a series of dreams

An Exploration of Choice and Craft in the New Media

Copyright notice: This article is a work in progress and is not to be published without the author's permission. Small excerpts may be cited in other works, with attribution. All graphics and images referenced for critical purposes herein belong to their original creators and may not be used without their permission.
Abstract

We are present at the birth of a new medium, or rather, a brood of new media. This is a unique opportunity, and like any opportunity it comes complete with its own challenges. The one that attracts me is the challenge of understanding the nature of the new media. There is something happening here, and we don't know what it is - yet. However, we are finding out. This is an important task. An understanding of the emergent esthetics will help artists to create, critics to understand, and users to enjoy. We all need a sense of the inherent capabilities, parameters, and imperatives that are being discovered.

The structure of choice is the defining esthetic of interactive media. The foundation of interactive craft is the design and presentation of choice. Interactive producers implement choice at various levels: their major structural decisions of narrative flow, their instrumental decisions about interface design, their detailed decisions on the fine points of interaction and play.

In order to address this task, this paper reviews some of the key esthetic variables that inform the design of and play of choice in the new media: interface, interactivity, structure, and outcomes. It uses these concepts and terms to examine an interactive multimedia work: Ceremony of Innocence\(^1\) (Real World MultiMedia (http://www.realworld.co.uk/rwmm/ceremony/index.html), 1997; Alex Mayhew, Gerrie Villon).

More work has to be done on both close studies of interactive works, and the development and consolidation of a critical framework for the analysis of interactive esthetics.

I stare at the screen, transfixed. In the dark frame a goblet stands, filled with clear water. Swimming in the goblet is a goldfish. It languidly traverses its narrow world, occasionally stopping to rest, or just to be. I don’t have high expectations for fish, and neither it seems, do they. This fish, however, is beautiful, and is the perfect fish for me. It seems alive, it is pleasant to watch, yet it doesn't smell, it requires no care. It is quite content to live its half life, asking nothing of me - except that I enjoy it. A bargain...

The sound is carefully constructed to add to the experience. It is quiet, subtle, and soothing. Careful listening (not easy - conscious awareness of the sound requires attention and concentration - defeating, I think, the intent of the sound's designer) reveals why it soothes. The top layer is the sound of the fish itself. A quiet bubbling and swishing of water as it moves, subsiding when the fish stops. Underneath this are layers that will not reveal themselves, that skirt on the edge of audibility. The intensity and clarity seem to pulsate with a slow rhythm, but they always stop just below the level of clarity. They evoke surf, a heartbeat, perhaps a harp being softly tuned.

I explore the fish's world, motivated by two factors. First, this frame stands between me and the story. Griffin and Sabine await, and I am indeed curious. My road to their world passes through this puzzle. More immediately, however, I am curious about the
fish’s world on its own terms. It elicits interest, encourages exploration. It is a clean world, a wine goblet on a black surface, a subtle blacker shadow with a faint refraction confirming the movement of the fish.

This world is framed and dimensioned, a series of comfortably and symmetrically nested rectangles. Its outer edge is the familiar boundary of my powerbook - my vehicle and my eyes (a tricky little roadster cruising the information highway, my personal window to the myriad forking paths of information realities and surrealities). Within its familiar rectangle (1024 x 768 pixels, our culture’s new golden mean, at least until the next generation of display units comes out) is nested a large black outer border. This border area takes up about half of the screen, but it has no light, so it doesn’t exist. Within this black outer border, there is an inner border of dark grey. Like its neighbor, this one takes up screen space, but makes no impression of existence. Instead it mutely presents the active stage. For nested inside the inner grey is a thin white picture frame, the real window to the fish’s own world: goblet, fish, and shadow...

I move my cursor, beginning my exploration. The cursor travels freely through the outer black, into the inner gray. The fish languidly cruises its narrow orb, the sounds sussurate, and I navigate. I go further towards the fish (its wine goblet secure in its black frame, slightly off center to the right). I pass through the grey, over the window frame, and I (or my agent - the cursor) move within the black of the fish’s world. I traverse the shadow and approach the glass. As I roll over the edge of the glass and the water within - the fish is agitated! It commences to flip and stretch and twitch, hopping and splashing within its narrow pool. It never breaks the surface, but it continues its thrashing as long as my cursor stays over the water. I can hear the splashing, the music changes tone. The fish feels the intrusion of my little arrow, and doesn’t like it. I test the boundaries - it tolerates my stroking the stem of the glass, and the shadow, and anything else on the screen. However, if I go over its water, its personal space, it reacts immediately and continuously, stopping only when I leave its virtual liquid boundaries.

I begin testing another parameter - a mouse click (a mixed metaphor if ever there was one) - what will that lead to? It turns out the response to a mouse click has a clear spatial hierarchy. Mouse clicks in the outer black border produce no sound and no visual reaction. As I move towards the center (and the fish) the clicks elicit more reaction from the screen. A click in the inner grey border is still silent, but the cursor pulsates to acknowledge my intervention. A click within the frame, in the black shadow world of the fish, produces both a sharp clicking sound and a visual pulsation.

Clicks on the glass itself produce a crisp ting, exactly as you would expect, sharp and musical.

Now it has my attention...

A second click, at the base of the stem - a duller ting, still tonal but dull. As I go up the stem, a slight increase in the melodic quality. Then I hit the bottom of the goblet, and the music returns to the ting. It is a sweet note, fully consistent with spring water in fine
crystal. Meanwhile, as my cursor is back over its private sanctum, the fish is noisily flopping and thrashing. I move up the edge of the goblet, click again, and am rewarded with a higher and purer note. I go to the edge of the glass, the lip of the goblet, and there I get the most melodious of results to my click.

This is very nice, so I try one more...and....

SHATTER!

CRASH !!!

SPLASH!!!!!

The glass shatters, water explodes, droplets fill the inner picture frame... I feel a chill run down the back of my neck, my hair stands on end.
The fish remains suspended in midair momentarily, then calmly swims to screen left. When it reaches the far left edge of the picture frame, it turns sharply to its right and disappears in back of the picture frame. A demi-moment after the fish leaves, the picture frame itself swivels horizontally, pivoting in the wake of the fish, following the momentum of the fishes exit. This pivot reveals the back side of the picture frame, where I see - Griffin's post card...

I am back in the main story. As I scrunch my eyes to decipher his letters, Griffin begins his voice over. I relax and let his words roll over me. Griffin is confused. He writes to Sabine: "...should I know you?". I had been wondering the same question, but like Griffin I will have to wait for the next post card to find out. To be exact, he will wait, I have to solve the next puzzle. As I wonder what it might be, Griffin's reading ends. His voice trails off, there is a pause of half a beat, and the fish swims in from screen right. It casually swims over the card and exits screen left. The ink is smudged where it has passed...

This vignette begins to illustrate the artistry and the craft in *Ceremony of Innocence*. The beauty of this work manifests at several levels. It is revealed most profoundly in the details of the interaction design. Viewer response has been carefully crafted. The account above demonstrates the role of the mouse clicks in leading you to the fish and the glass. However, this move has been anticipated, its likelihood amplified.

The visual layout would bring your eye to the glass even in a still photo or painting. The monochromatic world, blacks and dark greys, with a bright goldfish floating just off
center (relying on the old cameraman's rule of thirds to find the frame's visual sweet spot). A very strong composition, strengthened by the nested series of frames, corners forming diagonals, drawing the eye swiftly to the fish. Where the eye goes, the mouse will follow, as it inevitably does.

The use of sound adds resonance to the shaping of behavior. The ascending order of audio interest also draws you to the fish: silent click, audible click, dull ting, melodious ting. Once you start the tings, you are as hooked as any of the subject's cousins. It sounds very nice, and you want to hear more. The pleasure of the sound is amplified by its mimicry of the real world version. Tinking on glass is one of life's real (albeit small) pleasures. This experience feels like the same exploration, with the same childish delight in the results and the variations. The shatter, when it comes, is heard by a small child who has just gone a bit too far - regardless of how old you actually were when you started your exploration.

I believe the thrill is two-fold. For a moment the viewer probably feels somewhat abashed that she has broken a fine (albeit virtual) goblet. The real joy, however, is the naughty pleasure of an active and vital child, whose curiosity has led them to an act at once forbidden and supremely satisfying. The child in us delights at breaking glass, splashing water, and freeing a magic fish.

The ambient sound plays its own role within the larger piece. It is a soothing background, and it sets off and highlights two other events. The ambience blends with the fishes quiet burbling. This combination is broken by the splashing noises the agitated fish makes when it is disturbed by your intrusive cursor. This same contrast comes into play in setting up the dramatic effect of the shattering sound. Finally, the shatter is amplified most strongly by the silence which follows. The absolute lack of ambient sound is a noticeable void, and provides an effective punctuation to the emotional climax of this piece.

The transition to the postcard has its own artistry, although it is not concerned with shaping our behavior. This is the visual artistry of the cinema and surrealism. The fish swims out, breaking the framed boundary of its narrative world. It then pivots and swims in back of the picture frame, thus migrating from the two dimensional reality of its earlier frame to a more three dimensional existence. This pivot and move to screen right triggers a following move - the picture frame pivots and seems to follow the fish. This sequence has the precision and momentum of a good thirties film wipe. Like a good film transition effect it both signals and motivates a change of scene. We go from the fish puzzle to the narrative world of the lovers' post cards.

Griffin and Sabine's story is told through an exchange of post cards and letters. The messages alternate, one from Sabine, the next from Griffin. Before the viewer can read a card or letter, he or she must solve an onscreen puzzle. The solution of the puzzle (in this case the shattering of the goblet and the freeing of the fish) is followed by the presentation of the next post card or letter. The words in the print message are also read aloud in a voice over by Griffin or Sabine.
The fish sequence is the second puzzle of the story. The first puzzle was a parrot, and its successful solution led to the initiating post card. In the first card Sabine tells Griffin it is good to get in touch with him at last, asks for a fish postcard, and agrees that the wine goblet was the right vehicle for the fish. Immediately after reading/hearing that first card, we are presented the fish puzzle above, which in turn leads to the second post card. In the second card, Griffin expresses his confusion over this unknown woman's message. It came out of nowhere, and referred to details of his graphic design work known only to himself. His message politely asks who she is, and how she knows of his life.

This short reply begins the narrative dance between the protagonists, carried out in a series of letters and cards. Each message is punctuated and guarded by a visual puzzle that must be solved. For now, the narrative advance is brief - Griffin knows Sabine exists, but has no idea of who she is, or how she came to know of his life. As a final touch of visual wit, as soon as we are done with reading the card, the fish swims back into frame and smudges of the letters as it passes. It is time for the next puzzle...

The craft in Ceremony of Innocence is considerable, and draws from many disciplines. A partial list would include writing, calligraphy, graphic design, illustration, photography, cinema, music and theatre. As in any fine work, these varied skills and sensibilities are blended in a manner that is harmonious and effective. The key skill, however, comes from a new discipline, being forged in a variety of new media platforms. That skill is interactive design - the structuring of choice.
though the rules of the road have been lodged  

it's only people's games you got to dodge...  

It's all right, Ma, I'm only bleeding  

Bob Dylan, 1965  

Choice and the New Interactive Media

The structure of choice is the defining esthetic of interactive media. All media have many esthetic parameters. These esthetic parameters (such as composition, narrative voice, dramatic structure, quality of light) are shared between media. However, some parameters are so uniquely central to the understanding of a given medium that they serve to define that medium and to differentiate it from other media. Photography has been called "painting with light" for a good reason. The ability to see and to structure light is central to black and white photography in a way that it is with no other medium. Filmmaking's central esthetic variable is the structuring of time. The capture and the combination of pieces of time is the essence of the filmmaking process. This is not to say that these core esthetics are the only ones that producers use, or even that they are the most important for every phase of every work. Photographers can not ignore composition, nor can filmmakers ignore the use of sound. Nor can they (or other creators in other media) ignore the myriad of other esthetic considerations. However this ubiquitous pluralism of creative sensibility doesn't detract from the central contention of the argument. Some esthetic variables are uniquely and intimately tied to the essence of certain media.

In this regard, the foundation of interactive media is the design and presentation of choice. Interactive projects are being produced across a wide range of platforms: CD-ROM, DVD-ROM, World Wide Web, proprietary game stations, and other digitally based hardware/software combinations. They are being designed in a variety of forms with endless permutations and combinations: games, virtual realities, on-line communities, interactive movies, educational/informational environments. In all of these projects, the producers have a variety of design and implementation decisions to make. However, the possibilities and concerns that are uniquely emergent in these new media are those involved with the structuring of user choice. This creative consideration defines the new interactive media. Skill in this area is a necessary condition for the success of a particular work. Increased collective understanding is critical to the growth of the entire class of works. (footnote 1 - Marty Behrens Story, Banff Interactive Screen, 1996) This paper considers the esthetics of interactivity and choice from several perspectives. We have already seen how choice was shaped and experienced in the story of the fish. In this section we will review the role of interface, examine some of the parameters of interactivity, analyze several structural variations in the architecture of choice, and consider some of the goals that motivate interactivity and choice. The language and concepts developed will then be applied to the interactive CD-ROM Ceremony of Innocence.
Interface

Interactivity can be defined as the involvement of more than one entity in an exchange of related actions that have a measure of reciprocity. An entity acts, a second entity acts in response, and the first entity responds in turn. This interactive cycle can be repeated across time, and can be extended to include more than two beings. If one of the beings is a computer, the communications loop between the entities requires careful attention. (The same is true if both or all of the entities are human beings, but thankfully that is outside the consideration of this paper.) The conduit for this communications loop is the interface. Brenda Laurel defines interface at the simplest level as "the hardware and software through which a human and a computer [can] communicate". She adds that the interface reflects the physical properties of the interactors, the functions to be performed, and the balance of power and control. (Laurel, pg. xii-xiii)

Good interactive designers design the interface with the user clearly in mind. The designer's task is to select the information to be presented, the modes of presentation and feedback, and the range of user choices that will be accommodated. In order to do so, they put themselves into the place of their audience, and anticipate audience interest and reaction. Brenda Laurel poses the key question interactive designers ask themselves: "what does the user want to do"? (Laurel, pg. xiii)

Jakob Nielsen stresses usability in interface design. He defines usability as a combination of five factors. A good interface should be easy to learn, easy to remember, efficient to use, resistant to error, and subjectively satisfying. (Neilsen, pg. 26) Kahn, Peters, and Landow address the relationship of usability to user orientation. They stress the importance of visual signals for link presence, link destination, and link mapping in the design of hypertext (Schuler, Hannemann, and Streitz, pg. 167).

Interface design is a multimediated discipline. All the component media (text, graphics, sound, photography, moving image) can be used for interface functionality. This use of mixed media offers the opportunity to engage the user's senses in a variety of modes. For the interface design decisions, this capacity for increased mediation must be balanced with the imperatives of simplicity and consistency.

The same media can be placed in the service of narrative and story. There is more leeway in the broader interactive production for richly multi-mediated development of content, mood, character and story. For these tasks, interactive producers will rely on the esthetic skills and sensibilities developed in earlier multi-mediated forms such as magazines, comics, theatre, cinema and television.

The interface is the conduit through which choice is presented, enabled, and effected. It remains the user's vehicle for navigating and manipulating a larger narrative environment. The interface must be consistent with the design of the entire environment within which the experience plays out. Interface design considerations are a necessary and enabling subset of broader creative decisions concerned with environment and content.
Interactivity and choice

Janet Murray (Hamlet on the Holodeck) examines many of the larger concerns about the characteristics and the pleasures of digital environments. She wishes to develop sensibilities that will connect new media producers with the long human tradition of narrative and story. In this regard she addresses questions around the design of users' actions and choices within these environments. She feels that "interactive" is a vague term, and prefers a combination of two other terms: procedural and participatory. Computers are fundamentally rule-based engines. These rules accommodate the participation of human beings with greater or lesser facility. A pleasurable experience will include the structuring of rules that encourage and facilitate participation. Murray calls for rules that help interpret a recognizable world, that shape players' expectations and behaviors in ways that are dramatically satisfying, and are easy for writers to use.

Murray also writes about the phenomena of immersion. She first describes immersion as a "pleasurable surrender of the mind". She contrasts the digital version of this pleasure with the older (from Coleridge) concept of "suspension of disbelief". Murray sees this concept as too passive in the context of traditional media, and certainly inadequate for interactive media. She prefers the formula "creation of belief", reminding us of the interactor's (her term) participation in the process. She traces the term immersion to its metaphorical roots: the physical experience of being submerged in water. Murray stresses the potential delights associated with immersion: delight in a new world, learning to move within it, a flooding of the mind with new sensations, a suppression of the mundane reality of the verbal brain.

Murray associates immersion with two characteristics of digital media. She says computer based works can be both encyclopedic and spatial. The encyclopedic aspect enables digital storytellers to "offer a wealth of detail", multi-threaded stories, and multiple points of view. The spatiality of digital environments allows for a development of a manifold canvas (even in text-based digital stories) upon which narrative can be painted and discovered.

Bizzocchi labels a similar concept "information in depth" (Bizzocchi, Bizzocchi, and Quinlan; pg. 18), although "narrative in depth" is a better term. He points out that narrative elements can be embedded within the scene. A virtual apartment can have an answering machine, a diary, a shoebox full of pictures, or any number of quietly efficient distillations of daily experience and emotion. All of these are ready to be explored. Each contains narrative information. Each carries details that add resonance to character and depth to plot. These are opportunities, not add-ons. Their role is not to merely embellish the main narrative line. They are channels for the exercise of user choice. As such, they are an intrinsic essential of interactive narrative craft. This canvas of user choice differentiates interactive media from earlier multimedia forms such as film and television. "The ability to include narrative detail and sub-detail will be more akin to the capabilities of the novel than the film... The sidebar will be an art form, and subtext a narrative imperative".

©1999 Jim Bizzocchi
Structure and choice

Many theorists and critics have examined the question of choice at the macro level, treating it as a structural parameter. These critics extrapolate the experience's flowchart or storyboard from the play. They use this analysis to reveal how the creators have structured choice into decision points, action triggers, links and branches. These critics have identified many structural models that describe the play of choice and decision in interactive experiences.

The most common model (in terms of theory, if not practice) is the tree-branch or pyramid (Crawford, Phelps, Sawyer & Vourlis, Wimberley & Samuel). In this model the user reaches a choice point, and goes down one of two (or more) separate paths. Each path in turn has its choice points, which lead to sub-paths, and so on, and so on. This Borgesian model is intellectually compelling, narratively interesting, and relatively simple to explain.

A practical limitation to this model is the law of geometric progression. The model is difficult (or impossible) to produce in any significant scale. There are many reasons why story is full of "roads not taken". The mundane one is that no one has the time to build all the roads, or even a reasonably interesting approximation. Like a "complete" hypertext or a perfect virtual reality for Bukatman and Moulthrop (Moulthrop, 1995), the construction of pure and complete branched choice is the holy grail of interactive story models. An attempt at a completely open-ended branched world is the collaborative web site Addventure.

A further difficulty in any branched model is the explicit presentation of choice. It is hard to offer choice without disturbing the flow of the play. A common experience has the player ‘running’ the main character, perhaps moving him through an environment, deciding whether to pick up an item or engage in a conversation (Under the Killing Moon, In the Third Degree, Diablo). The challenge is to present choice points while minimizing the loss of the immersive experience.
The critics' categorization of other story models can be organized into a rough hierarchy, with the level of structural choice increasing down the list:

- annotated linear
- foldback
- obstructionist
- nested funnel
- parallel structures
- web
- simulations

An 'annotated linear' construction (term adapted from Phelps) is a storyline that is essentially linear, but which has embedded enrichments or information. An example of this is the CD-ROM *The Complete Maus* or the www essay *Digital Archives and Sibylline Fragments: The Tempest and the End of Books*. The other term Phelps uses for this model is "advanced footnoting".

A 'foldback' structure (phrase from Crawford) looks like a separate branch, but very quickly returns you to the main story line.

![Simple Foldback](image)

*(From Crawford)*

Crawford calls this strategy "false choice", but points out that it does address the logistical nightmare of the full blown tree-branch model. Wimberley and Samsel call a richer version of the foldback model the 'cul-de-sac'. The foldback appears in many interactive works, with wide variations of sophistication and complexity.

![Cul-De-Sac](image)

*(From Wimberley & Samsel)*

Crawford assigns the label 'obstructionist' to a popular variation on the cul-de-sac or foldback model. An obstructionist structure is a linear structure with a puzzle that must be solved before the user can advance. He is disdainful of this variation as an interactive
structure, calling it "Skinner Box" interactivity and a "fad". I don't agree with this global value judgement, for reasons which will I will address later in this essay. *Ceremony of Innocence* fits within this category.

![Obstructionist](from Crawford)

The challenge with all these variations is the management of transition. If annotations are key to an experience, the user must somehow be impelled to follow them. If many annotations are presented, will following them create a sense of choppiness, or confusion? In a foldback narrative, is the return to the main story forced, or can it be made to feel natural? (*The End of Books* deals with this question through the use of html's frame function. The user is grounded during the side trips, because the main argument is always present.) In an obstructionist format, is the negotiation through the obstructing element consistent with the feel of the central narrative arc?

It is not enough simply to create a series of discrete experiences from which the interactor chooses. Presentation is the key. Choice has to be integrated, motivated, and properly cued in order to maintain the immersive experience. Broderbund's *Living Books* series and Organa's *The Book of Lulu* are good examples in this regard.

The 'nested funnel' (from Phelps) is a more structurally (and narratively) sophisticated variation on the foldback model. If enough information, story, and interactivity are built into the foldback, what was a cul-de-sac begins to take on a narrative resonance of a different order. The contained space becomes an interesting world of its own, fully worthy of exploration and play. The structure of the overall work can then be seen as a series of rich and self-contained subworlds strung together in a line, with a narrow decision gate leading from one to the next. Other terms and descriptions for this structure are 'exploratoria', '"arenas', and 'free worlds' (Wimberley and Samsel); 'multi-threaded with pre-set branch points' (Platt); and my favorite, 'String of Pearls' (Garrand). Examples of this structure include the CD ROM titles *Myst, Discworld, Johnny Mnemonic, and Shelly Duvall Presents Digby's Adventures*. 
Variation on Nested Funnel
(Freewold Model from Wimberley and Samsel)

Some interactive works use 'parallel structure' (Sawyer & Vourlis) to develop two or more coequal narrative streams. These narrative streams may or may not explicitly intersect. Phelps calls the non-intersecting narratives 'multilinear' and the intersecting ones 'braided multilinear'. Examples of parallel structure narratives in linear forms are Rashomon (film) and The Norman Chronicles (television).

Parallel Structure
(From Sawyer & Vourlis)

Interactive works using parallel structure limit the user’s choice to the selection of alternate threads of parallel action to follow at a given time. As in the other interactive structures, the creators are challenged to skillfully motivate and present the choice points. Murray stresses the importance of developing conventions and managing expectations (Murray, p. 159). These strategies are methods for managing and channeling user choice. In a broader sense, the narrative material must be robust enough to support a central arc, develop a relationship between the parallel streams, and integrate the parameters and mechanisms of juncture. Interactive works using parallel structure include Tamara (live drama), Hot Norman (interactive version of Norman Chronicles), and 24 Hours with Someone you Know (www)

Interactive structures with highly distributed levels of idiosyncratic or random access linking have been called 'web-like' (Sawyer & Vourlis) or 'non-linear' (Phelps). The classic Eastgate interactive fictions (Patchwork Girl, Victory Garden, and afternoon - a story) and can be included in this category. A key creative decision in these works is the degree of orientation provided to the user. Some authoring systems (like Storyspace)
allow the use of explicit story maps, and the creator can decide how aggressively to make them available.

Orientation in a non-linear web-like environment can be seen as a subset of a broader constellation of esthetic variables. There is a tension between the randomness of an interactive environment, and the narrative resonances afforded by particular choices or links. Interactive authors will negotiate that tension partly through their own tolerance for redundancy, and partly through their commitment to precision. We saw earlier that Kahn, Peters, and Landow (pg. 167, Schuler, Hannemann, and Streitz) argued for authorial precision, identifying key variables that would allow users to maintain orientation and control. Contrast this with the Eastgate school's essays on breakdown (Moulthrop 1995) and contingencies (Harpold 1996). They seem to embrace an inherent acceptance of randomness, defining it as a characteristic of hypertext experience.

'Simulations' use a model that is fundamentally different from all of the above examples. Instead of diagramming specific choice points in advance, they rely on the dynamic and context-specific application of programmed rules and character objects. The story world has a virtual life of its own that responds to both specific user actions and to the history of previous interactions. Examples include *Microsoft Flight Simulator* and *SimLife*.

Simulations require that an author build or utilize an internally consistent ‘system’. The results must be believable to the user as consequences of the choices she makes. The challenge here is the attempt to replicate a complicated real world activity (e.g. - flying a plane), with a limited set of rules.

In the best simulations, the nuance of choice seems infinitely variable. The play should feel free even when (as in life) the options and boundaries of choice are structurally constrained. This is precisely why virtual realities are the most seductive of simulations. The play of choice is no longer overt, conscious, segregated. Instead, perception and volition are melded into experience. This seamlessness is a benchmark for interactive
designers in other formats. They must nurture seamlessness through craft rather than inherit it from a technology.

**Reward**

A structure is not an end in itself (except for structuralists and bad architects). It is useful insofar as it leads to something of value. What are some of the rewards to which interactive choices can lead? Celia Pearce is clear: "Interactivity craves meaning. It needs motivation, and it longs for emotional, as well as intellectual content." (Pearce, p. 219). Users don't want choice for the sake of choice. Users want choices with real payoffs that speak to the head and the heart.

Janet Murray speaks of two digital pleasures which address these needs. She feels that agency is a rewarding experience. She writes of "the thrill of exerting power over enticing and plastic materials (p. 153). She feels we find agency when we navigate digital spaces, when we solve problems, when we are pleasantly immersed in the "rapture of the rhizome" that is digital narrative (p. 132). She also sees a constructivist agency where users ("interactors") interpret (navigate and construct meaning) the story systems that the original digital authors created. Murray also stresses the transformational pleasure that can result from interaction with digital works. Interactors can change story elements and narrative perspectives. They can also be changed through these interactions.

Nathan Shedroff is building a "unified field theory of [interactive] design". He divides interaction into various parameters (Jacobson, pgs. 283 - 286). He believes each parameter forms a spectrum against which experiences can be rated as to interactivity. Among the parameters he cites are: feedback, control, creativity, productivity, and communication. I believe each one of them can also be seen as a potential reward for an interactive experience.

Finally, reward must be seen as working on various levels. At the macro level, the overall experience should have outcomes that are meaningful to people. Just as important for the interactive designer is the use of reward at the micro level. Reward and reinforcement can be used both overtly and subtly to shape the details of user behavior. They are critical tools that allow designers to channel choice and build the interactive experience.
The Paintbrush Scene

come in she said, I'll give you
shelter from the storm...

Bob Dylan
Shelter from the Storm, 1975?

Sabine waits in England for Griffin's return from his voyage of self-discovery. She has already written her absolute and unconditional love for him, and urged him to come back to England, and to her. Griffin's card has just informed her that he is in the South Seas, seeking her home in the remote islands...

Meanwhile, I sit here in East Cambridge, staring at my computer screen. In the middle is a blank white card, with the Queen's stamp floating in its upper right hand corner. My cursor pulsates at the top left of the screen, just outside the blank proscenium formed by the card. In the background I hear the faint sound of water - gentle surf barely discernible, an occasional quiet splash where a wave washes on the beach, wind lightly caressing the air.

I click the cursor. No reaction - no sound, no change, nothing. The cursor is pulsating to its own rhythm, my clicking has no effect. I tentatively roll the mouse down, the cursor disappears, but when it should be crossing the top left corner of the card - a broad round black swatch is painted within the rectangle. I stop. Slowly I move the mouse. As I do so, the round swatch moves, like a fat paint brush, revealing vague shapes embedded in the freshly revealed black background. I stop. This is a pleasure. Not like the previous dozens of puzzles triggered and then solved (sometimes after long painful fumbling, more error than trial) by clicks and double clicks and secret rollover spots too numerous to catalogue... This seems easy.

I roll the mouse. As I do so, the black area gets larger, more picture is revealed. And what is the picture? I have uncovered (painted?) about 15% of the screen, a rough triangle along the top edge. It is mostly black, but there appears the beginnings of what should be a face - eye socket, brow and cheekbone starting to show. I will go slow on this one, I like this game, don't want it to end. I move the mouse, continuing to uncover (paint!) with my thick round virtual brush.

I can hear a faint sound over the still fainter background surf. It is the sound of my brush rolling over its canvas. Wonderful... Fully engaged, I look closely at my screen, yes, it is a face, a woman, with the hint of her bosom at mid screen. Think I'll save that for a bit... Instead I move the brush to the left, revealing a swirl in the top left corner, a nebula-like orange sun or moon, with faint pastel yellow tendrils trailing towards the dark where the woman's face half appears.

As I move the brush, I see that the reveal effect occurs in stages. The first pass of the brush leaves a smear like wet watercolor. The smear dries as it passes, and the image underneath coalesces as it dries, firming up as the brush moves away. I wait again, not sullying the white in the bottom half of the card. I want this puzzle to last, this paint toy
is too good to use up quickly. Like a rich milk chocolate at the end of a meal, it is to be slowly lingered and savored. I find to my delight that I can roll the brush over already revealed image, and the wet effect repeats. I can enjoy the languid brush, the smear and faint hiss of paint, and the gradual coalescence of the image over parts I have already revealed. I dread leaving this page and facing another puzzle that hurts my wrist and taxes my brain. I experiment. This repeatable quality is not limited - I can replay this visual magic indefinitely, and not use up the precious white canvas below.

So I play with the brush effect to my heart's content. It is wonderful. I go over and over the parts already revealed, reveling in the visual play, while conserving the untouched card below. Finally, I am almost ready to attend to the rest of the card. First, there is one part of the top of the card yet untouched. At the right hand corner Queen Elizabeth's face is stamped, bounded by a small strand of untouched white. Her profile resolutely faces hard left, primly ignoring both my childish artistry and the buxom young woman it threatens to reveal. I attack the stamp with glee, thinking to put the Queen out of her misery (and out of my screen). Surprise - the brush paints the white card surrounding her, but the stamp, so clearly the property of the crown, is immune to my magic. So, the blacks and greys of the picture are now accented by the soft warm tones of the oval nebula to the top left, and the stern blue-grey Queen's rectangle on the top right. The queen will float on her black background through the rest of the event. The House of Windsor has its own concerns, and plays no part in the scene playing out around it.

It is the time for the bottom half of the card. Gradually I reveal the rest of the picture, drawing the moment out, reveling in the mechanics of my virtual artistry. The woman is indeed buxom, her breasts impossibly round and taut, born out of the adolescent esthetics of action hero comics. Her face is hidden in shadows, she seems pensive, half-turned to the golden orb on the left, half looking down and lost to any real contact.
There is one spot left to clean up, a last untouched island on the bottom left. As I run my brush over, it resists my magic, and then instead triggers a dissolution of the paint all across the card. The images melt, merge, and flow down. As it hits the bottom, the downward movement of the paint is continued in a vertical pivot of the entire frame. The pivot reveals Sabine's answer on the reverse of the card...

This episode further reveals the importance of craft in the design of interactive entertainment. Its attraction is not the charms of the woman who was partially revealed. Her trapped beauty certainly serves to confirm the thesis of the male gaze (Berger 1971; Mulvey, 1973), but it doesn't really explain my rapture with this episode. My senses were on the brush more than the picture. I felt it move, I loved the liquid life of the virtual paint, its cycle of play and display, as it first smeared across the card, then slowly dried, and revealed the image underneath. The hissing caressed my ears more than the women's shape caressed my eyes. I loved that I could repeat this process over the areas already painted.

The brush was enjoyable for two reasons. First, it behaved in interesting ways. It revealed an underlying image, and in the process of doing so it exhibited a fascinating visual dynamic of its own (the smear-dry-coalesce cycle). Second, it performed under my control. To add to my joy, the process of learning about that control was relatively easy, which was a welcome break after several dozen brain (and wrist) testers.

Much skill and craft went into the interaction design that my choices so pleasurable navigated. A review of the design instantiates and confirms the theory reviewed earlier. My options for choice were carefully constructed and channeled, and it was predictable that my actual choices would be rewarded. This experience met all of Nielsen's criteria: the interface was easy to learn, easy to remember, efficient to use, resistant to error, and subjectively satisfying. My attitude during the event was consistent with Pearce's call for motivated and meaningful interactivity. I wanted to effect the painting, and I also wanted to use the brush. I got to do both. In a broader sense, the experience confirms Murray's preference for a transformative sense of agency. I enjoyed both the fact of my intervention and its results.

The experience also profited from the skill in the incorporation of the component media. The background sound was quiet and pleasant, and made it easier to linger over the screen and the event. The sound of the brush was more proactive. It was quiet, but definite, verging on foreground. It added significantly to the feedback and the pleasure of the experience. That sound added tactility and life to the imaginary brush I wielded with my mouse.
The visual algorithm of the brush's paint function was most rewarding. I have gone back to that scene several times, mostly to enjoy the play of the paint smearing and drying with the image gradually appearing underneath. The painting itself had a mysterious quality that lent itself to a gradual reveal.

Finally, the interactive portion of the scene is terminated by the last bit of brushwork. This triggers a movie - the paint runs down, and with perfect cinematic matched action, the downward motion of the paint in turn triggers a wipe-like pivot of the card, revealing the next bit of narrative on the reverse side of the puzzle. The cycle is complete: narrative has led to puzzle play (in this case, more like a game or a toy), and play has led us back to story.

Ceremony of Innocence

This attention to the craft of interactivity and choice is repeated in each of the scenes in Ceremony of Innocence. It is informative to isolate a few individual strands of craft and examine them in various parts of the work.

An ongoing theme is the play with the cursor and its functions. We have just seen one example of cursor transformation - the cursor blinks in the corner of the frame, then becomes a form of paintbrush when brought into play. Other cursor transformations include the cursor becoming a butterfly, a recalcitrant parrot, a banana-moon construct, and a woman working a form of water wheel. In some of these the transformation is immediately apparent, in others it takes some work to figure it out. In the water wheel, for example, you don't realize the connection to the woman until you clearly understand the constraints on cursor action. Nothing works very well until your cursor traces a circular motion. As soon as you do, the woman turns the wheel, and the puzzle plays itself out.

This constraint and resistance to the cursor is another major theme. An early puzzle is the lizard (the frame of this puzzle is dominated by a lizard lounging diagonally across the screen). As this puzzle opens you quickly discover that your cursor is severely constrained. It does not want to go out of the center of the screen. If you try to do so, it bounces back, as if held by an elastic connection. The further you take it out, the tighter the elastic becomes. The cursor can only be tricked out to the edge of the screen by a violent back and forth rolling of the mouse (to the point where your wrist hurts, you wonder about the mouse's warranty, and why you bought this stupid game in the first place). After a certain amount of serious thrashing of your mouse left and right, the cursor magically becomes free. The freedom is accompanied by the merging of the cursor (gone now is its demure little arrow) with a butterfly from a stamp in the top right of the frame. The butterfly is the cursor, and like any butterfly it is free to roam the entire frame.

One's joy is two-fold. First, you have regained agency over your cursor. Second, your cursor has pupated into a lovely flapping butterfly. Again, considerable craft has gone into this little victory. It is natural that anyone will struggle to regain the well-learned
and endlessly reinforced control over mouse and cursor. This is after all the heart of the Xerox-Macintosh-Windows interface. It was rudely remediated (to use Bolter and Grusin's terms) to our detriment and distress. This particular remediation cries out for remedy. Luckily this *pharmakon* contains healing as well as poison, and the struggle with the recalcitrant mouse is rewarded. Once again all is well in wristville.

A closer look reveals the likelihood of success was increased by a subtle clue early in the struggle. Initial thrashing was echoed by a slight quiver of the butterfly in the stamp. This had two effects. First, the thrashing was rewarded with an outcome (however slight) - a latent and weak agency was still in effect, giving hope to the sufferer. Second, the user's attention was drawn to the butterfly, which was located at the corner of the frame. This reinforced wide thrashing sweeps, exactly the kind that ultimately resulted in success. That the form of the final success reinforced the connection to the butterfly was a nice touch of esthetic unity.

The key point in all of this is that both the struggle and its success were planned and channeled. The creators of the production shaped our choices. They crafted a combination of options, constraints, and hints, combining them against a shrewd understanding of our likely responses.

The cusp of these designs are the trigger events. In each puzzle you must carry out a trigger event or sequence to end the puzzle and return to the narrative. In the lizard-butterfly example above, the trigger event is not the transformation of the cursor into the butterfly. That is only an enabling event. In order to trigger the end of the puzzle, several other subsidiary events must be realized. The first one is delightful, but shocking. When your cursor is free, and a wonderfully flapping butterfly to boot, it is very pleasurable to move it about the frame, and watch it flap as it moves. As you do this, inevitably, the butterfly passes in front of the lizard. The lizard, being a lizard, promptly snaps the butterfly into its mouth. The lizard gulps, swallows, and ingests the butterfly. The reaction is a molting. The head of the lizard splits (with a sound of tearing paper) and a new lizard emerges from the old. Magically the butterfly reappears, again tied to your cursor (although now the faithful arrow is back as well, joined tightly with the butterfly). The arrow may give the butterfly (and the user) some courage, because it seems natural to poke the new lizard with the butterfly-arrow. A first poke yields a scoot towards the stamp on screen left (the same stamp the butterfly vacated, leaving a convenient butterfly shaped whole). A second poke, and the lizard disappears down the hole. Now the butterfly-arrow has no one to bother (the old molted lizard being quite inert and impervious to poking or temptation). The butterfly-shaped hole where the lizard disappeared does seem interesting, so...

That, of course, is the trigger action. Once the butterfly goes near its old outline, it is captured, the puzzle is ended, the card pivots and the next narrative is revealed. Other trigger actions include the pulling of a tiny string in a camel's pocket, the clicking of a large 'E' stamped on the side of a card, the tearing of an envelope into shreds, flipping a mask open and closed, and repeated rollovers on a huge crab monster punctuated by thunder and lightning.
Most of the triggers are easy, while a few are extremely difficult. The exact degree of ease or difficulty is affect strongly by the design. Reliance on predictable actions (simple clicks and rollovers) makes the puzzles easier. Constricted cursors, and non-standard actions (like the water wheel woman) are harder. Cues (such as the subtle flapping of the trapped butterfly in the stamp early in the lizard game) can make difficult puzzles much easier. In one puzzle, the trigger was the induced swinging of a suspended man. After many swings he fell down, ending the puzzle. Swinging him with the mouse elicited an interesting creaking noise. This noise reinforced the swinging action, which sped the puzzle up considerably.

Gauging the difficulty of the collection of puzzles seems like a difficult task for the designers. Too easy, and there is no challenge. Too hard, and the experience is frustrating. The designers did a decent job for me on this aspect of the project. I found the mixture of easy puzzles and hard puzzles about right. If I had my choice, I would have preferred things a bit easier, but I suspect the degree of difficulty will afford me more game play as I revisit some of the tougher ones. However, any judgement with respect to overall ease or difficulty must be highly subjective, which adds to the difficulty of this aspect of design.

Conclusion

One conclusion about Ceremony of Innocence concerns the relationship between the game play (the puzzles) and the narrative. There is an incomplete stylistic unity between the actions of the game and the story itself. It is as if the game and the storyline are twin spirals, entwined and synchronized, but not truly fused in a fundamental sense. The puzzles' primary narrative task is to punctuate, delay, and then enable the scenes of the story (the letters) to play out.

The raw material of the puzzles does indeed share a unity with the raw material of the story. Both draw on the excellent visuals and text of Nick Bantock’s Griffin and Sabine trilogy (http://www.griffinandsabine.com/). Both exploit that material marvelously. The Bantock visual touch cuts across both halves of the work. Similarly the transitional devices help with the appearance of unity. Usually cinematically inspired (primarily wipes and spins), they are executed with craft and taste. Like good cinema, the momentum of the transitions helps to join two separate scenes. That cinema-like success partially repairs the fundamental discontinuity of the work.

The essence of a puzzle scene is the play. These puzzles are concerned with the kinesthetic and audio-visual play on the screen in the moment. They are about cursors, rollovers, trigger movements, not about content. The content of Ceremony of Innocence is a love story, an intensely human drama about human emotion, psychology, and behavior. The puzzle play uses the visual artifacts from the story (the objects and places that Griffin and Sabine encounter). The music and visual design aim to evoke the emotional tenor of the narrative. However, the play itself remains a game.
It can be argued that much of the game play itself is a struggle, and the particular solution to any puzzle is, in the moment, a mystery. This can be seen as a version, or at least a reflection of the narrative. However, both the struggle and the mystery in the narrative are deeper and more profound than that of the game play.

There are exceptions to this disparity of mood and depth between the puzzle plane and the story plane. A few of the puzzles do seem to have an overall style closer to the dramatic heart of the story. The cemetery puzzle at the end of act two was particularly frustrating, but emotionally compelling. The object seemed to be to move forward through a cemetery, dodging the crosses and headstones which obstinately blocked your way with ghost-like magic. After a while of that play, I felt like I was struggling to get out of a world within which I was trapped. I wanted badly to find freedom in another world, which I could dimly see, but could not reach. This is exactly the struggle that Sabine and Griffin go through, trying to break the barriers of their parallel worlds, to be free to fully experience each other.

A second conclusion might be that the overall structure of *Ceremony of Innocence* is rather simplistic. Its storyshape is linear. The plot moves forward in a single line, punctuated by blocks - the puzzles that have to be solved for the plot to continue its single unbranched path. This interactive structure is labeled obstructionist, and some critics find such a strategy simplistic and lacking.

I agree with the formal analysis of structure, but I don't find the conclusion convincing. Instead, I see this game as successful, despite the disjuncture between the game play and the plot, and despite the simplicity of its overall interactive structure.

The game overcomes these potential flaws for several reasons. At the narrative level, the story is solid and engaging. That is a considerable strength, and it is not diminished by the fact that much of the game play is of a different dramatic order. Further, there is enough overlap in visuals, in mood, and in the well-executed transition strategies, that the piece does in fact hold together. The consistent excellence of the component media (text, graphics, audio and moving picture) adds to the overall enjoyment.

As for the criticism of the simplistic story structure, I think it misses the point. In one sense, a linear dramatic arc has proved serviceable for a long time. I don't see it as a problematic in this piece. Objecting to the choice of structure on purely formal grounds seems similar to arguing that the sonnet is intrinsically superior (or inferior) to blank verse.

Finally, and most significantly, the game play is excellent. This is the heart of the piece for me, and it excels in this regard. The structure of choice and interaction at the micro level is superb. Close readings consistently reveal the intelligence and the craft of the interactive design. As a result, playing these games is like watching a well cut movie. A good film editor understands how to assemble, order and trim shots to give a scene pacing and impact. Similarly, a good interactive designer understands how to shape, channel and reward choice to do the same for a game. In both cases the apparent invisibility of the craft is a testimony to its effectiveness. *(footnote 2 - Josh Portaway Story,Banff Interactive Screen, 1996)*
I have tried to detail some of the craft that goes into this process. I believe much more can and should be done in this regard. A clear need is for more close study of games and interactive toys at the detailed event level. This will help reveal and refine the craft and the art of interactive design.

A framework to help guide that analysis will be useful. The theory section at the beginning of this paper is the beginning of the background work in this regard. A more systematic understanding of some key parameters will help the process of close study. In turn, further close study will test and expand the framework. This iterative process will develop and consolidate a deeper understanding of the factors that go into effective design of interactivity and choice.
Dreams where the umbrella is folded
Into the path you are hurled
And the cards are no good that you're holding
Unless they're from another world.

Bob Dylan
Series of Dreams
Bootleg Series, vol 3 (1991)
Bibliography

John Berger; *Ways of Seeing*; BBC/Penguin Books, London; 1972

James Bizzocchi, Justine Bizzocchi, Mike Quinlan; *Birth of a Notion: A Filmmaker's Perspective on Interactive Narrative* (WRITE Conference, June 1995)

Tom Carey; Analysis of online information access - from *Designing User Interfaces for Hypertext* (W. Schuler, J. Hannemann, N. Streitz - editors); Springer Press; 1995 - pg. 201

Christopher Crawford; *Understanding Interactivity*; unpublished manuscript, 1998

Terry Harpold; *Contingencies of the Hypercard Link*; 1996; <http://www.lcc.gatech.edu/~harpold/papers/contingencies/index.html>; first published in *Writing on the Edge*; Number 2.2; Spring 1991

Paul Kahn, Ronnie Peters, George Landow; Three Fundamental Elements of Visual Rhetoric in Hypertext; pg. 167 in *Designing User Interfaces for Hypertext* (W. Schuler, J. Hannemann, N. Streitz - editors); Springer Press; 1995

Brenda Laurel, *The Art of Human-Computer Interface Design*; Addison Wesley; Reading, MA; 1990


Laura Mulvey, *Visual Pleasure and Narrative Cinema*; paper presented at University of Wisconsin; 1973

Janet Murray; *Hamlet on the Holodeck*; Simon & Shuster, New York, NY; 1997

Jakob Nielsen, *Usability Engineering*; Morgan Kaufmann Publishers; San Francisco; 1993

Celia Pearce; *The interactive book*; MacMillan Technical Publishing; Indianapolis, Indiana; 1997


Darryl Wimberley & Jon Samsel; *Interactive Writer's Handbook*; Carronade Group, San Francisco; 1996