty, a notion that is often equated with the sublime. Within art history, Kant and Stendhal represent two very different interpretations of who, spectator or artist, defines whether a work is beautiful. Kosara's model parallels Kant's interpretation of the viewer as the only necessary party in determining whether a visualization qualifies as sublime.

For Viegas and Wattenberg, the artist creator must enter into the definition, and it is the artist's opinion alone that determines whether or not a visualization is Artistic. As a title, however, artist is left undefined.

Presumably, self-definition qualifies one as an artist. Their model is thus almost opposite to Kosara's viewer-centered theory.

The lack of congruency between the two theories might find reconciliation in theories like dialogical aesthetics that locate meaning outside of the viewer, work, or artist alone. Focusing definitions on the interaction between the artist-designer and spectator-participant as it is supported by the visualization work, rather than one or the other, would likely lead to improved understanding of how meaning is made collaboratively through the artifact. The field of InfoVis could benefit from more holistic views of the meaning-making process as a dynamic, emergent property not locatable in any specific category, such as the user, information, information representation, or interaction. Traditionally, the field has emphasized the information representation, to the exclusion of the other categories. Artistic Visualization represents a particular way of employing the information representation to achieve a specific purpose, but defining the form might require thinking outside of either the artist-designer or the spectator-participant who realizes the artist-designer's objective. New theories of dialogical aesthetics represent valuable groundwork that might be applied to prevent re-discovery by InfoVis scholars.

Sack's theory of Information Aesthetics depends most heavily on an assumed linkage between aesthetic visualization artifacts and particular historical phenomena in a linear art history. He locates the essence of artistic visualizations in the conceptual art movement, and cites two art historians' detailed historical analysis of the meaning of the movement as a reaction to bureaucracy. To decipher his definition (and

thus to understand the visualization artifacts that parallel conceptual artworks) requires ample knowledge of the Constructivist, Productivist, and Russian Formalist movements, among others, as developmental phenomena within a larger trajectory of art history.

While these connections might in some cases prove relevant, the view of history as developmental that they are based on is just one way of reading new aesthetic computing artifacts. Etiology, for example, is a way of interpreting an event by examining the conditions that caused it, but without necessarily locating the event in a larger trajectory of history [10]. This approach may make more sense given the unique nature of Artistic Visualization in art history.

Each of the theories discussed suffer from a more general problem of not directly communicating the approach they employ. Criticism alone is not the answer: the lesson from art history is that the objects of critical analysis should include the reasoning behind the point of view assumed primary to meaning.

Conclusions

The lack of recognition in art history of assumptions of the artifacts of creativity as evidential in differing ways is the primary weakness by which emerging forms of creation like Artistic Visualization are affected. If art historical methods will be applied to artifacts like Artistic Visualizations, then as researchers we should remain aware of and critically address our own tacit assumptions around of the function of aesthetic objects.

Despite its foundational issues, art history has and continues to contribute insightful theory and criticism

around the creation, dissemination, and reception of artifacts of creativity. The field could potentially inform theories of interaction with creative computation artifacts like Artistic Visualizations, particularly through its more recent theories that expand to readings of meaning as dynamic and emergent.

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