

Chapter 2

Human Computer Interaction, Art and Experience

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Abstract This chapter considers relationships between the interactive arts, audience engagement, and experience design in public art. What might each offer the other? Engagement and experience are central to current Human Computer Interaction (HCI) thinking. For artists, what the audience experiences or feels is a key consideration. This chapter presents research issues involved in defining and understanding audience/user engagement and experience. A series of broad questions are posed and discussed. Two examples of approaches being followed to find answers to some of these questions are presented that demonstrate the kind of interesting results that are emerging including a more refined language for describing interactive experience. This research shows how frameworks, that support interactive art making and evaluation are being developed using practice-based research methodologies. These advances, made in the context of art, can be beneficially applied to both the interactive Digital Arts and HCI.

2.1 Introduction

For artists, what the audience feels, the experience, is a key factor. This goes beyond what the piece sounds or looks like. Interactive digital art, in particular, is very much about the interactive experience. It is not surprising, therefore, that the growing body of Practice-Based Research (PBR) (see Candy 2011) in interactive Digital Art is pushing the boundaries of our knowledge about what, in Human-Computer Interaction (HCI), we know as ‘experience design’.

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Interdisciplinary research across the relevant parts of science, technology and art can inform us both about artistic and scientific aspects of interaction, making experience design a truly interdisciplinary field. At least, that is one position. The chapter discusses questions relating to this issue and presents some work that might lead to answers.

The questions posed below and in detail in Sect. 2.4, represent a research agenda relating HCI, Digital Art and participant experience. In particular, there are various aspects of experiencing an interactive system that we either do not have answers to yet or only have partial answers: When is it engaging? What makes it engaging? What impact does familiarity have? A question that runs through most of this book is how to find methods that enable the evaluation of interactive experience to take place. As is argued in this chapter, and elsewhere, HCI and interactive Digital Art have much to offer one another, but exactly what can be transferred in each direction?

The work that is reviewed below in the section on Frameworks shows two examples of approaches being followed to find answers to some of these questions. They demonstrate that progress is being made and that very interesting results are emerging. In the case of these particular examples, we see that a more refined language for describing interactive experiences is being developed and that, even by itself, is a valuable step forward. This book contains a wide range of such contributions described by the practitioner researchers that are undertaking both art and technology projects. This chapter ends with some speculative propositions about the future that all of this work might eventually lead to.

2.2 Background

Digital Art is increasingly interactive. Some of it is built on interactions that evolved from computer games and device usage. Much of it is intended to engage the audience in some form of interactive experience that is a key element in the aesthetics of the art. Issues relating to Human-Computer Interaction (HCI) could be considered to be as important to interactive art creation as issues relating to the colours of paint are to painting. Concerns related to experience design, understanding the user, or audience and engagement are especially relevant. This chapter, and this book in general, is not concerned with task analysis, error prevention or task completion times, but with pleasure, play, experience, and short and long-term engagement. In interactive Digital Art, the artist is often concerned with how the artwork behaves, how the audience interacts with it (and possibly with one another through it) and, ultimately, in participant experience and degree of engagement. In one sense, these issues have always been part of the artist's world. In the case of interactive art, they have become both more explicit and more prominent within the full canon of concerns.

Whilst HCI in its various forms can offer results that at times can help the artist, it seems that the concerns in interactive art, rather like those in computer game

design, go beyond traditional HCI. Hence, we focus on certain relevant issues that are emerging in HCI research field, for example the increased emphasis on experience design. As is well known to HCI practitioners, there is no simple cookbook of recipes for interaction and experience design. Rather, there are research and evaluation methods that involve users as part of the design process. The implications of this HCI practice for art practice are, in themselves, interesting. The main implication is that the art-making process needs to accommodate some form of audience research within what has often been a protected and private activity.

2.3 An Art Historical Perspective of Interaction

Even when we stand still and look at Leonardo de Vinci's painting, *Mona Lisa*, our perceptual system is actively engaging with the painting and we could be said to be changing in ourselves as a result of that experience. By contrast, whatever the viewer does, whether standing still or moving, does not change the painting in any way. As we look longer, the painting may *seem* to change and we sometimes say that we "see more in it", but it is our perception of it that is changing. This change process is most often mentioned in relation to works such as the paintings of Mark Rothko, where at first it may seem as if there is nothing much to see, but the more we look the more we perceive in time. Campbell-Johnston commented, "...as you gaze into the [Rothko] canvases you see that their surfaces are modulated. Different patterns and intensities and tones emerge" (Campbell-Johnston 2008). Marcel Duchamp went so far as to claim that the audience completes the artwork, in which case active engagement with the work by the viewer is the final step in the creative process. As Duchamp put it, "the spectator ... adds his contribution to the creative act" (Duchamp 1957, p. 140). From this perspective, audience engagement with an artwork is an essential part of the creative process. The audience is seen to join with the artist in making the work complete.

This view of the audience became a particularly significant one in the second half of the twentieth century. For example, Jack Burnham saw the importance of understanding artworks in their environment and that all things "which processes art data, ...are components of the work of art" (Burnham 1969). So, by that definition, the audience is part of the artwork. By 1966, Roy Ascott had developed a view in which participation and interaction between the audience and the artwork was central (Ascott 1966). He later gave up the practice of making art objects all together: "In California in the 1970s, introduced to the computer conferencing system of Jacques Vallée, Informedia, I saw at once its potential as a medium for art and in 1979 abandoned painting entirely in order to devote myself wholly and exclusively to exploring telematics as a medium for art" (Ascott 1998). In other art forms, such as Happenings, participation was also prevalent. Kirby described rather basic examples of participation in Allan Kaprow's *Eat*: "Directly in front of the entrance, apples hung on rough strings from the ceiling. If the visitor wished, he could remove one of the apples and eat it or, if he was not very hungry, merely

take a bite from it and leave it dangling” (Kirby 1965). Participation in the artwork, by becoming part of the art system and interacting with whatever the artist provided, was becoming a familiar experience, whether it was typing at the keyboard or eating the apple.

Since the 1960s, an increasing number of artists have been taking active engagement further. Most famously, direct and physical audience participation became an integral part of the artwork and the performance of Happenings (Sandford 1995). Situations were set up by the artists with which the audience was meant to engage by actually taking part and hence explicitly ‘create’ the work. Thus, the artwork itself was changed by and evolved through the audience. Indeed, the activity of engagement became a part of the artwork. Art was interactive before the use of electronics, integrated circuits, and computing and networking devices.

The interactivity of art has become much more explicit as a result of the many ways in which computing technologies and the Internet have facilitated it. The computer, as a control device, can initiate and manage interactive processes in ways never seen before. Computing devices have become a ubiquitous material in our society. They operate our watches, our washing machines, our telephones, our cars, and a high percentage of the other devices that we use. Artworks that incorporate computing are an extension of the work that artists have been making for years: work that integrates and reflects prominent cultural materials. As a result of these changes new questions are arising and some old questions are being looked at again from a new perspective. The next section reviews such questions and introduces a discussion about the ways in which they can be tackled.

2.4 Questions to Address

What are the relationships between interactive art, audience engagement, and experience design and what might each offer the other? We can break this primary question down into the following:

When is experiencing interaction engaging?

What factors influence engagement with interaction? Which modalities are most significant? If we combine sound and image, for example, is engagement increased? Can we predict engagement? What kind of engagement is interesting and valuable? Is engagement with art of any relevance to engagement with, for example, an information system?

The central point is to see if we can discover how to predict engagement with interaction in these various respects. First, however, we need to know if there *is* any engagement in any particular situation. Certain clues can be obtained by simple observation. For example, if after a quick look someone walks away and goes to do something else we might assume that they were not very engaged. On the other hand, if they keep coming back to a work and actively interact with it over long periods of time, we might assume that they were engaged. These simple measures

are helpful but to understand the factors better we need to use methods that elicit the information from participants by either having them verbalise their experiences or by asking them in interviews.

How can we evaluate the experience of interaction?

How do we get at the experience that our users/audiences experience? Can we ask them to articulate their feelings during the experience? Must we rely on recall? Are there any objective measures?

Following on from our first question, there is a need to identify and develop methods for conducting evaluation. In the HCI world, closely related questions are seen to be important and both practitioners and researchers are trying to find answers, as for example in a CHI conference workshop (Väänänen-Vainio-Mattila et al. 2008). The questions are the subject of Chap. 3 (“Evaluation and Experience in Art”, Candy 2014), which discusses both the nature of evaluation in this context and approaches to conducting principled studies. The chapters of the book make a different contributions to the questions about methods for creation and evaluation and, taken as a whole, the book provides ‘answers’ as far as we are able to give at this point in time.

How do familiarity and engagement inter-relate?

If we are familiar with something, is our engagement likely to be lower? If the experience is subtle, might our engagement actually increase with familiarity?

The crucial point is that both levels and the quality of engagement will change as time goes on. For almost every question that we ask we can expect to find that the answer evolves, or even changes dramatically, over time. Changes may occur whilst a participant is interacting, between sessions or over months or years of familiarity. For example, initial delight and excitement in a simple, well designed, interaction piece may well turn to boredom after 10, 20, 30 or 100 repeats. The participant might come to yearn for the system to do something different. Of-course, some artworks do change their behaviour over time but then a change in behaviour implies at least the possibility of a change in the level of engagement. Zafer Bilda’s work which is briefly discussed later in this chapter, makes a contribution to the answer to this question in the sense of showing how, in any particular case, we might tackle it (Bilda et al. 2008; Bilda 2011).

Where is the art: in the object or in the experience?

Is interactive art about artworks? Perhaps it is only concerned with audience experience and not with objects at all? Might HCI design be less related to graphic or industrial design than we thought: less concerned with the object and more with the experience?

In one respect this is a philosophical rather than an empirical question. It asks where the essence of an interactive artwork is to be found. We might compare it to a question about a poem. Is the poem embodied in this particular text on this particular piece of paper? We might argue that the poem is some abstract thing that finds embodiment on the page. That is not good enough in the case of the

interactive artwork, however. Somehow the participant's behaviour and experience is central to the essence of the work. So this is a hard question. Rather than try to answer it we might simply note that we need to consider what we can discover about participant experience with at least as much vigour as we consider aspects of the object – interactive artwork, information system or whatever it might be.

Whose experience: audience or performer?

Sometimes, we might look at an expert user or, in art terms, an expert performer interacting. A performance piece can be interactive. It is just that the direct participants are not members of the audience but professional performers, such as musicians.

Umberto Eco distinguished between a performer and a member of the audience, “an interpreter”, but argues that in the context of what he terms an ‘open work’, they are in much the same situation (Eco 1989). Looking at, listening to, or interacting with an artwork is a performance in his terms. The way that we might tackle our studies need not vary much between cases where the interactive experience belongs to the audience and ones where it belongs to the performer. Andrew Johnston, for example, has worked on performer experience as part of his research and creative practice in both music and dance. See Chap. 4 (“Keeping Research in Tune with Practice”, Johnston 2014) in this book for more details of that work.

What makes interactive art engaging?

When and if an interactive work is engaging, why is it so? It is probably not simply because it sounds or looks nice. It is likely to be about the interactive relationship itself. So what are the characteristics of interactive relationships that engage us?

In evaluating interactive art and trying to find when and if it is engaging, we clearly need to make comparisons and try to isolate the influential factors. Laboratory style controlled experiments are hard or impossible to conduct in this area because the complexity of the problem. There are many variables and we do not have direct access to the human experiences that are a central concern. However, we need to find some way of drawing comparisons between different design features and participant experiences. So we need to conduct research that does so and, even if it cannot be as reliable as we might wish, find ways of forming confident opinions. For example, we might use collective expert opinion as a mechanism that can lead to results that we trust; and it will be noted that a number of authors in this book do exactly that.

Can HCI teach art anything?

What can art learn from HCI? Can interactive artists make better art through engaging with HCI? On the other hand, does HCI make their art boring, less intuitive and authentic? Which artists benefit: ‘professional’, gallery artists or artist-researchers creating prototypes?

A key current HCI issue is the problem of supporting people to be more creative. The implied research required is about understanding creative processes. This includes

the contexts in which they flourish and the constraints that help or hinder successful results. Hidden behind this research is a requirement to evaluate creative processes and, hence, a need to determine the success or failure of their outcomes. Taken as a whole, we can see that this is a particularly difficult research challenge. So, how can art help? Well, it is common in science to look at what are known as ‘boundary conditions’ or ‘boundary cases’. We can often learn most by studying the more extreme conditions than we can by studying just the normal everyday ones. For example, vision research, or how we see and understand the world around us, is quite a difficult topic. One way in which it has been advanced is by looking at when the process goes wrong. For example, by studying visual illusions, where we can find clues about how the process works or looking how failures actually stimulate creativity (Fischer 1994).

These questions have been a significant part of the ACM SIGCHI Creativity and Cognition conference series (e.g. Creativity and Cognition 2013) and, more recently have become an area that the CHI conferences have paid explicit attention to, although the research community is still in the early stages of exploiting the opportunities that the question implies.

Can art teach HCI anything?

Is interactive art a potential source of new insights about user experience and how to shape it? Or is interactive art a task-free world of no practical interest to CHI? Do we need to be clearer about the artistic contexts within which we are working if we are to learn anything?

Much of the knowledge of HCI and, perhaps more significantly, its methods can contribute to interactive art making. From HCI, we know how easy it is for a designer to shape software in ways that seem easy to use to them but that are a mystery to others. It is normally seen as an issue of distinguishing between the model of the system held by the various players: programmer, designer and user (Norman 1988). Such confusion often happens when the designer makes an unconscious assumption that is not shared by others. For example, when an item is dragged over and ‘dropped’ on a waste-bin or trash icon, it will normally be made ready to be deleted but retained for the moment. People new to computers sometimes assume that it is lost forever and so are nervous about using it, leading to behaviours unexpected by the designer. The same kind of thing can happen with interactive art. The artist may or may not mind but they do need to be aware of such issues and make conscious decisions about them.

At least in part, as a result of the HCI activities mentioned in relation to the previous question, we are seeing interesting examples of new ideas in HCI that come from observations about art. A recent example of work of this kind is Benford’s discussion of user interfaces that make people uncomfortable. He shows that we can learn from art that making the user comfortable is not the only option and may not always be the best one (Benford et al. 2013). This article can be seen as an example of the application of Costello’s approach as described in Sect. 2.5.1. Her work is interesting in the cyclic way in which she draws on HCI and psychology to make art and then gains insights that in turn, can contribute to HCI. This kind of work is

described in the next section, in which two example frameworks that begin to answer some of the questions posed above, are discussed.

2.5 Frameworks for Interactive Art

Considering the questions in the last section and, in particular, the last two issues, two significant specific contributions are now reviewed, each of which adds to our ability to deal with the issues and questions discussed above.

2.5.1 Costello's Pleasure Framework

In the context of making interactive art, Brigid Costello has argued that the nature of play can best be understood using a taxonomy that she has termed a “pleasure framework” (Costello 2007, 2011; Costello and Edmonds 2010). This work was done in the context of making artworks, such as *Just a Bit of Spin* (Fig. 2.1), in which participants enter into a game like situation playing with excerpts from Australian political speeches.

In doing this work Costello has synthesized a collection of research results that relate pleasure to 13 categories, each of which has quite different characteristics:

Creation is the pleasure participants get from having the power to create something while interacting with a work. It is also the pleasure participants get from being able to express themselves creatively.

Exploration is the pleasure participants get from exploring a situation. Exploration is often linked with the next pleasure, discovery, but not always. Sometimes it is fun to just explore.



Fig. 2.1 Two views of someone interacting with *Just a Bit of Spin* (Photographs Brigid Costello 2007, reproduced with kind permission)

Discovery is the pleasure participants get from making a discovery or working something out.

Difficulty is the pleasure participants get from having to develop a skill or to exercise skill in order to do something. Difficulty might also occur at an intellectual level in works that require a certain amount of skill to understand them or an aspect of their content.

Competition is the pleasure participants get from trying to achieve a defined goal. This could be a goal that is defined by them or it might be one that is defined by the work. Completing the goal could involve working with or against another human participant, a perceived entity within the work, or the system of the work itself.

Danger is the pleasure of participants feeling scared, in danger, or as if they are taking a risk. This feeling might be as mild as a sense of unease or might involve a strong feeling of fear.

Captivation is the pleasure of participants feeling mesmerized or spellbound by something or of feeling like another entity has control over them.

Sensation is the pleasure participants get from the feeling of any physical action the work evokes, e.g. touch, body movements, hearing, vocalizing etc.

Sympathy is the pleasure of sharing emotional or physical feelings with something.

Simulation is the pleasure of perceiving a copy or representation of something from real life.

Fantasy is the pleasure of perceiving a fantastical creation of the imagination.

Camaraderie is the pleasure of developing a sense of friendship, fellowship or intimacy with someone.

Subversion is the pleasure of breaking rules or of seeing others break them. It is also the pleasure of subverting or twisting the meaning of something or of seeing someone else do so.

Even a very brief look at the categories that Costello has identified shows that playful interaction comes in many forms and so the characteristics of a playful artworks may be quite different to one another when they evoke or encourage different kinds of playful engagement. Whether we look at this issue from the point of view of an artist making a playful work or of an interaction designer incorporating play into an interactive system, we can see that the questions that need to be addressed in more detail than indicated in the previous section. From Costello's work we also begin to see some of the answers.

It turns out that the time spent with a system and its familiarity changes the nature of the experience in various ways, whether we are concerned with playfulness or not. This is the focus of the second framework to be discussed.

2.5.2 Bilda's Engagement Framework

Zafer Bilda has developed a model of the engagement process through studies of audience interactions with a range of artworks (Bilda et al. 2008; Bilda 2011). He found that the engagement mode shifts from unintended actions through to deliberate ones that can lead further to a sense of control. In some works, it continues into modes that engage more exploration and uncertainty. He has identified four interaction phases; adaptation, learning, anticipation, and deeper understanding (Fig. 2.2).

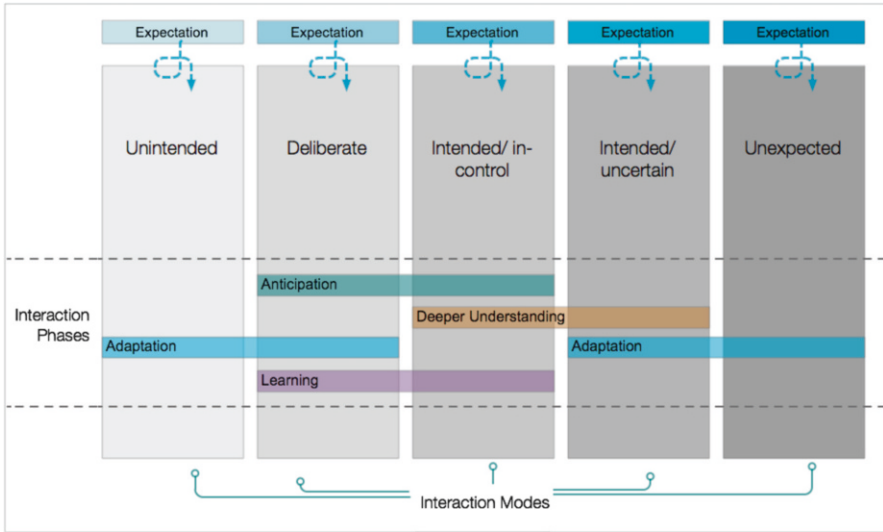


Fig. 2.2 Bilda's creative engagement model (Reproduced with kind permission)

Adaptation: Participants adapt to the changes in the environment, learning how to behave and how to set expectations. They work with and through uncertainty. This phase often develops from unintended action mode through to deliberate action mode.

Learning: Participants begin to develop an internal or mental model of what the system does. This also means that they develop (and change) expectations, emotions, and behaviours, as well as access internal memories and beliefs. In this phase, the participant interprets exchanges with the system and explores and experiments with relationships between initiation and feedback from the system. They develop expectations about how to initiate certain feedback and accumulate interpretations of the exchanges. This phase can occur from deliberate action mode to intended/in-control mode.

Anticipation: In this phase, participants know what the system will do in relation to initiation. In other words they can predict the interaction. Their intention is more grounded as compared to the previously described phases. This phase can occur from deliberate action mode to intended/in control mode.

Deeper understanding: Participants reach a more complete understanding of the artwork and what his or her relationship is to the artwork. In this phase participants judge and evaluate at a higher, conceptual level. Thus, they may discover a new aspect of an artwork or an exchange not noticed before. This phase can occur from intended/in control mode to intended/uncertain mode.

There are forms of engagement that may or may not be desired in relation to an artwork. For example, in museum studies people talk about attractors, attributes of an exhibit that encourage the public to pay attention and so become engaged.

They have “attraction power” using Bollo and Dal Pozzolo’s term (Bollo and Dal Pozzolo 2005). In a busy public place, be it museum or bar, there are many distractions and points of interest. The attractor is some feature of the interactive art system that is inclined to cause passers by to pay attention to the work, approach it, and look or listen for a few moments. An immediate question arises of how long such engagement might last. Counter-intuitively, we find that the attributes that encourage sustained engagement are not the same as those that attract. Sustainers have holding power and create “hot spots”, in Bollo and Dal Pozzolo’s term. So, presuming that the attractors have gained attention, it becomes necessary to begin engaging the audience in a way that can sustain interest for a significant period of time. This aspect of engagement might be found in the learning phase of Bilda’s model.

Another form of engagement is one that extends over long periods of time, where the visitor returns for repeated experiences, as in seeing a favourite play as many performances throughout one’s life. These are factors that enable the hot spot to remain hot on repeated visits to the exhibition. Facilitating this meets with the highest approval in museum and gallery world. This aspect of engagement might be found in the deeper understanding phase of Bilda’s model. We often find that this long-term form of engagement is not associated with a strong initial attraction. Engagement can evolve with experience. These issues, once recognized, are important to the interactive artist, and such conscious choices have significant influence on the nature of the interaction employed.

2.6 Conclusion: What Next?

The questions posed above are large ones without easy answers. However the frameworks briefly reviewed show that progress towards answering them is under way. The next chapter discusses evaluation, in this context and in depth and all of the questions raised above are tackled in various directions and combinations in other chapters of the book. The contention is that the relationships between the interactive arts, audience engagement, and experience design in public art form an important and fertile research landscape, the study of which can be highly beneficial to both the interactive Digital Arts and HCI. For other examples of such work and more detailed discussion see the book on interactive art research (Candy and Edmonds 2011), which might be seen as a companion volume to this text. This chapter, this book and much of the other work referenced point to a future in which research is often an integral part of art practice and where formal or semi-formal evaluation studies are incorporated into artists’ working lives. Equally, they point to a future in which creative practices provide a significant basis for the advancement of human computer interaction. So what might these futures look like?

From the artist’s point of view, we can expect a growth in the informed attention to the human participant’s perception and cognition of the art system and its context. This will in no way imply that artworks will increasingly be made to please or to match consumer demand. On the contrary, it implies that the artist will be more able

to challenge perception and cognition, to disturb, alarm or confuse participants should they want to as well as to relax, indulge or mesmerise them if that is their choice. From the interaction designer's perspective we surely will see a growth in the interest in encouraging, even exploiting, creative behaviour in users. The exploiting may come in the form of increasing engagement and interest through the provision of more creative experiences. In this view of the future, the encouragement of creativity in users, informed by a better understanding of creative interaction from the arts, will most probably take the centre stage in HCI. Already the days of task oriented HCI seem to be in the past and realisation of the future proposed here is well underway.

The application of the evaluation methods discussed in this book in interactive art is likely, then, to lead to a stronger emphasis in the arts on perception and cognition in interactive situations. In turn, the new knowledge that can come from such work will most probably accelerate the moves in HCI towards making support for human creativity the central theme.

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