
User Authorship and Creativity within Interactivity

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Introduction

The motivation for my research stems from an underlying belief in everyday people to act in creative and interesting ways when provided with the right circumstances and context. The artist and designer when creating, too often neglect the ability of the audience to participate and engage with the work, ultimately resulting in the audience's detachment.

In 1966, Roy Ascott (2003, p.129) coined a new term, 'Behaviourist Art', 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' (Ibid., p.128).

The term, 'Behaviourist Art' has since evolved into 'Interactivity', 'Interactive Art' or 'Interaction Design'; and has been labelled by one of its pioneers, Myron Krueger (1991, p.17) as 'a potentially rich medium in it's [sic] own right' 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' (Ibid.).

My research has sought to develop this association between the creative involvement of the user, and successful, engaging interaction. Questioning the importance of a user's role as an active author, and examining what this involvement contributes to an engaging interactive experience.

My practical work has involved the creation of what Ascott (2003, p.128) labelled an 'empty receptacle'. In the form of a drawing system which begins life empty, and is filled with the markings of its users as time progresses. The user's involvement and contributions are paramount, and will ultimately determine the success of my work.

History and Context

Interactivity as it is understood today, has a distinct history spanning across the wider field of design and the arts. Writer and theorist Jack Burnham (1969, p.99) 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'.

Stretching further back, the pre-history of audience participation involved interaction on a psychological level. With the individual physically passive, unable to affect the artwork but capable of interacting on a psychological level to 'fill in the blanks' and acquire their own meaning or direction.

Similar ideas in the field of literature and linguistics, accumulated in Roland Barthes' noted text *The Death of the Author* (1968, pp. 142-148), in which he argues the intentions of the author are meaningless when left to the reader to interpret. He famously pronounces that, 'the birth of the reader must be at the cost of the death of the author' (Ibid., p.148).

Prior to Barthes, John Cage worked with similar ideas in his 1952 piece *4' 33"*, a three-movement piano performance in which not a single note was played by the pianist. Cage shifted the focus from the performer to the audience, as complete silence was broken only by their coughs, murmurs, and rustles.

The performance works of Yoko Ono and Marina Abramovic progress towards a more direct and at times confronting form of audience participation. In Ono's 1964 *Cut Piece* (See Figure 1), she invites members of the audience to physically cut and remove pieces of her clothing. The resulting interaction from the audience leaves her semi-naked on stage in front of those who de-robed her.



Figure 1, Yoko Ono, *Cut Piece*, 1964, Yamaichi Hall, Kyoto (Source: adapted from Munroe & Hendricks, 2000, p.159/161)

Abramovic works with similar ideas in her 1974 piece *Rhythm 0* (See Figure 2), which offered a simple instruction to the audience: 'There are 72 objects on the table that you can use on me as desired' (Abramovic, 1998, p.80). Included on the table of objects were various everyday items such as a mirror, pens, and flowers, in addition to a razor, a gun, and a bullet. At various stages during the performance Abramovic was written on, stripped of her clothes, and held with a loaded gun to her head.



Figure 2, Marina Abramovic, *Rhythm 0*, 1974, Studio Morra, Naples (Source: adapted from Abramovic, 1998, pp.81-93)

Without doubt the work of Ono and Abramovic seeks to actively involve the audience and question the limits of their interactions and how far they are prepared to go. Roy Ascott's 1959 *Change Painting* (See Figure 3) also seeks to physically involve the audience, albeit in a more passive way. *Change Painting* allows the audience to slide and move panels within the painting, to create a composition which they find aesthetically pleasing. Ascott (2003, p. 29) notes, 'The act of changing becomes a vital part of the total aesthetic experience of the participant'.

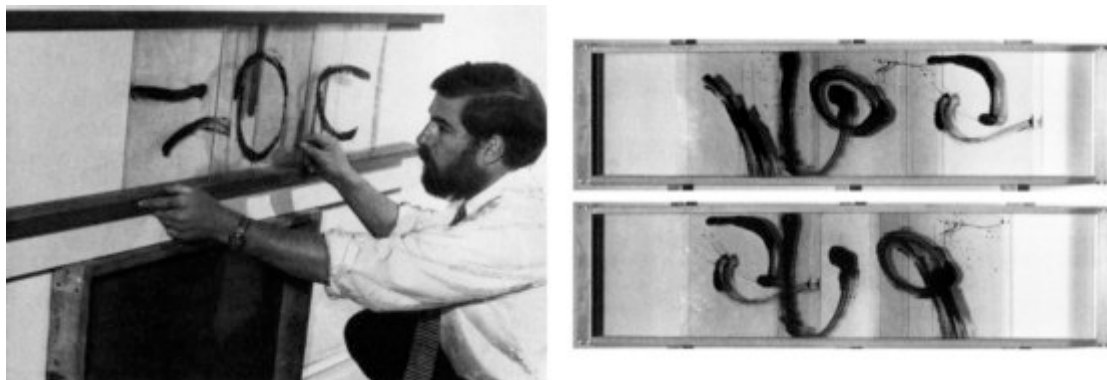


Figure 3, Roy Ascott, *Change Painting*, 1959 (Source: adapted from Ascott, 2003, p.99/29)

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 computer, it hints at the possibility of using such a system as an interface between the artist and the audience.

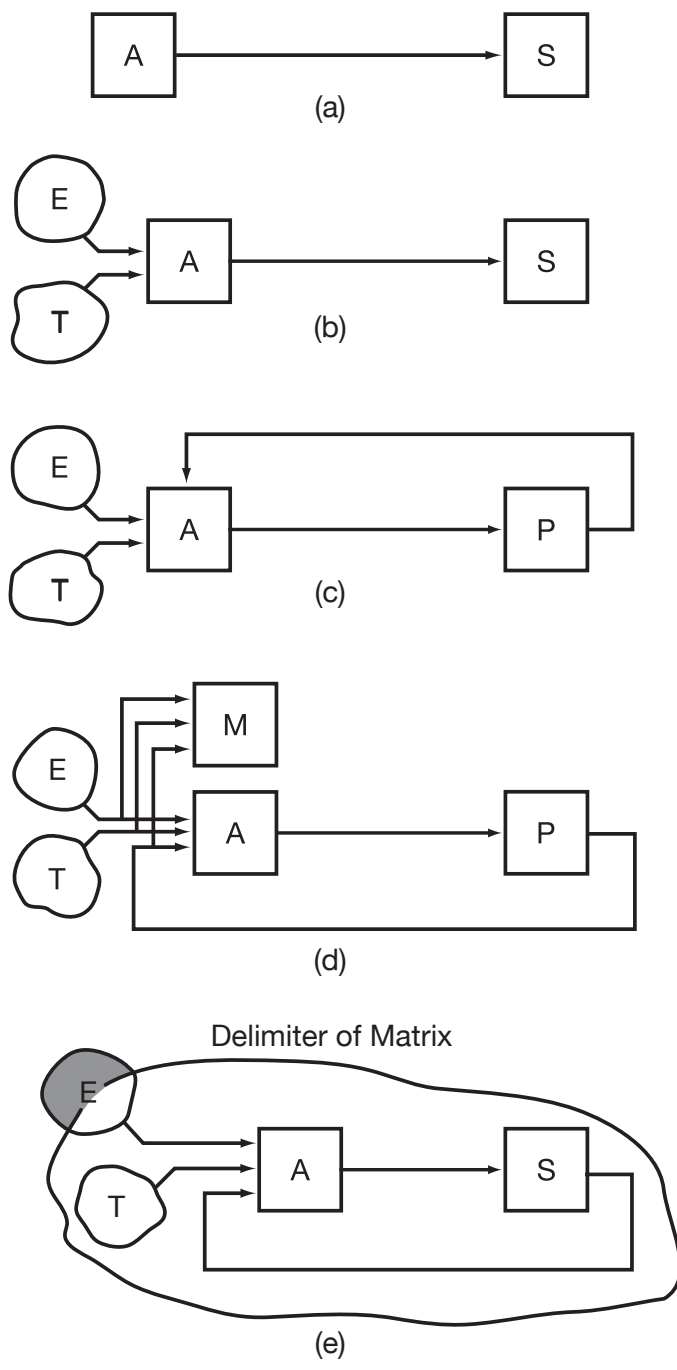
Defining Interactivity

As a basis for understanding and defining the role of the audience within interactivity, it is first useful to examine interactivity itself, and the conditions which brought about the advent of the *user*. In 1973, Stroud Cornock and Ernest Edmonds (1973, p.13) created a series of diagrams outlining five different art systems (See Figure 4). The first three remain the most relevant in defining the role of the user and highlighting the fundamentals of interactivity.

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*.



KEY
 A = artwork E = environment T = time
 M = modifier S = spectator P = participant

- (a) Static system.
- (b) Dynamic-passive system.
- (c) Dynamic-interactive system.
- (d) Dynamic-interactive system (varying)
- (e) Matrix.

Figure 4, Diagram outlining art systems (Source: adapted from Cornock & Edmonds, 1973, p.13)

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.

While this definition of interactivity establishes a basic context and a clear role for the user, it falls short in accommodating the ability of the artwork to absorb the user's response and in turn formulate a response of its own. The artwork in this sense is typically a system (usually a computer system, but not necessarily) created by the artist, with rules to govern how it responds to user interaction. Andy Lippman (Brand, 1988, p.46) of the Massachusetts Institute of Technology Media Lab, describes such a model of interaction as 'a conversation versus a lecture', 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' (Ibid.).

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 (2003, pp.110-111) 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' (Ibid.). 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 environment.

This idea of a physically active user is present in Erkki Huhtamo's (2004, p.6) attempt to delimit interactivity; Huhtamo suggests the word *interactive* be reserved for cases where 'active and repeated user-intervention plays a significant role in the functioning of the system'. In contrast to this physical approach to interactivity, Lev Manovich (2001, p.57) has argued that the psychological interaction of the user, should also be taken into account when dealing with the user's relationship to an artwork. He suggests, '[t]he psychological processes of filling-in, hypothesis formation, recall, and identification... are required for us to comprehend any text or image at all' (Ibid.). Manovich echoes similar sentiments expressed by Marcel Duchamp (1957, p.29) in his essay *The Creative Act*:

All in all, the creative act is not performed by the artist alone; the spectator brings the work in contact with the external world by deciphering and interpreting its inner qualifications and thus adds his contribution to the creative act.

Artists such as Yoko Ono worked both with and against such interaction, her 1964 *Cut Piece* attempting to 'move beyond the psychological interaction of art and participant[s]' (Munroe & Hendricks, 2000), and encourage real, physical participation.

Ultimately non-physical interaction is restrictive because it fails to affect the artwork, and in turn trigger the feedback loop. Consequently this approach limits interactivity to the domain of the user and denies the artwork

any response. As a result this approach is ultimately inappropriate for research focused primarily on user authorship and creativity, where evidence of such processes needs to be apparent.

Light Tracer

My practical work has involved the creation of an interactive system called *Light Tracer*, which attempts to engage and involve the user on a real physical level. My essential goal 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, quickly took form through a series of prototypes (See Figure 5). These prototypes utilised computer vision techniques to track the location of a small LED pen light using a video camera. As the pen light moves across the face of the camera, a line is drawn onscreen tracing the movement. The user is able to write, draw or doodle to create words or imagery as they see fit.



Figure 5, Screen captures depicting the basic drawing functionality of the *Light Tracer* system (Source: Author)

My research into similar projects uncovered the work of Myron Krueger, who from 1969 onwards developed *Videoplace* (See Figure 6), an augmented reality art system. *Videoplace* featured many different types of user interaction, all focused on ‘unencumbered full-body participation’ (Krueger, 1991, p.xv). Most relevant to my project was the Digital Drawing module of *Videoplace*, which allowed the user to draw on screen using their finger and erase the picture by opening their hand.

Videoplace focused on creating playful experiences, that required little in the way of user training or experience. My own work sought to function on such a level, but my focus was on creating a system which promoted user creativity.



Figure 6, Myron Krueger, *Videoplace*, Digital Drawing and Critter modules (Source: adapted from Krueger, 1991, plate 4/3)

I quickly found an array of light sources, could be used to create imagery. I discovered by accident that a desk lamp, could cause nearby objects to be illuminated and traced onscreen (See Figure 7).



Figure 7, Screen captures depicting the use of a desk lamp as light source for the *Light Tracer* system (Source: Author)

Having created this basic functionality, my next focus was on implementing this system in a way which would promote full user participation. By interacting with *Light Tracer* I began to notice my quick scrawls and tests taking on an aesthetic similar to graffiti (See Figure 8). I started to envision *Light Tracer* as something akin to a graffiti wall, where multiple users could contribute, draw, and erase its contents at will.

I began implementing further functionality to allow users to save their drawings and select the drawings of other users to edit. However I soon realised that such functionality encroached upon the fluidity of the interaction, and begin to take the form of an application complete with buttons and a kiosk. This continuum between simplicity and control became a pivotal issue in implementing my project, and something which I have addressed in my research later in the paper.



Figure 8, Screen captures depicting the graffiti like raw drawings created with the *Light Tracer* system
(Source: Author)

Through a series of tests using a projector and a large screen (See Figure 9), I began to realise a kiosk could actually distract from the interaction, despite offering the user more control and functionality. Additionally a kiosk would inhibit or shape the movement of the user when interacting in front of the screen. I wanted the user to have full freedom of movement, encouraging the user to interact at a distance from the screen which they felt served their creative needs.

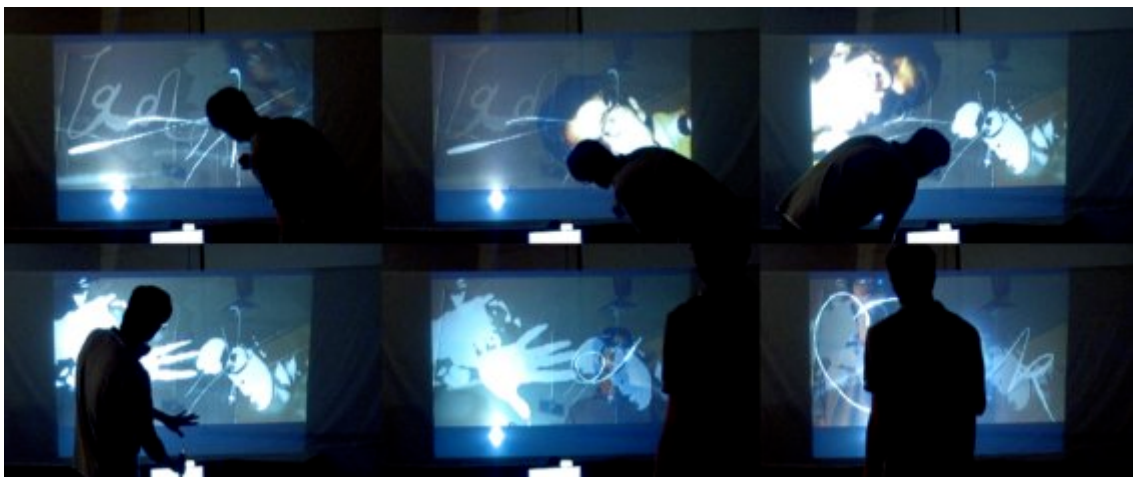


Figure 9, Video frames depicting interaction with an early test installation of *Light Tracer*. (Source: Author)

Krueger (1991, p.xv) speaks of similar goals, in attempting to create an ‘unencumbered’ environment where people can interact without wearing sensors, headsets or displays. The *Light Tracer* system attempts to involve the user by tapping into their desire to create. For that reason I felt the creativity of the user would flourish under a more fluid, less impeding system.

Part of the *Light Tracer* challenge rests upon the shoulders of the user, as ultimately how they choose to interact becomes the most interesting thing. I can anticipate people pointing lights directly into the camera or even using their cellphones to draw; but it is what I can not predict which remains the most exciting.

Interactivity as Conversation

Despite defining a scope for interactivity based on the feedback loop, the resulting definition still remains too broad, encompassing virtually any device or system taking input from a user and outputting something in return.

Krueger (1991, p.17) has stressed the need for interactivity to remain the 'focus of the work, rather than a peripheral concern'. Similarly Andy Polaine (2004), 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.

Polaine refers to a form of interactivity labelled, *branching-type interactivity* (Manovich, 2001, p.38). Using the metaphor of a tree, the user makes menu choices to access various content and sub-menus, branching further and further out with each click. However such interactivity remains problematic, as Lippman (Brand, 1988, p.49) suggests true interactivity gives the user 'the impression of an infinite database', 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 (Ibid.) argues, ceases to be *interactive* and becomes merely *selective*.

The work of the Antirom collective was in many ways a reaction to such interactivity, seen in the mass of commercial CD-ROM's produced at the time. Such works, *selective* rather than *interactive*, reduced interactivity to a mere gateway, denying the user any kind of interactive experience.

Antirom sought to address this by creating interactive works in which the interface was the content and the purpose of the interaction was the experience of the interaction, not a vehicle to access another, old-media, experience. (Polaine, 2004)

The Antirom approach to interactivity, requires a greater level of involvement from the user in comparison to *branching-type interactivity*. If as Lippman suggests, a successful model of interactivity is a *conversation* rather than a *lecture*, the Antirom approach fulfils the criteria. While a *branching-type interactive* work (such as a DVD) undoubtedly has interaction, to imagine it as a conversation comes at a stretch. Burnham (1969, p.96) further encourages this metaphor of conversation-like interactivity, labelling it, 'a dialogue where two systems gather and exchange information so as to *change constantly the states of each other*'.

By framing interactivity as a *conversation* which requires the user and the artwork as active participants working simultaneously, a *voice* is given to the user. With this voice the potential for creativity and authorship exists, governed by the rules set forth by the artist.

From Art Object to Art Experience

Having established the potential for a user to author and be creative within interactivity, what it is the user produces still remains unclear. As Polaine (2004) noted earlier, the reason for interacting was the interaction itself; to achieve this, interactivity typically employs a generative system capable of responding in a procedural and autonomous way to user interaction.

Such systems mark a shift away from more conventional art, where authorship and creativity by the artist culminate in a physical art object. Burnham (Shanken, 1999, p.157) describes such a system as 'an attempt to produce aesthetic sensations without the intervening "object"'. In generative systems, the art object could be

defined as the system itself, which houses rules, procedures, and processes defining its output each time it is run or triggered by the user. Adrian Ward and Geoff Cox (2003) state:

The output from generative systems should not be valued simply as an endless, infinite series of resources but as a system. To have a machine write poetry for ten years would not generate creative music, but the process of getting the machine to do so would certainly register an advanced form of creativity.

Ward and Cox (Ibid.) further expand upon the ideas of Walter Benjamin (1936, pp. 211-244), noting that in an age of infinite reproducibility a crisis of value results, in which it is argued, the process of creation itself becomes valued.

In interactivity this process is inherently tied to the user, given that an interactive system without a user has minimal output if any at all. The user therefore becomes a prerequisite for the process of interaction to occur; the process itself now becomes the artwork, an experience as opposed to a physical object. Ascott (2003, p.110) notes this shift 'from the field of objects to the field of behaviour', and further denies any finality to the artwork by claiming it 'exists in a perpetual state of transition' (Ibid., p.111).

With the shift from art object to art experience, the expectation to produce a final art object is removed. This expands the notion of what authorship can be, beyond the production of a physical object. Ascott (Ibid.) suggests that while 'the general context of the art experience is set by the artist, its evolution in any specific sense is unpredictable and dependent on the total involvement of the spectator'.

Engaging Experience

My practical work aimed to encourage the user to become an active author and creator, however I needed to discover whether such a system could really spark the user's interest and get them engaged creatively. Defining what constitutes an *engaging* interactive experience, is in itself a difficult question which I felt merited further investigation.

Video/computer games or gaming (as it is commonly called), are one form of engagement which has steadily grown in popularity. 'Americans named videogames as their favourite form of home entertainment for the third year in a row in 1999' (Poole, 2000, p.6), surpassing, TV, movies, reading, and video rental (Ibid.). The popularity of gaming is evident in the surprising fact 'that worldwide games sales, at around \$20 billion a year, now exceed movie box-office revenues' (Economist, March 2004).

What makes gaming so engaging, is for the most part to do with competition, goals, and scoring as opposed to any sort of authorship or creativity. This remains particularly true for console based games, which are dominated by action and sports titles (ESA, 2005). One notable exception is the Sony EyeToy (See Figure 10), for PlayStation 2. The EyeToy functions with a web camera plugged into the console, allowing users to interact with a range of 'games' in real time. The web camera image is fed into the console and analysed to detect the location of your body; this data is then in turn used to create interactive game-play. The complexity of the game-play ranges from simple co-ordination exercises, to more involved competitive game structures like *AnitiGrav*, a full body movement hover-board game.



Figure 10, The EyeToy for Sony Playstation 2 (London Studio, Sony Computer Entertainment Europe)

Several titles for the EyeToy have a slightly different focus than the more conventional goal/score orientated games, moving into the realm of authorship and creativity. Included on the EyeToy *Play* disc are several mini-games which allow the user to play various ‘musical instruments’ such as the drums, turntables, and the ‘air-guitar’ (See Figure 11). Aside from the novel way of interacting to ‘play’ these instruments, the user is quickly engaged in the interaction due to the speed at which they can begin to produce pleasing sounds and rhythms with little or no conventional training. However rather than being simply freestyle jamming, the *Play* series of mini-games do incorporate a basic scoring mechanism flexible enough to accommodate the creativity of the user.

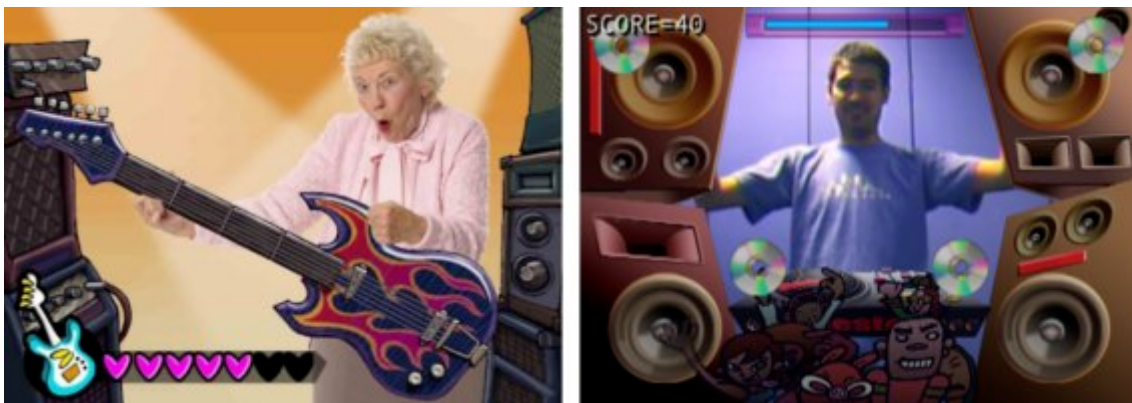


Figure 11, Screen captures of the *AirGuitar* mini-game, from the EyeToy *Play* title (London Studio, Sony Computer Entertainment Europe)

Another EyeToy title, *Groove*, is a dancing game where the player dances and moves to the beat of the music, while being tracked by the EyeToy camera. *Groove* follows on from the hugely successful arcade dancing game by Konami, *Dance Dance Revolution (DDR)* (See Figure 12). *DDR* uses pressure sensitive foot-pads to judge the dancing ability of the user and its popularity has created a subculture of players who show off their dance moves to others (often crowds) at the arcade. Steven Poole (2000, p.186), author of *Trigger Happy* notes that, ‘[t]he best of them combine[d] the moves required by the game with their own creative gestures and twirls’. Many of these dance moves such as looking away from the screen or triggering the pressure pads with your hands, do not

actually add to your score but are performed for cosmetic reasons. Such enthusiasts can compete in DDR freestyle tournaments where players develop and perform dance routines which follow the steps in the game. While the primary goal of *DDR* is to compete for a high score, players of the game move beyond this into the realm of creativity and authorship.



Figure 12, *Dance Dance Revolution* arcade game machine and a screen capture of the onscreen interface (Konami Computer Entertainment Japan)

Competition and goal based games dominate the market for the very reason that they produce the most engaging and immersive interactive experience for the user. In a rhetorical question, Grahame Weinbren (2002, p.183) asks: ‘What is in the compulsion to play and replay the game, missing appointments, losing sleep, sacrificing meals, companionship and even sex?’. Weinbren ultimately attributes it to the user’s desire for *mastery* of the game (Ibid.).

Creative Obsession

Competition and goal based games are not alone in their ability to engage and potentially induce obsessive behaviour. Such obsessiveness is often associated with creativity, which within the field of psychology is identified as involving ‘unusual, seemingly deviant psychological processes, that lead to highly positive outcomes’ (ed. Rothenberg & Hausman, 1976, p.4).

Within interactivity it is useful to examine what engages people creatively and induces them to spend their time and energy interacting. *Glyphiti* (Deck, 2001), is one such interactive piece where the user is invited to create and contribute to an online pixel based drawing (See Figure 13). *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 manipulate it by clicking and toggling the pixels between black and white.

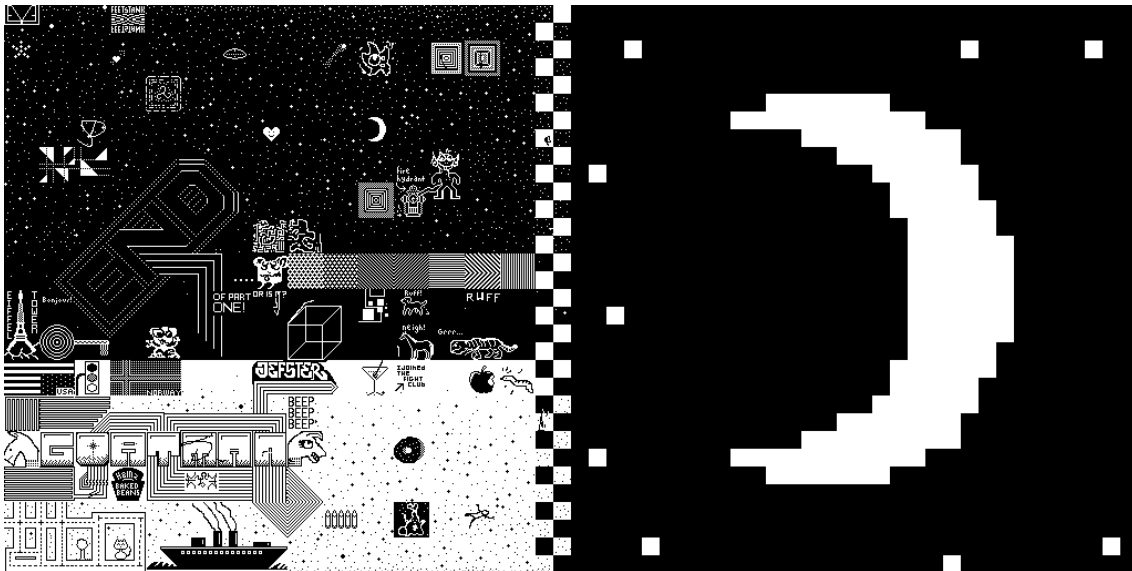


Figure 13, Screen capture from *Glyphiti* (Deck, 2001). On the left hand side is the main image, composed of smaller tiles which can be clicked on and edited in a larger format, on the right hand size.

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 14). As the *Glyphiti* system saves a copy of all imagery, it is possible to browse through the archives (See Bibliography for URL), and observe the amount of time and energy users have put into the drawings. In addition, because *Glyphiti* is an open multi-user system, there is no guarantee that what is created will remain in the system for any length of time; it could well be erased by another user shortly after completion.



Figure 14, Archived screen captures from *Glyphiti* (Deck, 2001), illustrating the potential complexity of the user drawings.

Given the volatile nature of the drawings created, it can be assumed that the user derives enjoyment from the process itself, in which creativity plays a major role. The user is invited to express themselves in a public forum, much like a kind of legalised graffiti. *Glyphiti* differs in that it augments the user interaction, allowing multiple users in geographically separate locations to be together in front of the same 'canvas' quickly and easily. Using Krueger's earlier criterion, *Glyphiti* can be judged at least partly successful based on the level of participation from its users and moreover its 'ability to interest, [and] involve' (Krueger, 1991, p.17).

Balancing Interactivity

Despite the desire to create, the process itself can seem more like a chore as opposed to EyeToy-like fun. Ideally an effective piece of interactivity will firstly provoke the user to interact and hence forth provide a fluid and fulfilling experience. Important to this is finding an appropriate balance between the difficulty of the interaction and the resulting complexity of the piece. While simple interaction may be accessible to a wider range of users, such interaction inherently produces 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. Interactivity relies heavily on the balance between these two properties; a user frustrated by the difficulty of the interaction will soon give up, as would a user bored by limited possibilities of interaction. Somewhere in between the two 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.

Csikszentmihalyi (1975, p.49) calls this sweet spot *flow*, when an individual's challenges are in balance with their skills (See Figure 15).

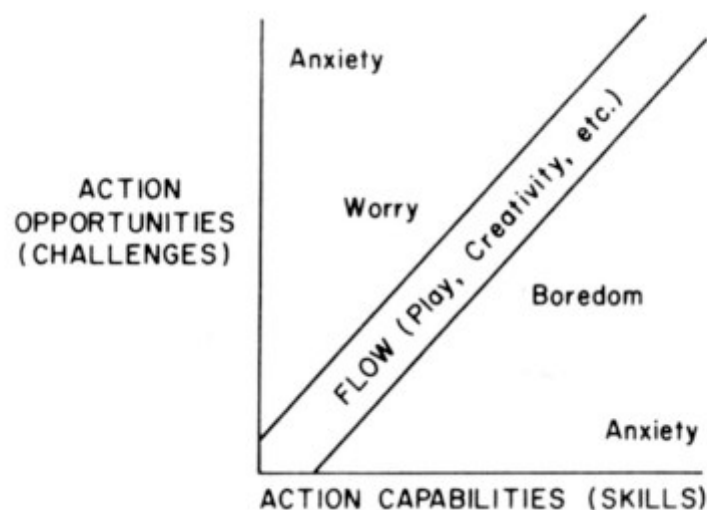


Figure 15, Model of the flow state (Source: from Csikszentmihalyi, 1975, p.49).

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.

Creativity as Engagement

The MIT Architecture Machine Group developed *Aspen Movie Map* (1978-83) (See Figure 16), is a notable first example of an ‘interactive virtual navigable space’ (Manovich, p.259). Using a touch-screen the user can virtually navigate their way around the city of Aspen, Colorado, driving down its streets and taking left and right turns at will. While undoubtedly an important work, *Aspen Movie Map* has inherent limitations; users wishing to fly for example, cannot simply launch off for an aerial view of the city. Interactive artist David Rokeby (1995, p.141) astutely remarks, ‘[b]y relinquishing a relatively small amount of control, an interactive artist can give interactors the impression that they have much more freedom than they actually do’.



Figure 16, Images and screen captures depicting *Aspen Movie Map* (1978-83) developed by the MIT Architecture Machine Group (Source: adapted from the laserdisc *Discursions* (Architecture Machine Group, 1983)

This in-between area of *selective* interactivity remains problematic; the user, lured by the promise of interactivity is all too often left frustrated or disappointed by either the limitations of their role as user or the limitations of the system (leaving the user wondering, ‘what if I could do this?’). *Aspen Movie Map* and the many similar works (such as interactive-cinema etc...) which exhibit this level of *selective* interactivity, fail to engage the user on a creative level simply by not offering them the chance.

The hugely popular video game series *Grand Theft Auto* by British developer Rockstar North, in many ways continues on from *Aspen Movie Map* in the format of a game. Game designer and researcher Gonzalo Frasca (2003) notes that ‘freedom’ is very much a key word associated with *Grand Theft Auto 3*; players are able to roam vast cities, enter buildings, steal cars, and even have sex with prostitutes. Frasca (Ibid.) notes what makes *Grand*

Theft Auto 3 different from other games is the ‘freedom to explore but also to experiment’; further noting the implications this has upon authorship:

When designers create a simulation that encourages experimentation, they are taking a huge authorial risk: trusting their players. Traditional authors are like overprotective parents: they do not trust their children enough.

It is exactly this bestowment of trust which Frasca finds refreshing in *Grand Theft Auto 3*, the openness of the system and the invitation to participate the way you want to. Csikszentmihalyi (1975, 1990), in his research into defining optimal experiences, talks of the need for people to feel they have the ability to affect their surroundings and be equal partners in this relationship. ‘A person who feels carried along by powers beyond his control resists these alien forces and experiences them as inimical’ (1975, p.194). Csikszentmihalyi determined that *flow*, was experienced in activities which ‘...offer[ed] high degrees of control in rather narrowly defined areas of experience’ (1975, p.195).

While competition based games fulfil this criteria, an alternate lies in the form of interactive experiences, such as the EyeToy, which offer the user an accessible outlet for their creativity. The brilliance of the EyeToy’s interactivity lies in how immediately satisfying the interaction is, regardless of age, gender, or skill levels. A large part of this satisfaction results from the openness of the experience and the latitude for the user to be creative.

From his observations of people experiencing *flow*, Csikszentmihalyi (1975, p.32) contrasts the motivation aspects of creative and competitive activities:

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.

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.

Conclusion

Much of the current discussion hinges on how we define creativity itself; while this question is beyond the scope of this paper, I suggest that a broader view of creativity is required beyond traditional views of special talent or genius (ed. Rothenberg & Hausman, 1976, p.7).

In dealing with software art, Burnham (1969, p.119) suggests what remains interesting is how ‘a dialogue *evolves* between the participants - the computer program and the human subject so that both move beyond their original state’. This mutual evolution and sense of progression, hints at one form of collaborative creativity. Rokeby (1995, p.137) further suggests that from an extreme position, significant interaction ‘cannot be said to have taken place unless both the spectator *and* the artwork are in some way permanently changed or enriched by the exchange’.

While the artwork is inevitably changed by user interaction, it remains more difficult to assess if the user is enriched by such an exchange. Interactive systems such as the EyeToy and *Glyphiti* attempt to reach the user by

tapping into their everyday desire for creative participation. *Glyphiti* in particular relies entirely on the creative participation of the user, without which it remains an empty shell devoid of content.

At various stages in the production of my work the challenge has been to achieve the right balance in restricting or ceding creative control to the user. In many ways my goal was to deliver both simple, fluid interactivity, empowered the user to create in diverse ways. In actuality I found that one compromises the other, introducing more functionality encroaches upon how fluidly we are able to interact. Rokeby (1998) recalls similar issues with early versions of his interactive sound installation *Very Nervous System* (1986-1990):

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.

Rokeby’s conclusions are similar to the more general research conducted by Csikszentmihalyi; Rokeby notes the need for the user to feel that their actions have a consequence and are not acted out in vain. Overly complex interaction he notes, begins to mask the interactivity altogether, as the user fails to link their actions with the reactions and feedback from the system. Rokeby (Ibid.) concludes:

In retrospect, the problem seems to have been a linguistic one: people were unfamiliar with the language of interaction that I gave them. Simplifying the language of interaction by reducing its variables let people recognise their impact on the system immediately. With repeated exposure, the user could handle and appreciate more nuanced levels of interaction. In time they could appreciate the flexible, expressive power I’d been trying to offer in the first place.

Rokeby hints towards a language of interactivity where partial responsibility for learning the new language lies with the user. To achieve a fulfilling and engaging experience, the user must themselves learn, engage, and participate to make that happen.

Creating the initial spark of interest to engage the user, can I believe be brought about by allowing the user a latitude to create and contribute some of *themselves* to the work. Rokeby (1995, p.133) labels interactive technology a *mirror*, ‘[t]he medium not only reflects back, but also refracts what it is given; what is returned is ourselves, transformed and processed’. In this sense our interest is sparked by our own involvement and maintained by the new perspective of ourselves offered through interaction with the *mirror*.

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.

Light Tracer attempts to tap into this, making the user responsible for what *Light Tracer* outputs. Additionally from my point of view as creator, giving control back to the user is the most satisfying experience; I can only look forward to seeing what will be produced.

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