An Ontological Analysis about Dynamic Composition of Abstract Fonts in Interactive Video Art Installation

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Abstract
An interactive video installation using an abstract font as visual elements is explained. The interactive abstract characters respond to viewers by varying their sizes while moving about in the video space, as algorithmically specified by a computer. This results in interactive and dynamic compositions of multiple abstract characters. In this paper, we study the characteristics of such dynamic composition in ontological terms, as it involves the viewer’s interactivity. We have found that ontological transmodality and inter-subjectivity are the key concepts that could explain the dynamic features in the visual aspects, as well as viewer experience.

Keywords: abstract font, fontography, dynamic composition, interactive video

1. Introduction
As the types of art forms have been diversified since Marcel Duchamp introduced ready-mades, video art has taken its place in the art domain pioneered by Nam June Paik[1]. While the dominated exposures of video-as-media took place in the commercial television and movie domains, video art has maintained its position to date in experiment conceptual perspectives. In addition, interactivity is still introduced to invite the user’s participation into an artwork that has substantially altered how we look at the art.

Developed technological capacity has allowed interactive video installations in the field of fine arts to be publically available since the 80s. Interactive video often requires realtime processing of images, which demands strong computing power. Moreover, when a video camera is employed as an input device, realtime image processing must be implemented, which even alone can be computationally demanding, depending on the choice of sensing strategy. Recent technological achievements allow high performance personal computers to run sophisticated codes involving functions that deal with cameras and video in realtime. This has motivated many artists to gain access to interactive video, and has also resulted in the introduction of many commercial applications.

Typography is a field of graphic design where the aesthetics of form and composition of letters is studied[2]. Typography compositions are applied to either printed materials in static forms, or motion graphics in dynamic forms[3]. While the usual approaches to typography composition are static and passive, we studied and attempted to show interactive and dynamic compositions in typography using projected video that allows and incorporates viewer participation. In our work, as viewers enter a sensitive region, the graphic elements in the video respond to the viewers by changing the form of the visual elements, and that in turn makes a contribution to change the composition of the whole group of the elements.

There are numerous works of art that can fall in onto the category of interactive video installation. In one of those, Jeffrey Shaw, in his 1989 work The Legible City, showed a video projection of navigating through a city landscape composed of letters as architectural elements, and using simulated bicycle driving motions[4]. Jeffrey’s work is thought to be analogical to the work described in this paper in that both are interactive video installations and use letters as visual elements. They differ in that Jeffrey’s work uses simulated navigation while ours seek for visual and transitional aesthetics. Since an ontological analysis is suggested as a plausible conceptual tool to analyze a work of interactive video installation, in this paper we introduce and discuss our work in ontological terms.
2. The Ontological Moments in Interactive Video

As Susan Sontag pointed out: “The function of criticism should be to show how it is what it is, even that it is what it is…”[5, p.14] an ontological perspective is accepted as a plausible way of looking at art. First, we review a static and passive work of art, and next, a video art as of temporal form, then interactive video art in terms of ontological aspects.

Do Ho Suh’s sculpture of an uncountable number of military dog tags forming a large object, titled Some/One (2001) offers a dramatic ontological moment through scale[6]. In this work, at a micro scale one can find letters of names, and metal tags partly overlapped, one on another. From a distance, it looks like a large lobe, a form that looks as if it could be worn by a human figure which has actually an empty space inside. This work offers at least two different ontological moments with regard to its scale. It is interesting that the same kind of awareness in ontological moments, in terms of scale, can be found in Geography, where the ontological moment of scale is defined as “operational scale,” i.e., the spatio-temporal attributes of a particular process[7][8].

The video of Noah Kalina, titled Everyday (since 2000-ongoing), is a sequence of frames of pictures taken by the artist, one picture every day, where the ontological moment is driven by temporal and sequential elements[9]. Kalina also shows the same pictures in a matrix, one next to another, to form a much larger-scale image that is analogous to Do Ho Suh’s sculpture explained above. Thousands of small, every-day pictures taken by the artist to compose a larger picture, would be representational of a corresponding span of the artist’s life, with each element being placed in one-day intervals.

The introduction of video to the art stimulated much debate on the ontology of that medium. As has been addressed by McLuhan, “The medium is the message,” the ontological questions about an video artwork are thought to be much of the ontology of the video as medium[10]. Friedberg identified the concepts behind video as “window,” “perspective,” and “virtual.”[11] Given the metaphor of video as frames or windows, introducing interactivity to video offers multiple ontologies in a work, due significantly to the participation of viewers. In addition, a new metaphor could be suggested, i.e., “mirror.” David Rokeby has built a conceptual background of interactive media by introducing the “mirror” metaphor, i.e., the outcome of interactive media projects a certain status of the viewer; thus the media works as a mirror[12]. This position is radically different from traditional static and passive media in the sense that these interactive media subsume an aspect of the participants in a certain way, which suggests a new horizon of representational methods.

As interactivity is introduced to a video through user participation, the transmodal feature appears evident across the ontological moments. For example, the interactive video work titled Liquid Time Series (2000-2002), by Camillie Utterback, exhibits an interesting multimodality, and thus is transmodal[13]. In this work of Utterback, the horizontal segments of the image projected in front of viewer are substituted with corresponding segments from different times. The distance between the audience and the image corresponds to the distance in time of the segments of the image. Thus, by moving one’s body, a viewer could play a movie in a cubistic way in terms of time and space. The most dominant effect of this work would be the transition of a still image into a moving image, which is driven by a viewer who enters into the sensitive region of the space. Viewers will first become engaged with this work by noticing the radical transition that occurs in the video space when they enter it. It would then take some moments for a viewer to notice that the moving image is spatially associated with him/her. It might take some further moments for the viewers to notice that distance is associated with time in regard to what is happening in the projected video. At first glance the work would look different to the viewer than what he/she would eventually understand to be taking place, after some time of being engaged in the interaction.

Mobility of the viewer plays a significant role in characterizing the modality of this work. First, the viewer’s motion that is normal to the image plane causes the corresponding segment of the projected image to travel along time. This particular modality could not be fully explained by the work itself. Rather, it is the combination of the function of the work and the mobility of the viewer. From the viewer’s perspective, the motion is reflected as a time-traveling segment, weaved with the rest of the image, and seen as a cubistic movie in terms of both time and space, where a unique dialogue between
the viewer and the work is created. In addition, the viewer movements that are horizontally parallel to the projected image can cause the image to be swept by segments of a different time. Moreover, combinations of those motions generate highly disoriented moving images as a form of temporal collage. The natural association of time and space is broken. When multiple audiences make up a group, each will witness the relational ontology of the others combined with his or her own. This could be thought of as a dialogue between the audiences as well as through the manipulation of the video to contain different segments of different times to compose an image, which we suggested is yet another ontological moment of the work.

Utterback’s work uses the “mirror” metaphor. An actual mirror device—a video camera—is mounted on the ceiling and looking downwards. Along the horizontal axis of the projected image, the audience is mirrored in a form of a tiled image. At the same time, the distance between the image and the audience is mirrored in terms of time. The presence of the audience is bisected into two totally different dimensions in this mirror, which is a crucial source of perceptual disorientation.

Interactive video could provide multiple ontological moments by its nature, not only to the engaging viewers, but also to spectators who watch both the work and the engaged viewer as one piece. This transmodal capacity is a feature of such interactive video works. At the same time, this transmodal feature is a part of ontology.

3. Abstract Font

A font is a collection of characters. Typography is a field in graphic design that has experienced substantial change in its process since the advent of computer-based design and production of printed materials. Today, one graphic designer could develop a font from the initial concept and then produce a finished design, as an application using that font. Joohoon Lee termed this process “Fontography.”[14] In the Fontography process, designers are free use computer technology to produce any kind of fonts to convey concept in a form of font, and often presuming combinations of the characters. This stimulated efforts to produce abstract fonts that are literally unreadable, but can be used as visual elements in designing graphical forms. In abstract fonts, aesthetics as the form and the combination of characters are sought for, in terms of the initial concept being developed in the manner as Dennis Summers describes, i.e., “From the Explicatory to the Evocative.”[15] In the history of typographic discourse, there has been movement to look at the published text as conceptual artwork as is mentioned by Blacksell, by using text as visual elements and sculptural units.[16] Blacksell pointed out that text is also regarded as readymade, i.e., “…sculptural qualities through the translation of material content into the mind of the “spectator” via the act of reading…”[16, p.71]

Text is used as Abstract fonts are often used to create decorative graphical forms and patterns using a font generation method. Since the process of Fontography involves abstraction of a concept, the combination of characters can also deliver abstract elements of that concept. Thus the composition can play a significant role in the application of fonts, since composition is supposedly the most crucial step in visual problem solving[17]. Given the number of characters of a font, the combinations create an explosive capacity of possibility of compositions, not only by the combinations of characters but also by the scale, rotation, space, etc., of each character, and which capacity provides a large expressive space. Since characters are basically letters that are typed, for example using a keyboard, offering combinations is an expected characteristic of a font.

![Figure 1. “Bubbles” font, © 2011 Joohoon Lee (screen capture)
Joohoon Lee created an abstract font named “Bubbles,” shown in Figure 1. Using this font, various graphic compositions were created, displaying interesting compositional variations created by the characters shown in Figure 2.

![Figure 2. “Bubbles1”(left), “Bubbles2”(middle), “Bubbles3” (right), © 2011 Joohoon Lee, offset print on paper, 594mm x 841mm](image)

The composition of the works shown in Figure 2 is characterized by compound features of visual elements in an informal structure that creates a particular diagram of space[18]. Such space is created by the dense and open areas in the layout through the placement of the objects. Note also that the compound characters show overlapped negative space in the abstract characters, which is evident in “Bubbles2,” where the size of characters is the same. Characters that are placed in different sizes, as in “Bubbles3,” create a unique dynamic composition.

The dialogical aspect of language has been a topic in the study of language, in terms of contrasting a dialogue to talking interactively[19]. Jan Van Toorn introduced the dialogic approach to visual communication, proposing a connective model of visual rhetoric[20][21]. This has influenced many graphic designers, in that although static, a graphic image could afford a dialogue with the spectators. Haslem introduced the concept of “the other” to denote a counterpart of something that is engaged in a dialogue[22]. Haslem explained his concept of intersubjectivity between the mutually engaged subjects as a tool to understand the nature of such dialogue. The interactive video installation described in this paper has been conducted in an attempt to make an extension of this theory of dialogic feature in graphic design by adding the explicit interaction made by the body of a spectator. The implementation of the interactive video installation is next described.

4. The Interactive Video Installation: “Flying Bubbles”

In the interactive video installation, the abstract font “Bubbles” was used as a visual element. A piece of Processing code was written and run on a Mac Pro computer in order to animate each character of the font. Arduino was used to interface a sonar sensor (LV-MaxSonar®-EZ0™) in order to take the position information of viewers, that is, the distance from the sensor to the viewers. Arduino sends the computer-coded distance information read from the sonar sensor in an ASCII stream to the computer using a serial communication link. On receiving the distance information, the computer accordingly changes the size of each character during the motions. The sonar sensor is mounted on a tripod and placed in the gallery space to locate viewers within its effective measurement range of approximately 5 meters.

Figure 3 shows the setup of the installation. We used two projectors with videos projected respectively onto two adjacent right-angle corners of the gallery space, for a reasonable scale and immersive experience. The left image of the floor plan in the Figure 3 shows the placement of devices.
The two projection walls are at the top-left corners of the room, as indicated by the thick lines. Two LCD projectors were used with each for the respective projection surface, with an identical video. The picture on the right in Figure 3 shows the actual setup of the sonar sensor on a tripod and one projector seen behind, next to the computer.

![Figure 3. Installation setup](image)

The Processing code uses “motion” library available from the Processing website[23]. Each character of the abstract font, Bubbles, follows a randomly defined destination at decelerated speeds. Every destination is randomly reset every five seconds. Thus the characters are shuffled every five seconds during motions. The maximum size of each character, within a certain range, is randomly given in advance. The size of characters varies according to the distance information received from the sonar sensor through the Arduino board. Rotational motions are also applied to the characters at randomly different speeds for increased dynamism.

We named this installation “Flying Bubbles.” Examples of the results are shown in Figure 4. The different sizes of the visual elements are the result of different positions of the viewers in the sensing region, with a short audience distance to the sonar sensor resulting in larger sized characters. Note that the visual element compositions in the video projection show the evident analogy to the still images shown in Figure 2. The differences of the video compared to the still images are: 1) the visual elements move, rotate, and change in their sizes by computation – generative composition; 2) the sizes correspond to the viewer’s position – dialogical composition. This dynamic composition and interactivity to the viewer characterizes the ontology of this interactive video work.

![Figure 4. Projected video examples](image)
Figure 5 shows the direction and the speed of the Bubbles characters taken with a slow-shutter speed. The trails show the directions randomly assigned at 5-second intervals, and the length of the trail shows the speed of the character motions. This figure shows the characteristic of dynamism of the motions of the characters.

![Image of Bubbles characters and trails](image)

**Figure 5.** The direction and speed of the motions of characters

Like other interactive video works, “Flying Bubbles” provides multiple ontological moments with its considerable transmodal capacity. At the first glance viewers encounter a video with the smallest characters moving about in the projection space, as in the top-left picture in Figure 4. When viewers enter the sensitive range, they will experience varying compositions of the visual elements. Figure 6 shows the frames sampled from video to show that the sizes of characters vary depending on the position of the viewer, while the movements and rotations are managed by the computer as programmed. While the motions of the characters are active, the size variation in accordance to the viewer position is sufficiently responsive for the viewers to recognize that they have caused a variation in the interaction. This process of recognition would create an additional ontological moment that is associated with interaction. As a result, viewers see and experience dynamic and unique compositions that vary in time, driven by the computer algorithm, which reflects the viewer participations. This installation also provides a performance space where spectators watch other viewers engaging interactively in the video, as well as themselves.

![Image of video frames](image)

**Figure 6.** Video frames from actual interaction in the space

6. Conclusion

This experimental interactive video installation uses characters from an abstract font as visual elements. In particular the aesthetic capacity of a dynamic composition of characters as visual elements that are engaged in an interaction with viewers is studied. Reas et al. identifies various modes of contribution of computer codes to a work of digital media, i.e., repeat, transform, parameterize visualize, and simulate[24]. The computer program code in our work generates various motions of each character on the video screen with the size parameterized by the user position in the space. The algorithm and the feature of interaction would create a unique perspective in which the abstract font as the visual element is seen, as in the way Achituv explained --- meaning could be created through cross-domain mapping from one conceptual domain to another[25].

Our interactive video installation suggests explicit and direct dialogues with a viewer in the course of the interaction, which is the most distinctive difference from the printed static composition of characters, in that they only suggest implicit dialogues between a work and a viewer. In comparison to
the still composition of the characters as in Figure 2, “Flying Bubbles” offers three distinctive differences: dynamic composition by motion, ontological transmodality, and intersubjectivity, which result in unique dialogical compositions with the participation of spectators, in realtime.

7. References