

# Intimacy and Embodiment: Implications for Art and Technology

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## ABSTRACT

People have aesthetic experiences when they manipulate objects skillfully. Highly skilled performance with an object requires forming a highly intimate relationship with it. Aesthetics flow from this intimacy. This paper discusses three works which bring together technology and art to illustrate the issues of intimacy and embodiment. The three works are: Iamascope, video cubism and the forklift ballet.

## 1. INTRODUCTION

There are four types of relationships which can form between people and objects. The relationships that form depend upon whether a person embodies an object, i.e., feels the object is an extension of himself or whether the object embodies the person, i.e., the person submits to the manipulations of the object. In the former situation, the process of embodiment can be seen as the formation of intimacy between a person and the device. In the latter case, the process of embodiment often has to do with the desire for belonging or the dissociation of oneself from an object that you are controlling. Each of these relationships have their own aesthetic appeal. In the works presented here, the divide between art and technology is crossed to explore the relationship between intimacy and embodiment. Three works are used to illustrate these concepts. The works are:

1. Iamascope (shown in figure 1): an interactive artwork which explores the different types of embodiment which we have with machines,
2. Glove-TalkII: a gesture to speech device that works like a musical instrument; a speaker is able to express emotions both verbally and non-verbally with this device,
3. Sound Sculpting: a gesture to sound parameter mapping where the use of simple cognitive models enables a user to be expressive with the device,



Figure 1: A picture of the author in the Iamascope.

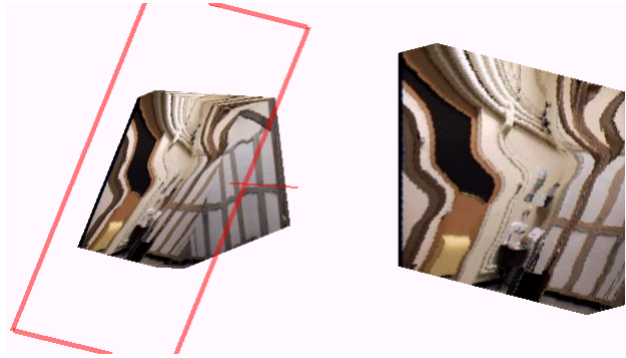
4. Video Cubism (shown in figure 2): an interactive exploration of spatio-temporal aspects of the self, and
5. The Forklift Ballet: a ballet using forklifts working at both a conceptual and aesthetic level.

## Embodiment

The four types of relationships can be categorized depending upon how deeply embodied an object is into the person or the person is into the object. The types of relationships are:

1. the person communicates with the object in a dialogue,
2. the person embodies the object,
3. the object communicates with the person, and
4. the object embodies the person.

In the first situation it is cause and effect that is aesthetic. That is, the person exercises control on the device and the result is communicated back. The result is critical for evoking any emotional response in the person. A typical example is when people first learn to use a computer. Being unsure of themselves they begin keying in commands. When the computer responds by doing something useful they feel happy, whereas they are unhappy if it does nothing. The key point



**Figure 2:** A picture of one cut through the video cube.

is that the result, separate from the control evokes the response.

In contrast, in the second situation it is the control that provides the aesthetic. In this situation the person embodies the object. That is, they have integrated the object and its behaviour into their own sense of self. The object becomes part of them. The object is an extension of their own bodies and mind. This situation is common among skilled operators of devices; for example, a painter and her paint brush, the musician and his instrument. In this type of interaction the emotional response comes from the control of the instrument rather than the result it self. The pleasure is in the doing, not the achieving.

In the third type of relationship we have the object conveying information to the person. In this case, the object does not respond at all to the person in any type of dialogue. There is no interaction. From its perspective the person does not necessarily exist. The aesthetic, for the person, in this case comes about as reflection or contemplation of the signals coming from the object. This type of relationship is common in traditional art forms. For example, a painting on a wall may evoke a response in a person looking at the painting; however, the response is a function of introspection by the person. The painting does not alter its signals in any way depending upon the person.

In the fourth type of relationship we have the object embodying the person. In this situation, the person derives an aesthetic feeling through relinquishing control of themselves so that the object can manipulate them. The emotional response arrives through submission and belonging. For this type of relationship, the object must be able to control the person and the person must be in a state to allow the control. This type of relationship is more complex to achieve as the construction of the object requires close attention to the person who will be manipulated.

Related to this fourth type of relationship is the fact that it is difficult to tickle yourself. People typically have embodied their own hands and thus, the response of your own hand is not surprising. When you try to tickle yourself there is no surprise and the sensation does not feel funny. However, it is

possible to build a machine which you can control which will tickle you. This machine will couple your hand movement to the machine movements in a slightly disassociated manner so that there is an element of surprise. The machine is easy to control; just a handle you pull. However, the sensation is disassociated and makes you laugh. In other forms of self-play this need for disassociation from the controlling mechanism and submission to the feeling is important for a satisfying, aesthetic experience.

The latest directions in interactive artworks have the potential to form all these types of relationships. Interactive artworks bring the person into the artwork. The observer becomes the observed. By doing so, the artwork brings in each individual and changes accordingly. At this point, the artwork can evoke a personal and emotional response to that person, and, as the person feels as part of the work itself she allows herself to feel. This fourth type relationship between the object and the person is rich for experimentation. It is much more difficult to explore than creating interactive artworks which exploit the first type of relationship. Remember, in the first situation, the person has an aesthetic response due to the response of the artwork which they caused through some action. In this situation, the artwork is an instrument for expression of the person. Likewise, in an interactive artwork which explores the second type of relationship, the control of the artwork by the person gives the emotional expression. The person, in this case, feels the artwork is an extension of his own body and feels emotion by controlling it. The artwork has gone from instrument. to medium. Of course, the third type of relationship can be explored in interactive artwork; however, this does not take full advantage of the possibilities of this novel direction.

While the relationships have been discussed here as separable categories, they most likely follow a continuum. At least in the case of the first two types of relationships a measurement called intimacy can be used to specify the degree to which a person is embodying an object. Additionally, the objects here are discussed as if they were inanimate; however, some of the same discussion holds for objects that are also people and animals. Finally, this discussion has not included the relationship of the audience with the observer becoming the observed in an interactive artwork. This three-way relationship is discussed below in the context of the Iamascope.

## Intimacy

When a person has a high degree of intimacy with a device they can communicate ideas and emotions effectively through the device as if it were an extension of themselves. Intimacy deals with the subjective match between the behaviour of a device and the operation of that device. For example, for a musician to be expressive with her instrument it is critical for her to have a high degree of "control intimacy". As stated by Moore[10],

The best musical instruments are ones whose control systems exhibit an important quality that I call "intimacy". Control intimacy determines the match between the variety of musically desirable sounds produced and the psychophysiological capabilities of a practised performer.

If there is no intimacy the effectiveness of communication is poor. A typical case where intimacy is very low is when a person first uses a new software package. There are many interacting factors which control the degree of intimacy a person may feel with a machine and/or person and the rate at which intimacy grows. For a more detailed discussion of the factors which influence intimacy see [6].

From the perspective of interactive artworks, it is interesting to explore our intimacy with our machines. In Iamascope, we begin to see intimacy forming between the machine and the participant very quickly. Within a few minutes, a person is completely unaware of the machine and is intimately linked to the images they are creating. From this perspective, the participant moves along the intimacy continuum so that the movement in the Iamascope is emotionally charged and disconnected from the result obtained, i.e., they have embodied the Iamascope. This separation due to the intimate relationship which forms quickly is critical to the formation of the fourth type of relationship, that is, the participant inside the Iamascope is embodied in the Iamascope.

One consequence when a person embodies a device is that expression is possible. One can conjecture that expression flows naturally when a device is completely embodied. This can be seen when an expert's emotional state is expressed through the usage of their tools. Masking this effect requires effort such as that of an actor being able to mask their own emotions while performing. The Forklift Ballet explores this relationship by having skilled forklift drivers make their forklifts dance. Interestingly, there is support that the aesthetics and personal growth that arise from the experience associated with highly intimate embodiment of tools as well as mind and body provide meaning and enjoyment of life[1][12]. Further, these aesthetics may also provide some of the selection criteria for learning and complex behaviour[2].

Finally, mirrors provide a means by which we can embody ourselves. Mirrors lack the ability to capture temporal events to allow people to experience their bodies in a temporal sense. Video cubism explores the aesthetics associated with spatio-temporal exploration of the self.

## 2. IAMASCOPE

The Iamascope is an interactive, electronic kaleidoscope. The Iamascope combines computer video, graphics and audio technology for participants to create striking imagery and sound with this aesthetically uplifting device. In the installation, the user takes the place of a colorful piece of floating glass inside the kaleidoscope, and simultaneously views a kaleidoscopic image of themselves on a huge screen in real time. By applying image processing to the kaleidoscopic image, participants' body movements also directly control music in a beautiful dance of symmetry with the image. The image processing uses simple intensity differences over time which are calculated in real-time. The responsive nature of the whole system allows users to have an intimate, engaging, satisfying multimedia experience.

For input the Iamascope uses a single video camera whose output is distributed to a video board with a drain to texture memory and the image processor computer. Imagery

output from the Iamascope is displayed on a large (170 inch) video monitor. Audio output from the Iamascope is played through stereo speakers beside the large video monitor. The video image from the camera is placed in texture memory and then the appropriate part of the video image (currently a "pie" slice or segment) is selected to form the original image which is used to create the desired reflections. A multi-polygonal circle is drawn upon which the the appropriate textures (original or reflected) are drawn alternately. The necessary reflections for the Iamascope are simulated with texture hardware providing frame rates of 30 frames per second. This frame rate provides low-latency, high bandwidth control of the kaleidoscopic image supporting a sense of intimacy with the the Iamascope. The video image is copied into memory of the vision-to-music computer. The image processing part of the vision-to-music sub-system extracts the exact same pie slice from the whole video image as is used to create the kaleidoscope imagery. By doing this, only movements which cause kaleidoscope effects will cause musical effects. Figure 1 shows the author using the Iamascope. For more details see[8].

The kaleidoscope sub-system and the vision-to-music sub-system are all written in C with a Tcl front end and Tk based interface[11]. The kaleidoscope sub-system runs on an SGI O2 R5000 computer at 30 fps. The vision-to-music sub-system runs on an SGI Indy (or O2) at 15 fps with full resolution. The systems are set up in a client/server relationship and communicate using a TCP/IP connection with a Tcl protocol layer built on top. The vision-to-music sub-system is the server and the kaleidoscope sub-system is the client. Using the bi-directional communication channel, any changes to the settings of one sub-system synchronizes with the other. For more details see[8].

Participants in the Iamascope have several levels of aesthetic experience arising from the different types of relationships that form inside it. At first, the participant typically does not appreciate the influence he has on the imagery and spends time moving his body to see what effect it has. The responding images and music at this time are generally pleasing and give the participant a good feeling, however, the participant does not associate it very well with his movement. This is first type of relationship where the effect provides the emotional response.

As he plays with the Iamascope more he finds that he can precisely control the image that he produces. This exploration is possible due to the highly responsive nature of the video images. This process stimulates the formation of intimacy with the device. Soon, he becomes unaware of the machine and moves as if the images are direct extensions of himself. At this point, he has embodied the Iamascope and feels satisfaction from just moving in it. This is expressed succinctly by John Bates, the Silicon surfer:

This is the first computer installation that I have tried that worked this well, gave me a very satisfying and creative experience and which actually got me emotionally involved with it. It is like playing a very satisfying and responsive instrument.

It is also at this level that the Iamascope becomes a "graphical instrument". That is, a performer plays images as a musician would play a musical instrument. Thus, the performer becomes an *imagician*. The performer can express himself through the imagery very easily. In contrast, the vision-to-music sub-system is allowing the participant to control the music. However, the musical control is not nearly as great as the imagery control. Only the coarse details of the music are controlled. These coarse features allow the music to be synchronized with the imagery without allowing too much intimacy to form. This is important for the participant to be able to allow the Iamascope to embody him since if he became a musician it would be difficult to separate from the control he is exerting on the Iamascope.

While the feeling of being an imagian is very satisfying, with time, the fourth type of relationship can form. That is, the Iamascope can embody the participant. This is possible since the intimate relationship that has formed while he is being an imagician allows him to disassociate the imagery from himself. This is assisted by the abstraction formed by the kaleidoscope and the music which is accompanying the imagery. The imagery is just abstract enough with enough symmetry that the participant can look at the beautiful imagery separate from his own control. In this case, the image then imparts an emotional effect. However, the image is the participant. Hence, the participant sees an abstraction of himself in the image and lets it manipulate him. The performer need only watch and listen as if from afar while the images seep through him. The occurrence of this emotional influence is coincident with the fusion of part and whole. That is, the performer is able to control the part (i.e., the pie slice) which is satisfying, but at the same time, due to the symmetrical and round quality of the image and the musical accompaniment his perceptual system sees and hears the whole, beautiful Iamascope.

The shape, pattern and music of the Iamascope is critical for this process. Other tilings have been tried with considerably less success than the current two-mirrored based kaleidoscope image. The two mirrored version has several qualities which support these multiple sources of aesthetics. First, the image is round. Thus, there is an inclination to see the circle without seeing the parts that make up the circle. Second, the image converges at the centre which tends to pulsate images into and out of it as the participant moves. This further tends to make the participant see the whole rather than the parts. Third, the image is not too abstract. That is, the participant can easily see the parts of his body that is in the Iamascope if he wants to. This is important to allow him to become intimate with the Iamascope and embody it. The Iamascope runs in real-time making it very responsive to the movements of the participant. This is also important for supporting the amount of intimacy so that the participant can embody the Iamascope. Finally, the music is controlled by the participant, however, only coarse grained control is possible. The timing, pitch and key are automatically controlled by the Iamascope. The feeling of the music though is controlled by the performer. This provides enough dis-association so that the participant does not feel strong intimacy with the music. However, they know they are controlling it so that they allow it to move them. Even though the music is simple and always harmonic it provides

a satisfying feeling.

### 3. GLOVE-TALKII

This section will describe Glove-TalkII and its relationship to embodiment and intimacy. Specifically, the speaker is able to express emotions with the device once it has been embodied.

### 4. SOUND SCULPTING

This section will describe Sound Sculpting and its relationship to embodiment and intimacy. This will be similar to the Glove-TalkII section except that the discussion will focus on expression with musical sounds.

### 5. VIDEO CUBISM

Video Cubism[5] is an interactive video visualization technique. With this technique, video data is considered to be a block of three dimensional data where frames of video data comprise the third dimension. The user can observe and manipulate a cut plane or cut sphere through the video data. An external real-time video source may also be attached to the video cube. The visualization leads to images that are aesthetically interesting as well as being useful for image analysis. Figure 2 shows an example of viewing a cut plane into the video cube.

The use of multimedia technology enables us to make the abstract concrete and to enhance our sense of reality and un-reality. Video Cubism is an interactive exploration of time and space of the self.

### 6. FORKLIFT BALLET

The Forklift Ballet is a dance and music performance to illustrate contemporary life. In this work, three forklift operators dance using their forklifts to music performed using a Lightning2 musical instrument. This work shows the relationship between humans and machines and the interface between man and his feelings. Humans express themselves only through the skilled manipulation of machines. The ballet of electrical forklifts guided by skilled drivers and live sounds expresses the metaphor of now. The work was performed in August, 1999 in Acqui Terme, Italy. Music was performed by Alzek Misheff. Refer to [3] for more details.

In the situation where a person has embodied a device sufficiently so that manipulation becomes automatic, I refer to that as a highly intimate relationship. When a person has this high degree of intimacy with a device they can communicate ideas and emotions effectively through the device as if it were an extension of themselves. Intimacy deals with the subjective match between the behaviour of a device and the operation of that device and the operation of that device. The Forklift Ballet is an exploration of this intimacy.

### 7. SUMMARY

In summary, the Iamascope is an interactive artwork that explores the relationship between the participant and the artwork. The Iamascope supports a high degree of intimacy to allow the participant to embody it. Once embodied, disassociation can occur. The image and music that are controlled by the participant then become outside the participant while allowing an aesthetic experience from just

controlling the work. The image and music at this point then are able to impact the participant as the whole image and music create an enveloping experience. Eventhough the image and music are controlled by the participant, they are now separate and pull the participant to see the whole, and once seen, provide a strong aesthetic experience. Video cubism provides a means for people to explore spatio-temporal relationships of self. The Forklift Ballet exploits the intimacy that forms between forklift operators and forklifts in a ballet performance.

The Iamascope, Video Cubism and the Forklift Ballet illustrate new forms of expression when state-of-the-art technology are used for artistic expression. Other works which explore these directions include: Sound Sculpting[7], the MusiKalscope[9] and Glove-TalkII[4].

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