User Authorship and Creativity within Interactivity

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ABSTRACT

This paper tracks the development of the author's work entitled *Light Tracer*, and examines the surrounding issues of user authorship and creativity within interactivity.

Light Tracer is an interactive system which invites the participant to write, draw and trace images in real physical space. The participant is situated in front of a screen reflecting their own image, and by manipulating a series of light sources, marks can be left onscreen such as drawings, messages, traces of physical objects such as faces, hands and bodies.

It is the argument of the author that by allowing the user an optimum level of creative authorship within an interactive work, the user can be successfully engaged with the experience of the interaction and in turn produce and create themselves.

Categories and Subject Descriptors

J.5 [Computer Applications]: Arts and Humanities: Fine arts.

General Terms

Design, Experimentation, Human Factors, Theory.

Keywords

Interactivity, creativity, user, authorship, drawing, computer vision, light, tracing, writing.

1.INTRODUCTION

In 1966, Roy Ascott coined a new term, 'Behaviourist Art' [1], and stipulated the necessary conditions that 'the spectator is involved and that the artwork in some way behaves'. He went further to suggest the artist could provide 'a more or less empty receptacle (the canvas) into which the spectator can project his own imaginative world' [1].

The term, *Behaviourist Art* has since evolved into *Interactive Art* or *Interaction Design*; and has been labelled by one of its pioneers, Myron Krueger as 'a potentially rich medium in it's own right' [11] which should be judged by the 'quality of the interaction...: the ability to interest, involve, and move people, to alter perception, and to define a new category of beauty' [11].

This paper maps the development of the author's work entitled *Light Tracer*, an interactive drawing system which seeks to function as an *empty receptacle*; beginning life empty and subsequently filled with the markings of its users as time progresses. User involvement and contribution are paramount, and ultimately determine the success of the work.

2.INTERACTIVITY

Interactivity as it is understood today, has a history spanning across the wider field of design and the arts. Writer and theorist Jack Burnham notes, '[w]e have already seen in happenings, kinetic art, and luminous art some premature attempts to expand the art experience into a two-way communication loop' [4].

Stretching further afield we can find non-physical interaction parallels within the writings of Marcel Duchamp [9], Roland Barthes [2] and Umberto Eco [10]. Wherein the individual is physically passive, unable to affect the work, but interacting on a psychological level to fill in the blanks and acquire their own meaning or direction.

Roy Ascott's 1959 *Change Painting* (See Figure 1) is an early example of an artwork which seeks to involve the audience in a direct physical way. *Change Painting* allows the audience to slide and move panels within the painting, to create a composition which they find aesthetically pleasing. Ascott notes, 'The act of changing becomes a vital part of the total aesthetic experience of the participant' [1].
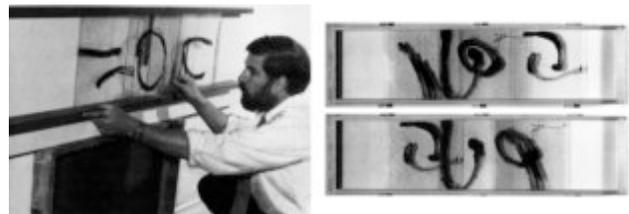

Figure 1, Roy Ascott, *Change Painting*, 1959 [3].

Ascott's *Change Painting* introduces in a very basic way, the idea of a standalone system which the audience can interact with to physically manipulate and affect the artwork. While Ascott's *Change Painting* predates the personal computer, it hints at the possibility of using such a system as an interface between the artist and the audience.

2.1 Defining Interactivity

In 1973, Stroud Cornock and Ernest Edmonds created a series of diagrams outlining five different art systems [6]. The first three diagrams shown in Figure 2 are relevant in defining the role of the user and highlighting the fundamentals of interactivity.

KEY

A = artwork   E = environment   T = time
M = modifier   S = spectator   P - participant
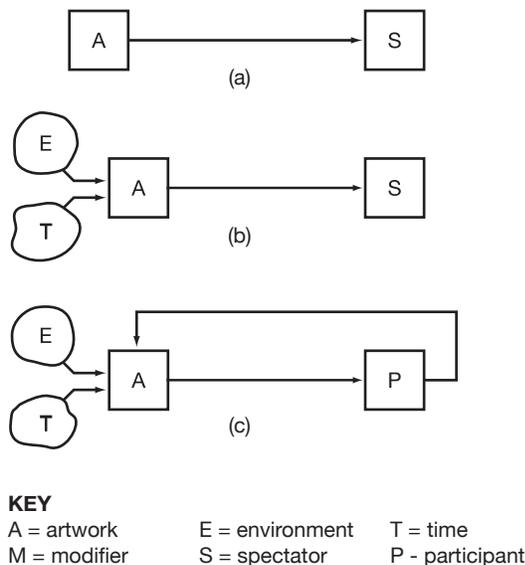
(a) Static system.
(b) Dynamic-passive system.
(c) Dynamic-interactive system.

Figure 2, Diagram outlining art systems (Abbreviated) [6]

System A, the Static system, illustrates art as a static unchanging object observed by the spectator. For example, a spectator looking at a painting.

System B, the Dynamic-passive system, remains similar to System A, with the exception that the artwork is sensitive to changes in the environment and time. For example, a kinetic sculpture which moves in the wind.

System C, the Dynamic-interactive system, has two small but significant changes. Firstly, the spectator is substituted for a participant, therefore secondly, the participant is no longer passive but has the ability to affect the artwork. For example, Ascott's *Change Painting*.

This idea of the participant (or user) interacting to change and affect the artwork in some form, creates a clear distinction between a Dynamic-interactive system and a Static system. While all artworks remain sensitive to their context, with factors such as the physical environment and audience numbers changing the individual viewer's impression of the work, the Dynamic-interactive system stands alone in that the form of the artwork can be altered by the user. This change affects not only their perception of the artwork but potentially the perception of any subsequent user who interacts with the artwork.

Andy Lippman describes the Massachusetts Institute of Technology (MIT) Media Lab model of interaction as 'a conversation versus a lecture' [3]; stating the Media Lab's working definition of the term 'interactivity' as: 'Mutual and simultaneous activity on the part of both participants usually working towards some goal but not necessarily' [3].

By this model, both the user and the artwork have a role to play, interacting and affecting each other in turn to form a loop. By referring back to the diagram of the Dynamic-interactive system, we can track this loop from the the artwork to the participant and then back to the artwork again.

Roy Ascott labels this the *feedback loop*, 'The participational, inclusive form of art has its basic principle "feedback," and it is this loop that makes an integral whole of the triad artist/artwork/observer' [1]. This definition of interactivity suggests that both the artist, the artwork and the user, each have a very real role to play in shaping the output of an interactive work.

2.2 Light Tracer

The essential goal of *Light Tracer* was to create something which enabled others to create; providing an open framework to house the creative expression of the user.

The basic interactivity of the *Light Tracer* system, took form through a series of prototypes (See Figure 3) utilising the Max/Msp/Jitter programming environment to process a live camera image. The user is situated in front of a screen reflecting their own image, and by manipulating any type of light source, marks can be left on the screen such as drawings and messages as they see fit.
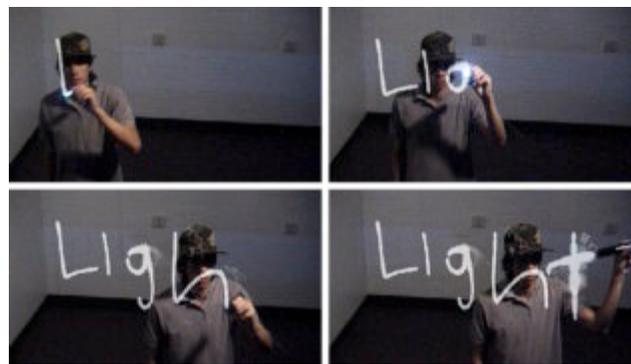

Figure 3, Drawing with *Light Tracer*.

Technically the system is very simple; as the user moves the light sources across the face of the camera, the brightest areas of the camera image are extracted and recomposed onto the incoming realtime image.

Krueger's interactive *Videoplace* system [11], developed from 1969 onwards, is a notable early work dealing with similar ideas. *Videoplace* featured numerous modules including a *Digital Drawing* module which allowed the user to draw and erase imagery on screen using their fingers and simple hand gestures. *Videoplace* focused on creating playful experiences that required little user training or experience. *Light Tracer* also seeks to function on such a level, but with a focus on creating a system which promotes user creativity.

Figure 4, Tracing with *Light Tracer*.

By experimenting with an array of light sources, I soon discovered by accident that brighter lights, could cause nearby objects to be illuminated and moreover traced onscreen. This enabled the user to 'trace' their own face, body or hands, to create realistic imagery in a simple yet creative way (See Figure 4). With this basic functionality of *Light Tracer* established, it is subsequently up to the user to decide how they interact and create.

2.3 The Interactive Experience

Light Tracer as a system is devoid of content which can be navigated or delivered to the user. As such the focus very much remains on the experience of the interaction itself.

Krueger has stressed the need for interactivity to reman the 'focus of the work, rather than a peripheral concern' [11]. Similarly Andy Polaine, a founding member of media collective Antirom, draws a distinction between interactivity which acts as a gateway to the 'real' content and interactivity as the content itself:

"From navigational menus to videogames, interactivity is often part of an interface to other content. This ignores the experience of the moment of interaction and relegates it to a mechanism of control at best and something to be mastered and 'got through' at worst." [12]

Such navigation-based interactivity remains problematic, as Lippman suggests true interactivity gives the user 'the impression of an infinite database' [3], with the user ideally having a multitude of interactive choices available to them at any instant. Interactivity which fails to give such an impression, Lippman argues, ceases to be *interactive* and becomes merely *selective* [3].

2.4 Creativity

In attempting to promote user creativity, the openness of the interactive experience and the level of choice afforded to the user became the focus of further research.

Glyphiti [8], is an interactive work where multiple-users create and contribute to an online pixel based drawing (See Figure 5). *Glyphiti* is made up of a 15 x 15 grid of smaller tiles that can be edited by the user. When the user clicks on one of these tiles, it appears enlarged on the right hand side of the main image and the user can edit it by clicking and toggling the pixels on and off.
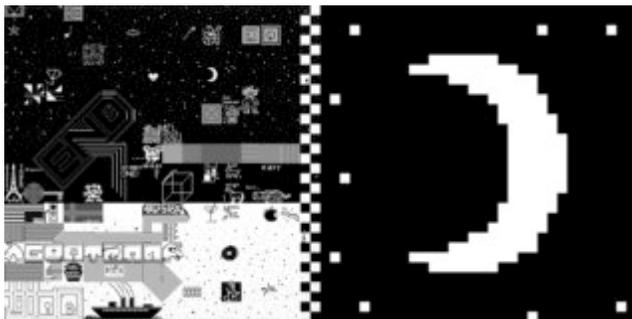

Figure 5, The *Glyphiti* interface [8].

The interaction is overtly simple with no instructions or iconography required to understand the functionality. In fact the over-simplified interaction at times becomes frustrating, as there are no brush sizes, colour palettes or pen tools to empower the user to create a more polished final drawing. However these restrictions have not stopped numerous users from constructing painfully detailed drawings pixel by pixel (See Figure 6). As the

Glyphiti system saves a copy of all imagery, it is possible to browse through the archives and observe the amount of time and energy users have put into the drawings.

Figure 6, Archived screen captures from *Glyphiti* [8], illustrating the potential complexity of the user drawings.

Using Krueger's earlier criterion, *Glyphiti* can be judged at the very least partly successful based on the level of participation from its users and moreover its 'ability to interest, [and] involve' [11]. How it manages to solicit such an active response can be put down to several factors. Firstly the social nature of the interaction; users can draw and exhibit their drawings as well as erase the drawings of others. Secondly and perhaps more importantly, *Glyphiti* finds an optimum balance between simple easy-to-use interaction which has a wide range of possible creative outcomes.

2.5 Balancing Interactivity

As *Glyphiti* does successfully, the key to engaging interactivity seemed to be in finding an appropriate balance between the difficulty of the interaction and the resulting complexity of the work. While simple interaction may be accessible to a wider range of users, such interaction can potentially produce more specific results from the interaction.

The children's block system *Lego*, is a useful metaphor for describing the trade-off here. *Lego* comes in a range of sizes, such as *Duplo* (the larger blocks for children), regular *Lego*, and at the other end of the scale, *Technic* (the smallest blocks for teenagers). In the case of *Duplo*, it is possible to create something very fast, though at the expense of the precision and definition of the object. On the other end of the scale, *Lego Technic* offers this precision and definition, at the expense of the time and skill required to make the object.

Interactivity functions in much the same way, ultimately more complex interaction allows the user greater creative possibilities, but at the expense of creating a more complex learning process for the user. Artist David Rokeby recalls similar issues with early versions of his interactive sound installation *Very Nervous System*:

"In the early days of *Very Nervous System* I tried to reflect the actions of the user in as many parameters of the system's behaviour as possible... Ironically, the system was interactive on so many levels that the interaction became indigestible... I found that as I reduced the number of dimensions of interaction, the user's sense of empowerment grew." [13]

At various stages in the production of *Light Tracer* the challenge has been to achieve the right balance between these two factors. Somewhere in between lies a sweet spot where the user can interact fluidly without their attention being drawn to the difficulty of the interaction or the limited possibilities it offers.

Psychologist Mihaly Csikszentmihalyi labels this sweet spot, *flow* [7], when an individual's challenges are in balance with their skills (See Figure 7).
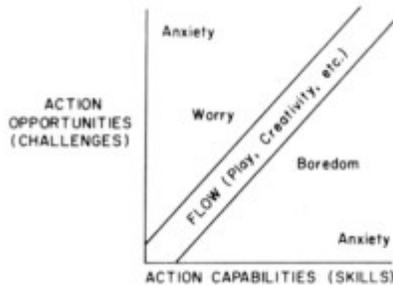
Figure 7, Model of the flow state [7].

While Csikszentmihalyi's research is general in nature, it can be applied to interactivity given that the interactive system governs both the user's challenges and required skills. Interactivity in this sense, acts as a micro-environment where such optimal experiences can be achieved.

From his observations of people experiencing *flow*, Csikszentmihalyi also states the importance of creativity:

"Those who are involved in more creative and less competitive activities enjoy intrinsic rewards more. However, regardless of the activity, people who perceive what they are doing as primarily creative rather than competitive, are also motivated by intrinsic rewards." [7]

By this we can determine, that the importance is not placed on the actual level of creativity exhibited, so much as the perception of one's activities as being creative. Flow experiences are therefore not unique to so called creative people, but rather are something accessible by anyone who perceives what they are doing as creative.

3.CONCLUSION

The initial idea behind this paper was to define how authorship functioned within interactive systems, and moreover examine what constitutes user creativity. However rather than attempting to gauge the level of authorship or creativity exhibited by the user, it became more useful to look at the systems themselves, and try to discern the characteristics which in turn promoted creative behaviour from the user.

Glyphiti is one such work which achieves an optimum balance between the difficulty of the interaction and the range of possible creative outcomes. By restricting interaction to a simple black & white grid, the user has a comfortable and easily controlled framework within which to create. Yet within that narrowly defined structure, the creative possibilities are all but endless.

Interactivity is inherently tied to the issue of control and choice [5], and seemingly wants to provide both at the same time. Inevitably one compromises the other, but as has been show with *Glyphiti*, balances can be found.

Light Tracer has now been exhibited and successfully received by users in several different countries. Upon first coming across *Light Tracer* it is common to see users draw squiggly lines or write their names; but often enough, experimentation with the system progresses beyond such simple interactions. Users quickly discover the system is sensitive to light, and proceed to write with their cellphones, lighters, or even while smoking with cigarettes. Tracing with light also produced some interesting interaction, with users tracing out their t-shirt prints, found objects and quite often their exposed bodies.

From observing *Light Tracer* it can be stated that people are genuinely engaged by the system, often returning time and time again to draw and create.

While both cinema and computer-games offer forms of engagement based on narrative and competition, the success of *Light Tracer* I contribute to the lure of creativity and expression. Although examining why this is, moves beyond the scope of this paper, there are no shortage of recent interactive works which call upon the creativity of the user as a means for engagement. I believe this is fertile ground for further research and practice; moving away from simple reactive works, towards instruments for user creativity.

Ultimately, the process of creating and authoring is something we all enjoy partaking in, regardless of the originality or value of the end results. One need only look at the uptake of blogging, digital photography, or even karaoke to realise that people are intrinsically interested in and engaged by such activities. What we create may read poorly, be out of focus, or out of tune, but it is the participatory experience of creativity and authorship which engages us.

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