Movies, Talkies, *Thinkies*:

An Experimental form of Interactive Cinema

by

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Abstract

This thesis introduces a form of interactive cinema called "thinkies." Thinkies use the medium of interaction along with cinema to elicit a thought experience in an audience. Thinkies also use a number of specific techniques to affect an audience including: use of an immersive environment, integration of interaction with story, and constraint of narrative construction.

Two thinkies were created for this thesis. The first, entitled *The Files of Dr. Bern*, is a single viewer experience. It experiments with the design of an interactive

environment and the active construction of story to elicit thinking in an audience. The second thinkie, entitled *Lurker*, is designed for multiple participants. The idea of an interactive cinematic experience for an audience is the main contribution of this thinkie. It also experiments with the use of dramatic control in a real time experience.

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The following individuals served as readers for this thesis:

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Contents

Introduction

This thesis defines a form of narrative developed for the medium of interactive cinema, called "thinkies". Thinkies use the language of cinema to communicate a story. Thinkies also use the language of interaction to engage the viewer in an experience. Thinkies weave cinema and interaction together with story to provide a unique experience for an audience.

The central goal of a thinkie is to get an audience to think within a framework. This framework is built from the three means of communication available in interactive cinema - moving images, sounds, and interaction. The combination of these three elements can be used to create an environment in which an audience can experience a story. As audience members navigate this environment, they interact with the content. The acts of navigation and interaction require some thinking on the part of the audience member. If a thinkie is well crafted, all the thinking that an audience member undergoes during their experience will contribute to a unified style of thought. Through design of these elements, the maker of a thinkie may evoke a particular style of thinking in an audience.

Thinkies use a number of techniques to create a thought experience. These techniques include, the use of an immersive environment, the integration of interaction with story, and the constraint of the users' construction of the narrative.

The immersive environment in a thinkie provides an audience with a story space to think in. All the aspects of a thinkie are experienced in this space. Both the story and its interactive elements exists here. The immersive environment provides a substrate on which a thinkie can be built.

Thinkies are designed explicitly for interaction. Interaction in a thinkie is not just a means of accessing content, but is a necessary part of the story experience. In order for interaction to contribute to the experience of a thinkie, the interactive elements must be integrated with the story. When this is done properly, the interactive elements of a thinkie are perceived by the audience as a natural part of the story experience.

Constraint of narrative construction is the main technique used in thinkies to get audiences to think. When audiences experience a thinkie, the story is what they are after. By constraining the way in which the audience can construct this story, thinkies can influence the way in which audience members think. As audience members navigate the story environment, they construct the narrative. It is in the processes of navigation and construction that the thinking happens.

Two Examples

Two thinkies were created for this thesis. Each thinkie raises important questions about interaction in cinema. These thinkies also help to identify some characteristics of this emerging form.

The first thinkie was designed for a single participant in a structured but relatively unconstrained environment. It highlights the difficulties in influencing the thinking of a participant using interface design and active story construction.

The second thinkie pioneers the idea of an interactive narrative experience for multiple participants. It creates a real time story environment in which audience members interact with the content and each other over the network. This project looks at the dynamic of a group experience and the use of dramatic control in an interactive real time environment.

Reader's Guide

Chapter 2 presents the ideas that make up the theory behind thinkies. The development of thinkies from their cinematic and computational roots is presented. The key elements that define thinkies are also presented in this chapter.

Chapter 3 is an overview of the first thinkie. This experience, called *The Files of Dr. Bern*, is examined from its first stages to audience feedback and conclusions.

Chapter 4 is an overview of the second thinkie. This thinkie, called *Lurker*, was created to explore the ideas and results generated by the first thinkie. This chapter highlights the implementation of a thinkie for multiple viewers and the impact of this idea on the thinkie form.

Chapter 5 takes a closer look at how *Lurker* was made. This chapter extends this discussion to provide a taxonomy for the creation of a thinkie.

Chapter 6 discusses a number of projects and ideas that relate to the thinkie form. These projects are discussed with respect to the experience the offer to an audience. The projects discussed in this section are placed on a continuum of experience with the two thinkies presented in this thesis.

Chapter 7 presents the conclusion to this thesis.

Theory

Origin of Thinkies

The idea of thinkies began with a question - "What can interaction possibly add to cinema?" To answer this question, we must first look at cinema and interaction, and how the two have evolved.

A Brief Look at Cinema History

The earliest movies were simple recordings of actions or events. Some early filmmakers envisioned film as a medium that would be able to capture life so

accurately that the audience viewing the film would experience the recorded events just as if they were seeing them live.(Bordwell & Thompson, 1990) Film has made significant advances in this area, but it has also developed a number of other proficiencies. Cinema has been used to tell stories. Cinema has been used to sell products. Cinema has even been used to affect nations. A closer look at some of the ways cinema has been used in the past can provide some insight into the ways that cinema is used in thinkies.

Discourse Based Cinema

The tradition of discourse based cinema is at the heart of thinkies. Thinkies share with discourse based cinema the desire to bring the viewer as close to the content as possible. This ideal has shaped the evolution of discourse based cinema. The history of cinema verite in America provides a good example of how this form has developed.

Robert Flaherty is one of the pioneers of documentary film in America. His film *Nanook of the North* (1922) received both critical acclaim and box office success. It was an enormous effort in filmmaking. The equipment of the time was bulky and the locations were difficult. In one case, in order to capture scenes inside an igloo, Flaherty had to cut the igloo in half.

Richard Leacock, a filmmaker who once worked for Flaherty, continued the documentary tradition, but also had a great influence on its development. Leacock, along with Robert Drew and D.A. Pennebaker, developed a genre of film that is described as cinema verite. Authors of cinema verite, as the name implies, are chiefly concerned with the capturing of life and truth on film. These filmmakers try to capture the essence of their subjects without letting the process of filming influence the content. Leacock described the problem of equipment affecting the nature of documentary film prior to 1960:

> "What happened was that with this *ridiculous* equipment, we came in like a Hollywood crew. It was all so organized that we took all the life out of it. I've often said that we spent enormous amounts of effort going out into the real world and destroying the very thing we set out to record."(O'Connell, 1992)

It was this frustration that drove Leacock and his colleagues to pioneer the use of smaller, more portable movie making tools. Leacock was influential in the development of wireless synchronized sound systems for film. The systems Leacock developed allowed a sound recordist to position himself in the best possible area to record sound, while a cameraman could get in the best place for picture. Advances of this sort drove the development of discourse based cinema.

Documentary filmmakers were often the first to devise and embrace technological advancements in cinema. The development of television and video had a strong

impact on the documentary world. The lower cost of video recording, and the portable size of many video cameras were a natural fit for cinema verite. Many documentary movie makers now use consumer Hi-8 video cameras for shooting. Although these cameras cannot deliver the image quality of film, their flexibility and inconspicuous size allow movie makers to record events previously not possible. The fact that Leacock has shot his last several movies in Hi-8 provides significant evidence of this trend.

Glorianna Davenport has worked to move the discourse based cinema tradition into the interactive world. From her early work at the MIT film/video section under Richard Leacock, she has pursued the idea that computation is a tool that when combined with cinema will allow for a maker to create a true sense of discourse between the viewer and the content. The pursuit of discourse, from Flaherty to the current work in the Interactive Cinema Group, is at the core of what thinkies try to accomplish.

Discourse Based Cinema and Thinkies

The name thinkies is derived from the idea of conveying thought to an audience via cinema. Discourse based movie makers have tried to present images of life and moments of truth to audiences through documentation of reality. Up until recently, the audiences for these movies could only watch the material that was presented by an author. The only way an author could affect an audience was though compelling images and sounds. Through skillful movie making these images and sounds can be made to resonate in an audience member, and even cause a change in that person.

The interface, the medium through which interaction takes place, allows users to access information in a system. In interactive cinema, interface affords makers another mode of control over the way in which an audience experiences content. The combination of interface design and cinema creates an interesting dynamic. In computer science, an interface designer uses various techniques in the creation of an interface to design the most elegant means by which a user can access the content of a system. In the context of a story, the maker may not want the audience to experience the content via the most elegant means. The maker may want to affect the audience in a particular way by means of the interface. In other words, in interactive cinema, the interface of an experience can be used as way to affect the audience. In this way interface is a medium that also conveys a message. Thinkies use this medium to affect the audience. Thinkies try to get the audience members to think in a directed way while experiencing a narrative through the design of the interface.

Narrative/Feature Film and Thinkies

Although thinkies may be more closely aligned with discourse based cinema, thinkies use the story telling techniques of narrative cinema to accomplish their

goals. The story element of thinkies is also the glue that holds the experience together, and keeps the audience engaged.

Edward Branigan describes people's use of narrative as, "a strategy for making our world of experiences and desires intelligible." Branigan also describes narrative as, "a fundamental way of organizing data."(Branigan, 1992) The use of narrative in feature film has evolved into a highly sophisticated tool for communicating emotion. Modern narrative films are most effective at getting their audiences to feel. This can be seen when people cry at the movies. Most people can remember a movie that has affected them so deeply that they have experienced real emotions right in the theater. This is the ultimate power of narrative cinema.

While narrative cinema does well at conveying emotion, it has considerable trouble affecting the thinking of its audience. A good film can communicate ideas, but it does not make a viewer think as a part of the viewing experience. The audience of narrative cinema is engaged in the linear construction of the narrative. The constant flow of the narrative does not allow the viewer to think actively with the content. The interactive element of thinkies allows makers to affect a viewer's thought process. When viewers of a thinkie interact with the content, they perform actions. The maker of a thinkie can design these interactive elements so that the thinking leading up to these actions is related to a specific style of thought. By designing all the interactive experiences to relate to one general mode of thought, a thinkie can get a viewer to think in a specific style.

Cinema Audience and Thinkies

The earliest movies were "peep shows" at nickelodeons. These movies presented simple stories at best. The experience of the nickelodeon was designed for a single individual. When projected film was introduced, the cinema audience was born. The reason for going to the theater was not only to see the movie, but to see it as part of an audience. The cinema audience still exists today, even surviving the video rental industry.

Until recently, interactive cinema has been in a nickelodeon type period. Most of the current projects in the field of interactive cinema have been designed to be experienced by a single viewer. Recent developments, such as the popularization of networked computing, have freed interactive cinema from a single user model. Thinkies have been found to be more effective when designed for an audience. When an audience experiences a thinkie, the audience members can interact not only with the content, but also with each other. In a networked environment, viewers of a thinkie can exchange ideas and work through the thinking aspect of the experience together. The idea of interactive cinema for an audience has become an integral part of thinkies as a form.

Talkies and Thinkies

There is a temptation to compare the advent of interactive cinema to the end of the silent picture era. Will interactive cinema replace linear cinema as the storytelling medium of choice in the same way that talking pictures supplanted silent films? This is unlikely. The addition of interaction to linear cinema is not like the introduction of talking pictures. Talkies were a natural progression from silent pictures. The actors in silent films spoke, but instead of hearing them, the audience would read their words on graphic frames. The audience of the silent picture era was accustomed to hearing actors voices from live theater. The audience had already heard live piano accompaniment to "silent" films. When the technology allowed for synchronized sounds to be delivered in the theaters along with the projected picture, it was something the audience could easily accept. Interaction represents a more drastic media change.

Early talking films were crude by today's standards. The idea of a soundtrack for a film was new, and the filmmakers had to develop a language of cinematic sound. Today's films don't just talk, they make every sound imaginable. Just as in the development of movies in general, there was a refinement of talking pictures to the extent that they totally replaced silent films.

Interactive cinema will undoubtedly undergo a period of refinement. The products of today's interactive cinema authors may be considered clumsy and inferior to linear cinema. Many theatergoers of the silent picture era had the same comments about early talkies. But this is where the comparison ends. The addition of interaction to today's cinema represents a much more dynamic change than the sound track did to silent films. The way in which an audience experiences a modern movie is essentially the same as the way an audience experienced films in the silent picture era. This will not be true of interactive movies.

Interactive Cinema

Unlike linear cinema, which is a static medium, interactive cinema is a medium in which the very means by which content is delivered to an audience is a potentially mutable expressive element. This element is interface. In linear cinema, there is no means by which the audience can affect the content. In interactive cinema, interface acts as a means of discourse between the audience and the content. Linear cinema has two means of expression: moving images and sounds. Interactive cinema has a third means of expression - interaction.

Interaction is drastically different from images and sounds. Both images and sounds are visceral media. We can see images with our eyes and hear sounds with our ears. In this sense, both sounds and images are media which are universally understood. All sighted and hearing people immediately know how to experience these phenomenon. Linear cinema is a language of these expressive elements that has been created so that authors can relay complex messages to audiences.

Interaction is not a visceral medium. We cannot hear or see interaction. In this sense, interaction may not be best described as a medium. It is presented here in that context to highlight the impact of interaction on linear cinema. Interaction might be better described as a meta-medium. Interaction is a mutable form of communication in which the medium truly becomes the message, or the content.

A large number of ideas have already been produced that can be described as interactive cinema, or multimedia, or interactive multimedia. The mutable nature of the medium may be one reason why there are already so many terms to describe the content that emerges from the combination of cinema and interaction. That same mutable nature may also be the reason why none of these terms truly capture the essence of interactive cinema. This thesis will not solve that problem. Instead, it examines one form of interactive cinema based on a theory of production - thinkies.

Thinkies

Thinkies try to affect an audience in a unique way. A thinkie is designed to place the viewer in a thought provoking environment. Through the viewer's interaction with the content, a thinkie is designed to elicit a directed thought experience in the viewer. In other words, a thinkie tries to get its viewers to think in a particular way. For example, a thinkie could be made about the scientific method. Such a thinkie would, through the use of interaction, get the viewer to think with the scientific method. The three main techniques at work in a thinkie are: the use of an immersive environment, the integration of interaction with story, and the constraint of the users' construction of the narrative.

Immersive Environment

The use of an immersive environment is not unique to thinkies. Use of immersive environments is not even unique to interactive cinema. A movie can be seen as a story environment in which the viewer becomes immersed. When a viewer becomes immersed in a movie, this state is referred to as reverie. The goal of any storyteller is to place the viewer in this state of reverie. It is only in this state that the viewer can fully suspend their disbelief and experience the intentions of the author. Movies use this state to elicit emotions in the audience. Thinkies use this same state to put the viewer into a thought space. The difference is that thinkies can use interaction and interface to help the viewer achieve reverie.

Integration of Interaction

So far, interaction has been presented as the magic component that transforms cinema into a new dramatic entity. While interaction is a powerful tool, it must be used with great care because of its ability to affect an audience. It is important to remember that no matter what a thinkie does, it is still a story. Any interaction that is used in a thinkie must add to the story. When a portion of the interface or

an interactive element of a thinkie fails to add to the narrative, the audience is drawn out of the story, and their sense of reverie may be jeopardized. So the general rule for interaction is that it must be integrated and make sense within the context of the story in order to work in a thinkie.

Constraint of Narrative Construction

Constraining the viewer's construction of story is the real key to how a thinkie gets a viewer to think. Thinking is not an easy thing to do. People generally need some incentive to get them to think. Story acts as this incentive in thinkies.

Story is something people crave. Story is combined with constraints in thinkies to create an unfolding environment. As constraints in this environment are presented, the viewer navigates them in order to experience the story. If these constraints are well designed and integrated with the story, they will be viewed as an integral part of the story, and not as obstacles or barriers. The navigation of these constraints is where the thinking takes place. The combination of all the constraints and the resultant thinking by the viewer adds up to the unique experience of a thinkie.

The First Thinkie

The Files of Dr. Bern is the first thinkie. *The Files of Dr. Bern(The Files*) was produced in the spring of 1993. *The Files* tries to create an interactive environment that engages the audience in a style of thinking reminiscent of analytical psychotherapy. *The Files* does not pretend to teach or address the entire field of analytical psychotherapy. Instead, *The Files* creates a thought experience for the participant that is meant to resemble the type of analysis a therapist might engage in while working on a case.

The Files is a relatively short experience, lasting between fifteen minutes and three quarters of an hour, depending on the participant. In this time the participant is given access to the confidential patient files of a therapist(Dr. Bern) through an error in a hospital file system. From here, the participant is free to browse the doctor's notes and video records. Through the process of browsing, the participant actively constructs the stories of the patients, the doctor, and how they are all related. This active story construction is meant to parallel the process a psychotherapist undergoes when analyzing a patient.

In psychotherapy, a therapist receives information from a patient. This information is in the perspective of the patient. From session to session, the patient may talk about diverse aspects of their experience. It is the therapist's job to take this contextualized, out of sequence content and to make some sense of it. It is from this construction of meaning that the therapist makes his or her

evaluation and diagnosis of the patient. *The Files* attempts to mimic this interaction between the patient and the therapist in its implementation.

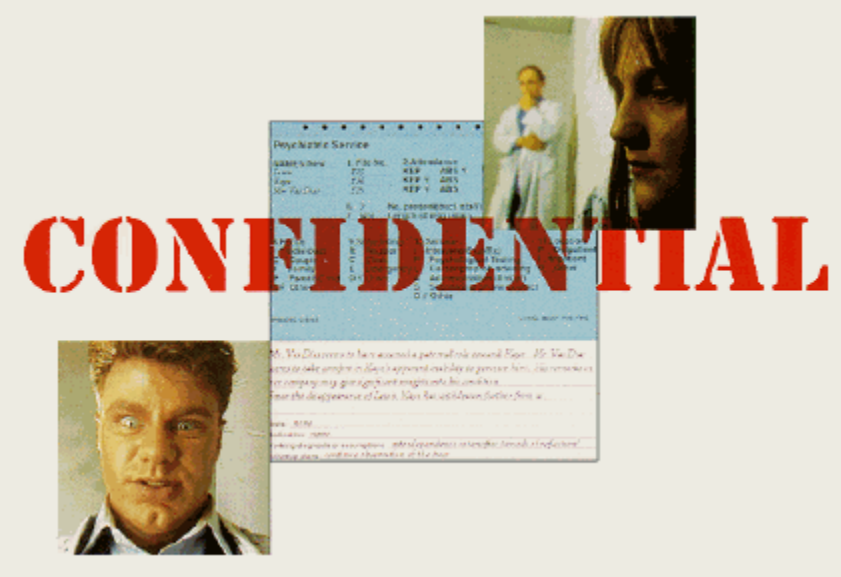

Figure 1. *The Files of Dr. Bern*

The Story

The Files deals with several levels of reality and the viewer's perception of these realities. This theme is present throughout the story. The first level of reality involves a mental hospital, a doctor, and his three patients. Dr. Bern is the therapist and Lewis, Kaye, and Mr. Vas Dias are his patients.

The story, because of the non-linear nature of its content, is difficult to present in summary. However, there is a basic structure to the narrative. While reading this summary it is important to keep in mind that there are several possible interpretations of *The Files*. The following is only one of these possible interpretations.

Certain characteristics of the doctor and the patients become clear over the course of the participant's experience. From the start, the participant can see that Mr. Vas Dias is in conflict with Dr. Bern. Lewis is nervous and maybe even fearful of Mr. Vas Dias. Kaye is withdrawn, and may not even be aware of everything that is happening around her.

In the first scene, the doctor is not present. Lewis approaches Kaye tentatively. When Lewis reaches out to touch Kaye, she shouts at him to stop. Mr. Vas Dias hears this, grabs Lewis and throws him to the floor. Mr. Vas Dias then jumps on Lewis and starts choking him. Mr. Vas Dias mutters something about staying away from Kaye and threatens that if Lewis doesn't stop, Lewis will end up like Dr. Bern. The scene ends with everyone collapsing.

In the next session, Dr. Bern tricks Mr. Vas Dias into taking a sedative. Dr. Bern then has an intensive session with Lewis in which they try to uncover some memories that Lewis seems to have repressed. During this session Kaye has a flashback in which one of the patients makes a cake. In this flashback, the person making the cake drops a doll's head into the mix. At the end of the session Lewis has a breakdown, possibly as a result of remembering what he had previously repressed. At this point, Lewis also has a flashback. In Lewis's flashback, Dr. Bern lies dead on a carpet, and a hand reaches into his mouth and pulls out the same doll's head that appeared in Kaye's flashback.

In the third scene, Mr. Vas Dias is alone with Kaye. Kaye is playing with the doll's head that appeared in the previous scene. Mr. Vas Dias moves over to her and picks up the head. Kaye watches in amazement. It appears from their interaction that Kaye cannot see Mr. Vas Dias, and instead she sees the head moving on its own. After playing with Kaye, Mr. Vas Dias returns the toy to her, and the scene ends.

The fourth scene shows Mr. Vas Dias speaking to Kaye, who still seems to be unaware of him. Mr. Vas Dias talks about Lewis's disappearance, and that the doctor is next. He says that just he and Kaye will be fine on their own. At the end of this scene Mr. Vas Dias has a flashback in which Dr. Bern appears, sitting in an office with one of the patients from the ward. There is a birthday cake on the doctor's desk. The doctor wishes the patient "happy birthday", but calls him "Bob". The patient then blows out the candles.

In the fifth scene, Mr. Vas Dias and the doctor confront each other in a therapy session. In this scene, Dr. Bern appears incompetent and Mr. Vas Dias seems to be the one who is truly in control. Mr. Vas Dias accuses Dr. Bern of taking something from Kaye, and the doctor denies any knowledge of such an event. The scene ends when the doctor leaves in a huff.

In the final piece of content, the viewer can zoom in on a frame showing Mr. Vas Dias from the fifth scene. Close inspection of the image shows that Mr. Vas Dias is concealing Kaye's toy doll's head in his hand.

This linear presentation of the story does not provide all the detail present in the actual experience. In the actual experience, the content is still not supposed to add up to a complete story after the first viewing. Instead, it should give the viewer the promise of a story, but also raise a number of questions in the viewer's mind. These sequences are meant to create a conflict in the viewer's understanding of the narrative. The sequences alone only tell part of the story. To fully understand the narrative, and to resolve the conflicts that the sequences create, the viewer must do some more careful analysis of the content.

Figure 2. The Special Effect 'Zoom' Segment

The Introduction

The content in *The Files* resides in a psychiatric hospital file system. The participant gains access to this information through an error or bug in the file system's implementation. The reason for this style of access is twofold. The first reason for this scheme is the increased dramatic value that it adds to the experience. If the participant believes that they are looking at information that they normally would not have access to, their natural curiosity heightens the impact of that information. Additionally, giving someone unauthorized access to confidential information forces them to make a decision. The participant must decide if they will look at this content or not. If this information is presented skillfully, the viewer may not even be aware that they are looking at fictional material. At least at the start of the experience, the viewer may believe that the content is real.

The system error introduction to *The Files* was not implemented. The reasons for this were both technical and ethical. When development of *The Files* ended, the only viable publishing formats for the thinkie were local network or CD-ROM. Once *The Files* was transferred to CD-ROM, there was no longer any way to maintain the illusion that the files on the CD were real hospital files. If *The Files* was made available to the Media Lab community over the Lab's network, creating the illusion of accidental access would have involved tampering with

machines around the lab. For these reasons, the current version of *The Files* does not incorporate the idea of accidental access.

However, since the completion of *The Files*, the World Wide Web has emerged as a viable publishing medium for this type of content. It would be easy to implement the system error that allows access to *The Files* on the World Wide Web. Some ethical concerns still exist in the idea of tricking the audience in this way. Although, since using the World Wide Web is explorational by nature, this style of entrance to an experience on the Web seems appropriate.

The Content

Once the participant enters the file system, he or she is exposed to the real content. Over the course of their experience, the audience is meant to take the content into their own context and make some sense of it in order to understand the story that is present. This process is this thinkie's imitation of a therapist's style of information analysis.

There are two main types of content in *The Files* - video and notes. There is a total of just under twelve minutes of recorded video broken into five segments. The video segments are of more or less equal duration. There is also one special effect segment that allows a viewer to interactively zoom in on a specific detail of a still frame taken from one of the video segments. There are six "blue forms" that the doctor has filled out with his notes. Each one of these forms contain the doctor's notes on a specific video segment or special effect segment.

The Interface

The environment chosen for the experience was a doctor's file system. A customized filing system could have been implemented for this story. Another option was to use an existing file system. A decision had to made based on the impact of how the interface would affect the viewer. In the case of *The Files*, the interface was solely intended to be a means by which the audience could access the content in a nonlinear mode. The interface should inhibit the viewer as little as possible. Ideally, the viewer was meant to not even be aware of the interface while they were using it. For these reasons, the interface chosen was the Macintosh Finder.

The Finder has the advantage of being familiar to all Macintosh users. The interface of the Finder is so familiar to this group that they no longer need to think about how it works to use it. Macintosh users could experience *The Files* and would not even consider the Finder an interface.

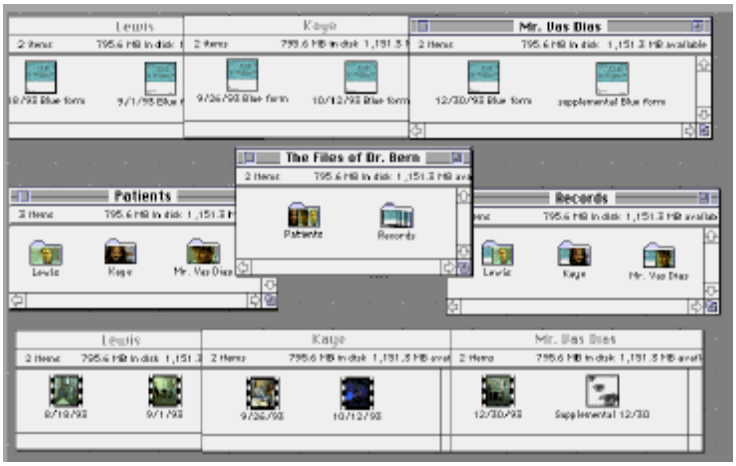

Figure 3. The File Hierarchy for *The Files*

Using a familiar environment also solves the problem of the user's expectation. Whenever users encounter a new interface, they need to discover what actions they can take and what the effects of those actions will be. While experiencing an application, if the user feels that they should be able to perform a certain action but cannot figure out how to perform it, or simply are not allowed to by the software, that application has failed to satisfy the user's expectations. This can sometimes be used for dramatic effect, but is often the result of poor integration of interaction with content. By using the Finder as a platform, the entire issue of the user's expectation is solved by their familiarity with the environment. Researchers at Apple Computer have already examined the issue of how to "optimize the interaction between people and Macintosh computers."(Apple Computer, 1992) By a combination of good design and exposure, the Macintosh Finder has become so familiar to its users that it ceases to be an interface, and the elements of the Finder come to represent the information itself in the mind of the viewer.

The two other levels of interface in *The Files* are the introductory screen and the individual items contained in the file system. The introductory screen, as shown in figure 4, was designed to situate the viewer and provide some context for the content in the file system. Originally the introductory screen was designed to look like an application pop-up screen. The application in the context of *The Files* is a multiple media filing system in use at a mental hospital. To further situate the viewer, a voice mail message was added to the introduction. This message is addressed to Dr. Bern from another doctor in the hospital, maybe the chief administrator. The message says that the chief is not satisfied with Dr. Bern's diagnosis of his patients, and that Dr. Bern should take another look at his files. The message closes with the chief saying that Dr. Bern's progress will be discussed at the next staff meeting.

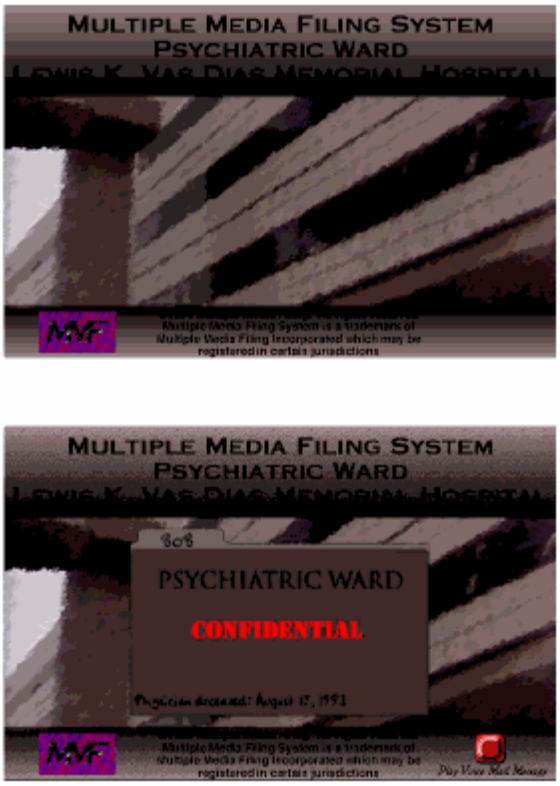

Figure 4. The Introductory Screens of *The Files*

This message was successful in raising the level of curiosity in the viewer, but it also set up an expectation that the chief administrator would emerge as a character in the experience. This side effect was problematic because in the current implementation that expectation is left unsatisfied.

The Creation Process

The creation of *The Files* was a complex process. The first phase of production involved writing the story and designing the interaction. Next, the video was shot and edited. Finally, the software was implemented and the system was integrated.

The design phase included authoring of both the narrative and the interactive elements. The key to the design phase was to create a story and an interactive environment that combined to create a thinkie. The modes of interaction had to be integrated with the narrative to create an experience that would elicit the desired thinking style in the audience.

The Writing of the Story

The story and interface of *The Files* were developed around a well defined set of constraints. The most severe constraint was that the video shoot was limited to

two days. In order to tell a story in video on such a short production schedule, the story had to be further constrained to a single location and a small cast. With these limitations in mind, I set out to write the script for *The Files*.

The most unique aspect of the script for *The Files*, was its non linearity. I tried to write several short scenes that could be viewed in any order. I also tried to design the content of these scenes in such a way that when they were viewed in different orders, they might convey different ideas to the audience. This proved to be a very difficult undertaking. Although it may not be readily apparent, many standard dramatic events rely on a fixed temporal structure. In order to use things like causality in this story, I had to compromise some of the non linearity. The final script allowed for a certain amount of ambiguity in ordering the scenes, but there were several events that fixed the relative time of certain sequences. For example, at one point in the story Lewis, one of the hospital patients, disappears from the ward. Unless the audience is led to believe that he resurfaces, all of the scenes in which Lewis appears must occur before his disappearance. In the results section, the impact of these linear structures and the inherent non linearity on the audience's experience is discussed.

The Design of the Interface

The design of the interface for *The Files* began with the idea of a hospital filing system. The dynamic of how people work with filing systems seemed like a good basis on which to build a style of thinking. In a filing system there is both structure and content. When people access information from a filing system, they may be more or less aware of the way in which the structure of the system constrains their thinking.

When an individual uses a filing system, the information in that system is present in both the content of the files and the way they have been organized. The information contained in the content is relatively straightforward. The way in which these pieces of content are organized can sometimes convey more meaning than the files themselves. Take for example, a collection of correspondence of a well known individual. If a letter that relates personal details of this person's life is filed under "personal correspondence", that letter has a certain meaning. If a similar letter is filed along with letters of a harassing nature from unknown sources, this letter takes on an entirely different meaning. *The Files* uses both organization and content to relay meaning.

Video Production and Application Implementation

The video production for *The Files* followed the typical production cycle of a student film. Several weeks of pre-production planning, two days of shooting, and an extended period of post-production yielded just under twelve minutes of edited video. The video was shot in a studio setting on the Sony Betacam SP format. The

video was then edited using a Digital F/X nonlinear editing system. The edited video was digitized and incorporated into the file system as QuickTime movies.

The implementation of the interactive environment was developed in parallel with the editing of the video segments. The doctor's notes were created on a digital hospital form, the layout of which was copied from an actual psychiatric record form from the MIT Medical Center. Once all the content was completed, it needed to be incorporated into the structure of the file system.

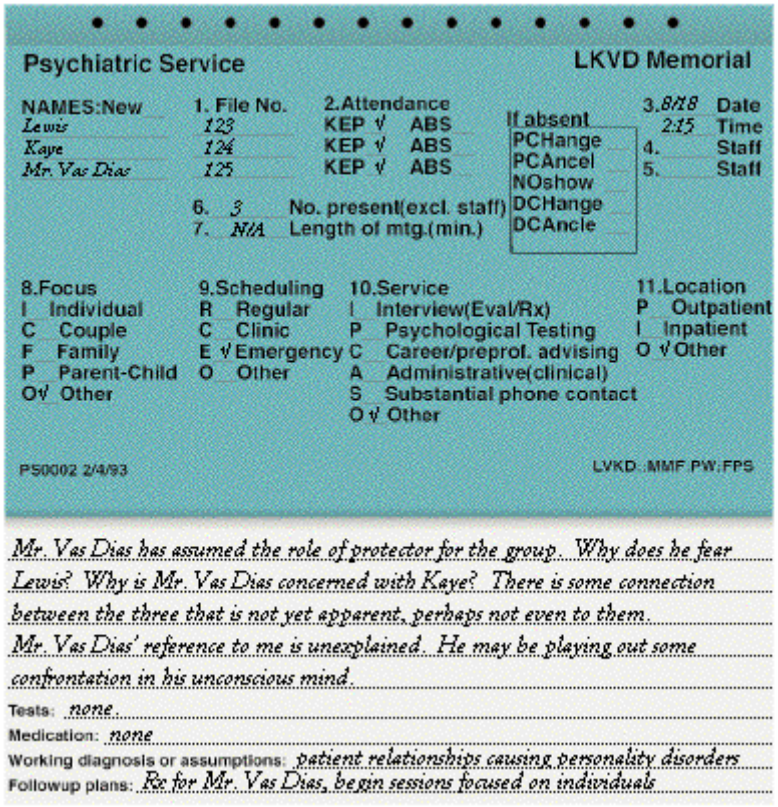

Figure 5. A 'Blue Form' from *The Files*

The fundamental idea behind the implementation of the interactive elements of *The Files* was to integrate every aspect of the interface with the content. This meant trying to a achieve a maximum level of realism in the file system implementation. Integration meant thinking about how each piece of content fit into the overall experience and then placing it in the file system in a way that highlighted the relevant aspects of that piece of content. A look at the file hierarchy of *The Files* shows how this thinking impacted the file system organization.

The Organization of the File System

The top level of the file system has two folders - patients and records. Both the patient and record folders contain three sub-folders, one for each patient, Lewis, Kaye, and Mr. Vas Dias. Each individual patient folder contains two video segments, with the exception of Mr. Vas Dias's patient folder, which contains one video segment and one special effect segment. Each patient's record file contains two forms with the doctor's notes. In other words, each patient has both a folder of video content and a folder containing doctor's notes. Overall, the file system is broken down first by type of content (video or notes) and then by patient. Figure 2 shows this structure.

This organization encourages two possible browsing strategies for users. A user could browse this content by patient or by content type. A user could easily watch all the video segments and then begin with the doctor's notes; or, the user could exhaust the database of content on each patient before moving on to the next.

Each file in the system is dated. The dates on the video segments and doctor's notes serve as a cross reference between the two types of content. These dates allow for a third style of browsing. Using the dates, the database can be browsed chronologically.

Ideally, each of these different browsing strategies yields a different interpretation of the content. The following section discusses how viewers experienced the structure and content of the file system.

Results

Once *The Files* was finished, it was run through an informal user testing phase. This process consisted of sitting users down in front of the piece, giving them a brief introduction, and then letting them loose on the content. A brief discussion of the user's reactions was conducted when the user had finished with the experience.

For the testing, individuals were brought into the Interactive Cinema Lab to view *The Files*. The participants were seated in the Lab, which is separated into eight work stations. The atmosphere of the lab varies, depending on the number of students working. However, it can be an intimidating environment for individuals unfamiliar with the Media Lab. One a participant was brought into the space, a short introduction was made to prepare the individual for the experience. The introduction given to the participants was meant to simulate a more appropriate form of distribution. The problem is that when someone is brought in to view a piece like this, they are not properly situated to experience the content. They are often too aware of their surroundings, and approach the experience with a critical bias. If the viewer is too concerned about judging the piece, their experience may be tainted. For *The Files*, this was a particularly serious problem. The whole idea behind *The Files* is to engage the viewer in a designed way of thinking. This goal is compromised if the participant is distracted by feeling that they need to report

on their experience at its conclusion. After running several individuals through *The Files* with an extensive introduction, I found that a shorter introduction allowed viewers to approach the content more objectively. I also got a better response from participants who did not consider themselves a test audience, but rather only viewers of a completed piece.

Once a viewer was satisfied that they had experienced *The Files* thoroughly, I discussed their reactions and explained the ideas and goals behind the work. Audience reaction provided some interesting insights. The level of enjoyment varied widely amongst the viewers. The extremes ranged from almost complete rejection of the content to questions about the possibility of a sequel.

The browsing style among viewers also varied. Many viewers started by watching the video content and later viewed the notes and then discovered the relationship between the two forms of content. Some viewers followed the chronological order of the content, while others used a totally free form style of browsing.

One general trend that emerged was that, given sufficient time, almost all viewers sought out and viewed all of the video segments. The most likely explanation for this is that the video segments contained the most relevant story information, and so the viewers we more engaged by this content. This trend seemed to represent viewers actively pursuing story. Some viewers even extended their search outside of the application to other files contained on the machine on which they viewed *The Files*. This behavior supports the theory that story and people's need for narrative has a strong influence on a person's behavior.

Another interesting trend was the pattern of interest levels of viewers in different age groups. Although there were a range of reactions across age groups, in general younger viewers reacted more positively to the experience than older viewers. The younger viewers generally gained a more thorough understanding of the story and formulated more complex explanations for the scenario than the older viewers. Not enough data was collected to create an informed hypothesis about this trend, but level of exposure to electronic media could be an important factor.

Most viewers did not view the video more than once. Although many of the viewers felt that if they had viewed the video a second time, they may have learned more about the scenario. Some viewers did return to the video, but often they only skimmed over certain portions. This behavior may be a result of how people currently perceive video as a medium. Due to the nature of how video has been distributed, it has evolved as primarily a single use medium. Once people watch a movie, they believe that they have experienced it fully. Repeated viewings usually are reserved only for people's favorite movies.

Now that video has entered the digital domain, it is possible to create video segments that vary on repeated viewing. This was the case for a small segment of

the total video in *The Files*. Since this fact was not disclosed to the audience, only a very small percentage of viewers discovered this feature. In each of the flashback scenes, one of the patients is shown. If these scenes are reviewed, the viewer finds that each of the three patients will appear in each flashback. In the implementation there are three versions of each flashback scene. Each version shows a different patient in the same scene. The three different versions are cycled on repeated viewings.

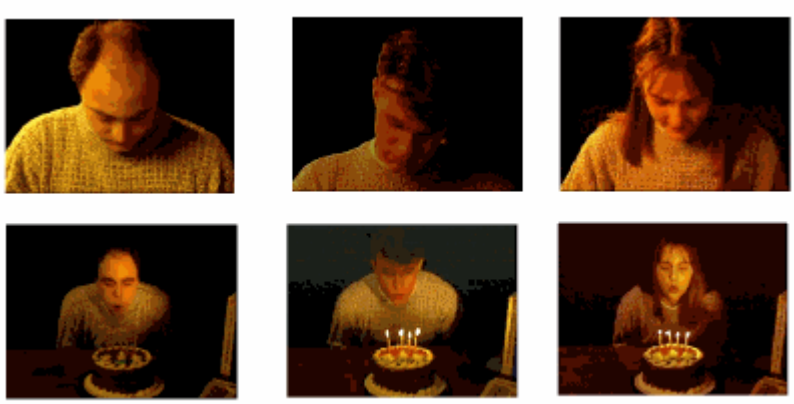

Figure 6.
Three Variations of Two Scenes.

The intention in the design of *The Files* was that the content be difficult to understand on a first viewing. The idea was that the audience would review the video after they had gained enough context to begin to understand the story. This strategy did work with a very small number of viewers, but the majority of viewers were not affected in the intended manner. Instead of having a heightened interest in the content after the first viewing, some participants were turned off by the sometimes cryptic nature of the content. This breakdown of the story can be attributed a number of causes.

One possible cause is poorly crafted content. If a viewer is not hooked by the story, then they will not become engaged. An uninterested viewer is not likely to expend the amount of effort involved in reviewing the video in order to understand a story they don't like. This cause is difficult to control, and is not interesting from a research perspective.

Most viewers' assumption was that the video portion of *The Files* was static. This assumption was so strong in some viewers that, when they saw variation in the playout of some sections of the video, they assumed that they remembered the first viewing incorrectly. This was probably due in part to the fact that the variations in playout were subtle to begin with. Without the realization that repeated viewings of the video would provide new information, most viewers seemed to prefer to plow through new material in hopes of it providing some understanding, rather than to return to old material for another look. As a result, *The Files* failed to alter these viewers' assumptions in this area.

Conclusion

The choice of content for *The Files* was both advantageous and problematic. The advantage of using the field of psychology as content for a thinkie is the inherent link between psychology and thinking. But this relationship also raises the question of whether or not the idea of a thinkie can be expanded to areas of content that do not deal so directly with cognition. Thinkies would be a rather limited tool if they could only deal with one style of reasoning. Additionally, any movie that deals with mental disorders is treading on very sensitive ground.

Aside from the choice of subject, there are issues that *The Files* raised about thinkies. These involved the choice of interface, the activity of the audience, and the roles of story and interaction.

The interface chosen for *The Files* was essentially no interface. The choice of the Macintosh Finder as the environment for *The Files* made the content easy for viewers to access, but it may have failed in encouraging viewers to think. By making the interface almost invisible, there was very little structure placed on the viewer's activity.

One complaint about *The Files* was that there were no tools provided for the participant to manipulate the content. Thinkies try to immerse their audience in a style of thought. *The Files* showed that this was a difficult task, especially when no tangible structure is given for the viewers to think with. When the Finder was chosen as the interface, the intention was not to constrain the thinking of the viewers. The Finder was intended to allow each viewer to interact with the content in their own style. But, by allowing a totally free form interaction with the content, *The Files* may have compromised its focus on the particular style of thinking characteristic to analytical psychology.

The Files was designed to be a single viewer experience. From other projects, I found that in many cases products designed for one participant actually worked better with a group. When an experience involves foreign styles of thinking and using your mind in unfamiliar ways, it is often helpful to have several perspectives in order to stimulate thought. This almost certainly depends on an individual's preference, but many people enjoy and excel when working in groups. There was not enough testing done on *The Files* with multiple concurrent viewers to make any hypothesis, but the idea of an audience based thinkie seemed right. The idea of an interactive movie designed for an audience caused an evolution in the definition of thinkies. My next project, *Lurker*, is a second generation thinkie - a thinkie designed for an interactive audience.

Lurker

Lurker is a thinkie that uses the Internet as both its medium for distribution and as its basis for interaction. *Lurker* was created to test thinkies as a form, and to test some of the ideas that were derived from *The Files of Dr. Bern*. Chief among these ideas is the designing of an experience for multiple participants. The notion of a group of participants, and its implementation in *Lurker*, changed the very definition of thinkies.

As a thinkie, *Lurker* was designed to engage its participants in the "hacker ethic." Through the use of story and interaction, participants in *Lurker* are expected to view the content from the perspective of a hacker, and are even encouraged to do some hacking themselves. The word "hacking" has several definitions and some misconceptions associated with it. *Lurker* tries to deal with all of these to varying degrees.

The *New Hacker's Dictionary* defines a hacker as:

> hacker n. <P> [originally, someone who makes furniture with an axe] 1. A person who enjoys exploring the details of programmable systems and how to stretch their capabilities, as opposed to most users, who prefer to learn only the minimum necessary. 2. One who programs enthusiastically (even obsessively) or who enjoys programming rather than just theorizing about programming. 3. A person capable of appreciating hack value. 4. A person who is good at programming quickly. 5. An expert at a particular program, or one who frequently does work using it or on it; as in `a UNIX
>
> hacker'. (Definitions 1 through 5 are correlated, and people who fit them congregate.) 6. An expert or enthusiast of any kind. One might be an astronomy hacker, for example. 7. One who enjoys the intellectual challenge of creatively overcoming or circumventing limitations. 8. [deprecated] A malicious meddler who tries to discover sensitive information by poking around. Hence `password hacker', `network hacker'. The correct term is cracker.
>
> The term "hacker" also tends to connote membership in the global community defined by the net (see network, the and Internet address). It also implies that the person described is seen to subscribe to some version of the hacker ethic (see hacker ethic, the).
>
> It is better to be described as a hacker by others than to
>
> describe oneself that way. Hackers consider themselves
>
> something of an elite (a meritocracy based on ability), though one to which new members are gladly welcome. There is thus a certain ego satisfaction to be had in identifying yourself as a hacker (but if you claim

to be one and are not, you'll quickly be labeled bogus). See also wannabee.(Raymond, 1994)

Since *Lurker* is an experience designed for non-hackers as well as qualified computer hackers, the definition that most closely describes what *Lurker* is about is number 7 - "One who enjoys the intellectual challenge of creatively overcoming or circumventing limitations."

Along with the idea of spreading the hacker ethic, *Lurker* experiments with the use of more active user interface elements. *Lurker* also tries to experiment with a different kind of interaction for thinkies. Traditionally, the interaction in interactive cinema has been between the audience and the movie. *Lurker* instead encourages interaction among the audience members, using the movie as a catalyst. The decision to implement this strategy of interaction has a practical basis. The current state of the art in machine modeling of intelligence is not yet at a level where a machine can engage in rich interaction with a human. The recent explosion of the network as a means of communication illustrates that machines are superb devices for communication between humans. So, *Lurker* just tries to use computers at what they are already good at, allowing people to interact with each other. However, *Lurker* adds the dimension of narrative to this interaction to provide a unique experience.

Figure 7. *Lurker*.

The Story

Lurker is a story about an on-line hacker group. The group calls themselves the "Toad Sexers." Although the group has an expanding membership, initially the audience has exposure to seven members of the group located at a technical institute. The members' names are Shira, Bippy, Nick, Val, Squanch, Lester, and Jax. The audience begins the experience by signing up for the Toad Sexers' initiation test for potential new members. The act of signing up consists of entering one's email address on the Toad Sexers' registration Web page and then replying to the email message which notifies the user of the Toad Sexers' initiation test. Six participants are chosen, and the initiation test begins.

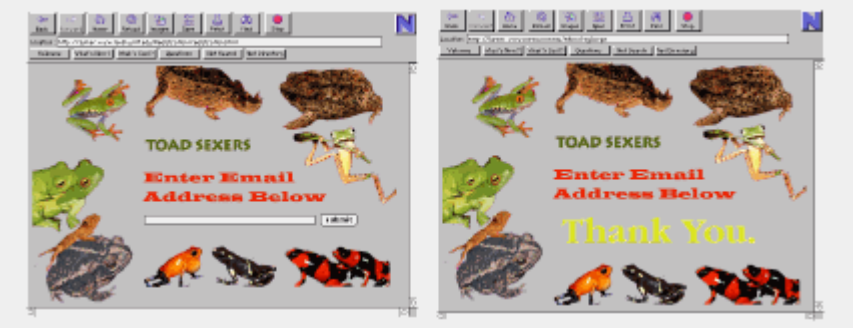

Figure 8. The *Lurker* Registration Pages.

Soon after the initiation test starts, Jax, the Toad Sexer responsible for administering the test, sends the participants email which asks them to help out with a situation that has arisen in the Toad Sexer group. One of the members has disappeared. No one is sure if Shira, the Toad Sexer that is missing, is setting them up for a hack, or is really in trouble. The Toad Sexers themselves are split on this issue, but a number of them believe that it is better to assume the worst, and investigate. The participants are given "lurker status" on the Toad Sexers' mailing list. This means that the participants will receive all email that the Toad Sexers post to this list, but the participants, since they have not yet proven themselves to the members, are not given the privilege of posting to the Toad Sexers' list. Instead, the participants are given their own "lurker list" for their communication. From this point on, the participants are referred to as the "lurkers."

The lurkers learn that Shira disappeared while exploring the bowels of the Institute with Bippy, another Toad Sexer. Right before Shira left Bippy, she found a strange device that she described as being some sort of transceiver. Eventually, the Toad Sexers find that this transceiver is sending data to a secure file server on the institute network. Because of Shira's unknown situation, the Toad Sexers decide to crack the file server, and enlist the lurkers' help. Once the file server is cracked, it is discovered that the server is being used to store digital sequences

from a security system installed in an Institute lab. The video contained on the file server shows that Shira is trapped in this lab.

At this point, the initiation test is completely dropped, and the lurkers are asked to continue to help the Toad Sexers, both in locating Shira and then in freeing her from the lab. Before the Toad Sexers can accomplish this, the professor and his assistant who work in the lab discover Shira and decide to involve her in their research. Now the Toad Sexers need to get Shira out of the lab before the professor uses her as a guinea pig.

The Implementation

Lurker is an entirely network based experience. All of the content is delivered to the participants through a combination of email and the World Wide Web. *Lurker* attempts to interactively narrate a story through these two media. Both the World Wide Web and email have distinct characteristics that make them good candidates as story telling media.

Email as Story

Email is rapidly becoming the communication medium of choice among "wired" individuals. Its advantages include speed, economy, and asynchronicity. Email is faster than conventional mail and cheaper than a phone call. An email message can be edited prior to transmission, and the recipient will receive the message as soon as they check their mailbox.

Email is used extensively in *Lurker*. It is used as a communication medium by the participants and by the characters. Email is also used to convey story. One useful feature of email is that all the mail messages an individual receives are stored chronologically in that individual's mailbox until they are deleted. This condition allows email to be used in a linear mode to convey story. There is some precedence for this style of storytelling. Throughout the development of literature there have been a number of novels composed entirely of letters. A popular modern example is *Griffin & Sabine: An Extraordinary Correspondence* by Nick Bantock.(Bantock, 1991)

In this book the author has taken full advantage of the medium of novels conveyed through letters. In *Griffin & Sabine* there are actual envelopes on the pages of the book, which open to reveal handwritten letters. By personalizing the content, Bantock has enhanced the experience of reading *Griffin & Sabine*.

Personalization of correspondence can also be implemented in email. Many people have characteristic compositional elements in their email such as using only lowercase letters, or ignoring punctuation. Some users also append a form of signature, commonly known as a dot-sig, to their email. These usually contain some personal information like physical addresses and phone numbers, quotes,

and sometimes art. The use of these elements brings a richness to the email and enhances the reader's experience.

Unlike the use of letters in a novel, most of the email in *Lurker* is delivered live to the participants. The fact that the email is sent in real time to the audience allows the author to control when the audience will be exposed to each email message. A certain amount of dramatic control is maintained throughout *Lurker* through the delivery of email messages.

Real Time Story

Dramatic control was the main reason why *Lurker* was implemented to run in real time. Real time in this case relates to story time; it has nothing to do with data throughput. In *Lurker*, if Bippy tells Nick to email him in an hour, Nick's reply will show up about an hour later. Running *Lurker* in real time gives the experience more realism, and also helps deal with network lag.

Movies served over the network can take several hours for users with poor connections to download. In order to make the experience equally accessible to these users, time must be allotted for them to download these movies. A real-time implementation allows for these breaks in the story, without sacrificing the ongoing narrative. The participants' reactions to real-time delivery of a story is discussed in the results section of this chapter.

The Web

The World Wide Web and a graphical interface to it make up the second medium of *Lurker*. At the time of the writing of this thesis, there seems to be a shortage of story based content on the Web. Of the stories that do exist on the Web, few of them use the medium to its full extent. This is true for a number of reasons.

• Stories are hard to write. Interactive stories are especially hard to write.

• Interactive stories that use the Web fully cost money, and a reliable and efficient way to charge for content on the Web has not taken hold yet.

• An average user's bandwidth on the net does not allow for downloading of large files in reasonable time.

Each of these issues had to be dealt with in order to produce *Lurker*. The quick answer to the first two problems is that *Lurker* is part of a funded masters thesis, and thereby large amounts of time and money have been spent on its production. The third problem, bandwidth, will be solved in time. If the current rate of development of computer processing is any indication, it will be solved sooner rather than later.

One other problem with producing narrative content for the Web is that the methods of production have not been developed for this medium. There are well developed production models for both print publishing and film and video publishing. There has also been extensive work done on computer software production. Some elements of the production of these media can be adapted for use in production of interactive cinema, but there are numerous issues that are specific to interactive cinema production. Many of these issues deal with the combination of elements from production in different areas.

Figure 9. Nick's Home Page from *Lurker*.

The Interface

Lurker's interface design tries to incorporate the good ideas from *The Files of Dr. Bern* while learning from the mistakes made there. As in *The Files,* the media for interaction (email and the Web) are familiar to the user. On top of this substrate, several interactive episodes have been implemented to engage the user and allow them to think and act as a part of the experience.

The Initiation Test

The first interactive element of *Lurker* is the beginning phase of the Toad Sexers' initiation test. When the participants are notified that the test is beginning, each participant is issued an alias. The six alias names are taken from the Chinese astrological animals; they are: the dog, the goat, the monkey, the pig, the rat, and the snake. The names are issued at random and allow the participants in *Lurker* to communicate anonymously.

For the first task in the initiation experience, each participant is issued two questions. In order for the Toad Sexers to learn some vital information about the

group of lurkers, the participants must solicit answers to each of their questions from all of the other participants. A form based Web page is implemented for entering these answers. As the answers from the various questions are entered, a profile that is readable to all the participants is built up on each lurker.

Figure 10. An Initiation Test Question Page from *Lurker*.

This first interactive episode is essentially an ice breaker. It is meant to both establish the lines of communication between the participants, and to help the participants get to know each other. The only real feature built into this interactive element is the ability for lurkers to write their answers in html code. The answers from the test are complied on the profile pages. If the answers are written in html, the lurkers can design their profiles to reflect their personal tastes. This feature allows html hackers and web savvy participants to flex their muscles and make their knowledge of the Web evident to their fellow participants.

Figure 11. The Snake's Automatically Generated Page from *Lurker.*

The Secure File Server

The second interactive episode involves breaking into a secure file server. Technically this sort of activity is considered cracking, not hacking. From an ethical perspective it should be mentioned that in the context of the story, the Toad Sexers crack this system out of necessity. The Toad Sexers as a group do not condone malicious tampering with computer systems.

At this point in the story, the Toad Sexers enlist the aid of the lurkers to help them crack the file server more quickly. Each participant is given the Web hotlist of a major user of the secure file server. The participants are then charged to examine the areas of interest contained in the hotlist, and to try to guess the password from that information. This task, along with all the following interactive episodes, is designed to be solved by the group as a whole. Each hotlist contains between ten and twenty entries. Each of these entries is an existent Web site. For an individual to thoroughly explore all the sites on their hotlist would take several hours. If the participants share their individual hotlists with each other, they will quickly realize that there is a subset of the total number of sites that occurs in each hotlist. The discovery of these repeated sites is the key to uncovering the password. Although it is possible to derive the password from a single hotlist, communication between the lurkers greatly simplifies the task at hand.

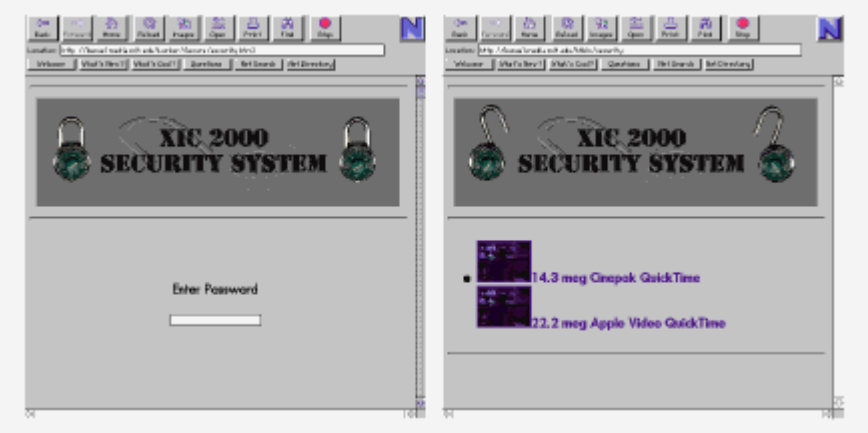

Figure 12. The Secure File Sever from *Lurker*.

An additional feature of the design of the file server interactive episode is that it blurs the line between the story's content and the multitude of additional content on the Web. One of the challenges of good storytelling is to create a believable and seemingly infinite world for a story. The Web, although it is a virtual space, is recognized by its users as a very large environment of content. By incorporating Web sites created by other authors into the domain of *Lurker*, viewers have a more difficult time defining the boundaries of their experience with *Lurker*. If these boundaries are sufficiently blurred, viewers may be unable to discern what

content is external to the story. If the technique is successful, viewers may even view the story space as potentially infinite.

PGP Encryption

The third interactive episode involves Pretty Good Privacy encryption. At this point in the story, the Toad Sexers are monitoring the correspondence between the professor and the researcher that work in the lab in which Shira is trapped. At a certain point the professor and researcher begin encrypting their messages using PGP. To read these messages, the Toad Sexers and lurkers must comb through all the old correspondence between the professor and the researcher in hopes of finding their encryption keys.

Again the task is split between the participants. In this case, each participant is pointed at a different section of the data to be analyzed. In order to find all the necessary keys, all the participants must find some relevant information in their data set.

Perhaps the more interesting issue raised by this interaction is the degree of work that the participants are asked to perform. The data examination is not particularly intensive but, once the participants have acquired the PGP keys, they will need to have PGP running on their machines in order to decrypt the messages. The process of installing PGP by each participant will be the challenge. Installing PGP is not overly difficult, but it is more work than pleasure. For many email users, PGP is something they would like to have but never find the time to install. *Lurker* attempts to coerce the participants to install PGP by giving them a motivation to do so though story. The number of users that actually download PGP and get it running should prove to be a good indicator of how successful *Lurker* is at engaging its audience.

Virtual Tunnel Hacking

In the final interactive episode of *Lurker*, the participants explore the corridors of the Institute through a set of on-line floor plans. At this point in the story, the Toad Sexers have acquired several sets of directions to the lab, but none of them contain any landmarks. The directions are distributed to the lurkers with almost no instructions. Hopefully, by this time in the experience, the lurkers have begun to understand the central idea behind hacking - creatively overcoming or circumventing challenges. At the beginning of the experience, the lurkers were given access to a set of maps of the Institute. At the current point in the story, the lurkers are meant to use these maps to cross reference the multiple sets of directions in order to find the lab. If the lurkers think to use the maps and combine the directions, they have essentially dealt with the situation as a hacker might.

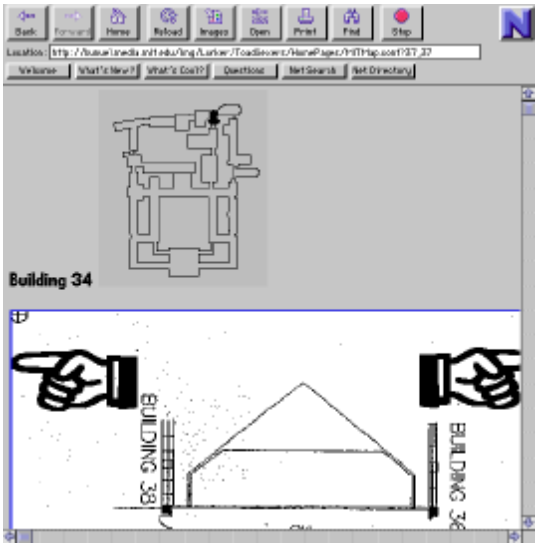

Figure 13. One Page from the Interactive Map in *Lurker*.

As with the previous interactive episodes, the information is distributed amongst the lurkers. It is up to them to discover that they have been given disparate sets of directions. It is also left up to them to understand how to combine these sets of directions with the Institute maps in order to pinpoint the location of the lab. Once the lab is located, the story runs to its conclusion.

Integration of the Interaction

As the interactive elements of *Lurker* have been presented here, it is easy to see them as distinct episodes of the overall story experience. A major challenge in designing these elements is to integrate them seamlessly with the content. In order to give the audience a satisfying dramatic experience, they must feel that the story flows smoothly. One danger in using interactive elements that ask the user to solve problems or uncover information is that they can stop the story. If the story is designed so that it cannot progress until the audience satisfies a certain criteria, there is the possibility that the audience will not complete the necessary actions. In this case, the story stops and the audience members may give up. *Lurker* has been designed to prevent this phenomenon from occurring.

The simplest way that *Lurker* solves the problem of audience failure is by involving the characters. Throughout the story, both the Toad Sexers and the lurkers are trying to locate Shira and return her to safety. So, when the lurkers are asked to solve a problem, the Toad Sexers are also working on it. If the lurkers have not finished a section of the experience in a reasonable amount of time, the Toad Sexers finish it. In order to further integrate this idea into the story, the lurkers, through reading the Toad Sexers' mailing list, are able to track the progress of the group in each situation. In this way, the story doesn't stop when the interaction becomes more intense.

The use of the characters in the interactive episodes has several other beneficial properties. The ideas that the characters come up with may help the participants with their own ideas on how to approach a situation. In this way, the progress of the Toad Sexers on a particular problem can be used to give hints to the participants.

This story device also allows users to interact at a level at which they feel comfortable. One problem with interactive narrative is that not everyone wants to interact all the time. Audience members vary widely in their desire to interact with content and the way in which they want to interact. *Lurker* allows audience members to participate in the interactive episodes as intensively or passively as they desire. If a viewer does not enjoy solving problems or hacking situations and would rather just experience the narrative elements, this viewer can ignore the Toad Sexers' requests for aid. Even if all the participants in an experience decide not to interact, the story will continue until its conclusion. Conversely, active participants can try to solve every problem, and can extend their enthusiasm to building relationships with their fellow participants. This sliding metric for interactivity is one important idea that *Lurker* explores in the medium of interactive cinema.

Results

Lurker was still in its early stages of distribution at the time of the publishing of this thesis. As a result, only a small number of individuals have experienced *Lurker* as participants. Although some conclusion can be drawn from the experiences of these individuals, the basis for these conclusions is not comprehensive.

One of the difficulties that *Lurker* must deal with is the scheduling of events for multiple participants. Since *Lurker* runs in real time, interactive episodes happen at specific times. It becomes a challenge to coordinate six individuals so that a majority of them can be on-line to experience these episodes. Three strategies have been suggested to help deal with this problem. One idea is to give each participant sufficient advance notice so that they can be prepared for each experience. The second strategy is to extend the duration of each experience to increase the probability that the participants will be on-line for some segment of it. The third strategy is to dynamically schedule events. In this case, the system must be aware of when participants are on-line. If an experience is ready to begin, the system can wait until at least one participant is logged on. At that time, the system can notify the on-line participant of the current experience. It then becomes that participant's responsibility to notify the other participants of the experience. None of these strategies deal with the problem perfectly, but the third seems to be the best current solution.

Another issue that *Lurker* has raised is the issue of on-line identity. On the positive side, the early participants in *Lurker* have experienced some difficulty in

discerning which individuals are real people and which are scripted characters. On the negative side, the early participants have not communicated amongst themselves as much as was expected. The reason for this may be that the participants have no history with this type of interaction. The participants may simply not be accustomed to communicating with other people while experiencing a story. To alleviate this problem in *Lurker*, additional instructions and incentives may need to be added to encourage more communication. However, if interactive cinematic experiences for multiple participants become more common, this problem may be solved through exposure.

Future Work

Two major ideas involving *Lurker* could not be implemented for this thesis because of time restrictions. Both these ideas involve the audience's role after experiencing *Lurker*.

When an individual signs up for *Lurker*, they are told that if they successfully complete the Toad Sexers' initiation experience, they will be given membership in the Toad Sexers' organization. In the current implementation this promise goes unsatisfied. But there is a way fulfill this promise to the audience.

When *Lurker* is run for the first time, the membership of the Toad Sexers is made up of the fictional characters in the narrative. When the first group of participants completes *Lurker* they are offered membership. If the participants accept membership into the Toad Sexers, the Toad Sexer group will have its first real members. As successive groups experience *Lurker*, the number of real members in the Toad Sexers will continue to grow. In this way, the Toad Sexers will emerge from its fictional roots and become a real on-line group.

User ReAuthoring

The on-line environment of *Lurker* allows for re-authoring of the experience. If *Lurker* participants are allowed to modify the text of *Lurker*, some very interesting possibilities arise. One of these is that the virtual membership of the Toad Sexers can grow along with its real membership. Initially, there are seven visible Toad Sexers in *Lurker*. If participants are given the ability to imbed their own characters in the narrative, the Toad Sexers' membership can grow over successive runs of *Lurker*.

Adding oneself as a member of the Toad Sexers and as a virtual character in *Lurker* is a relatively simple process. First, one must add some email messages to the script that relate to the events that occur in *Lurker*. This process is simply adding your character's reactions to the story. When new participants experience *Lurker*, they will receive your character's reactions along with the reactions of other Toad Sexers. If you have a Web page, you can create a link to it from the Toad Sexers' people page. These two steps will embed your character in *Lurker*,

and if the scripting of the content is good, your character may be indiscernible from the original Toad Sexers.

The only remaining issue is the video content of *Lurker*. Those participants that have the skills and resources necessary to re-edit video could incorporate their characters into the video portions of *Lurker*. This process is probably not practical because of the amount of work involved, but there is some precedent for it. For example, some *Star Trek* fans have been known to re-cut old episodes of the show and edit themselves in as characters. By implementing *Lurker* on-line, fans of the content can implement their most bizarre re-authoring strategies.

Issues of Authorship

Once users begin to re-author the content of *Lurker*, the idea of who owns or is responsible for the resultant experience comes into question. It has been clear for some time that the current idea of copyright does not transfer well to an on-line world. It is beyond the scope of this thesis to propose a solution to this problem. However, with respect to *Lurker*, there are several ways to deal with authorship. One model is to allow anyone with the appropriate resources to serve their own version of *Lurker*. In this case, if someone wishes to modify the text of *Lurker*, they set up their own server, and thereby gain total control over their version of the content. The administrator of the new site becomes the true author of all the changes that are made. This model works well because new versions of the story can be made while the older versions remain available. The problem with this model is that only users with significant resources can make a contribution to the story.

An alternative is to set up one or more publicly modifiable versions of *Lurker*. Only users that complete a version of *Lurker* would be given permission to modify one of these versions. The drawback of this approach is that the changes any one user makes are only temporary. Once someone else experiences the modified version, the new user can now make their own changes, which will replace the older version.

Both models of modification share a central idea. Although each version of *Lurker* may represent the efforts of a number of individuals, the content is actually prepared according to one person's overall vision. This choice was made based on the results of other collaborative narrative projects. A narrative is a highly structured collection of material. Some form of control must exist to ensure that this material makes sense as a story. A single author or group of authors with a single vision provides this control. Without this level of structure the resulting experience is likely to have divergent story ideas that result in weakening its narrative power.

Role Playing

Another way for viewers to revisit the text of *Lurker* is through role playing. The original structure of *Lurker* is designed to encourage interaction between the lurkers while disallowing any real interaction with the characters in the story. This design was used because of the constraints of the medium. It is likely that, at some point in the story, the participants will want to interact with the characters; but, the original implementation of *Lurker* does not support this. If the participants are allowed to role play characters in *Lurker*, the rules change.

When individuals decide to take on the roles of the characters in *Lurker*, real-time interaction between the lurkers and characters becomes possible. In the original version of *Lurker*, relationships are meant to develop between the lurkers and, to a limited degree, with the characters. Since all the content in the original version of *Lurker* is scripted, the audience will at some point become aware that the characters are fictional. But if there are real people role playing the characters, the whole nature of the characters in *Lurker* changes. The characters change from a narrative device used to shape the audience's experience into living entities. Some audience members might even believe that the experience is real; and, in some bizarre sense, it is. The premise for the story is an initiation test run by the Toad Sexers. Only individuals that have already experienced *Lurker* will role play the characters. These individuals are members of the Toad Sexers. These members will be in control of how the experience unfolds. In this sense, the role players are Toad Sexers, and they are running the initiation test for the participants. So, the experience that began as a purely fictional exercise becomes a reality.

The Making of a Thinkie

The production cycle for works in interactive cinema is not yet well defined. As works are created in this medium, it is informative to look at the process used to make them. The production approach for a project can have a dramatic effect on the project's finished form. For these reasons, this chapter will look at the various phases of production of *Lurker*.

The first task of creation is coming up with the idea for the story. In thinkies, this process involves not only the choice of story idea but also the choice of the medium for interaction and the choice of experience the audience will have. These three parts of the project as a whole are intimately connected. Changes in any one of the three will necessitate alterations in the others. The important thing to keep in mind in developing a thinkie is to incorporate the interactive element of the experience from the very start of the creative process.

Writing

The writing of *Lurker* involved the weaving together of several streams of ideas into a united experience. The main streams of ideas were: characters, story, experience, interaction, environment, and axes of modification. Each of these categories provides a different view of the content of the overall project. Character and story ideas make up most of the pure narrative content in *Lurker*. Experience describes the type of thinking or intended experience that *Lurker* is meant to elicit in the audience. The interaction class included all the forms and instances of interactivity contained in *Lurker*. The environment included descriptions of how the interactive elements would be implemented and how the various parts of the project would be viewed by the audience. The axes of modification contained a description of the areas of the experience which the audience could affect through their interaction.

In *Lurker*, the initial writing phase centered on scripting the video portion of the experience. A twenty page screenplay was the final product. As this document was created, ideas for the interactive elements were fleshed out and the intended experience of the viewer changed several times. On some projects, the experience of the viewer may be the guiding idea, but in *Lurker* the idea of an audience based networked experience was the real motivational force. Most of the early focus of the project was on how a group of individuals could experience a story and interact with each other in the context of that story.

By the time the screenplay was finished, the medium for interaction had been chosen and the interaction had been scripted. For *Lurker*, the medium for interaction is the net. The decision was made to use email and the World Wide Web as the delivery system for the experience. This decision was based on the fact that there are a large number of net users that are familiar with these two media. Other forms of net based communication (such as talk and IRC chat) are not explicitly used in *Lurker*, but the participants are encouraged to use these and other forms of communication during their experience.

The choice of the medium for interaction constrains the choice of interactive elements in the experience. The choice of the Internet as the medium for *Lurker* created both unique opportunities for interaction and strong constraints. The main strength of the net as a medium is that it allows people to connect with large amounts of information and other individuals. The network is a difficult medium because of the lack of structure. There are large numbers of different machines connected to the network, dealing with different sorts of information in different ways. For example, if you wish to publish video on the net, how do you make it available? There are numerous different digital video formats for the various machines connected to the net. In order to allow all users to view the video, you would need to publish it in many different formats.

Another problem with the net is that not all users have high bandwidth connections. For modem based users, their connections are so slow that it would take them hours to download a short segment of video.

Lurker tries to use the strengths of the net to overcome the net's current weaknesses. *Lurker* encourages its participants to use communication to deal with the inequality of users on the net. If only one participant has the right configuration to view the video, it is his responsibility to relate the information in the video to the other users. *Lurker* also presents essential information in forms that all users can access.

Production

The video production of *Lurker* followed the typical production cycle of a student film. Preproduction involved drawing up story boards and shot lists. The shooting ran over a five day schedule. The five days of shooting yielded approximately five hours of raw footage.

The footage was edited on an Avid Media Suite Pro nonlinear editing system. As the footage was edited, production began on the remaining aspects of the project. These areas include the coding of custom software, configuration of the server, and development of supporting content.

For *Lurker* some software had to be written to schedule the events that occur over the course of the experience. This scheduler had to deal with sending email, posting information to the Web, and handling interactive elements. A user interface also had to be developed for this software so that participants could make modifications to future versions of *Lurker*. This scheduler was written by Rich Lachman. His bachelor's thesis contains more detail on this tool.

The story environment for *Lurker* is a series of Web sites. Almost one hundred Web pages were created for *Lurker*. The main thread of the story is conveyed through email messages. Over one hundred and fifty email messages were composed for *Lurker*. These messages were written by Rob Frederick. Both the Web pages and email messages were created after shooting was completed but before the final edit of the video was finished.

Creating the supporting content after scripting and shooting the video portion of *Lurker* provided some advantages and created some problems. The risk with starting work on the email and Web environment so late in the production cycle was that this content might not be integrated well with the video. In a well scripted story, all the elements of the narrative are woven into a tightly integrated whole. When new ideas are injected into a story late in the production process, this can sometimes serve to dilute the original core of the story. However, developing the email and Web based portions of the story after shooting allowed these elements to be used to strengthen weak areas of the video. "We'll fix it in

post." is a saying in the film and video production community. This phrase means that any mistakes that may have been made while shooting can be fixed using advanced techniques in film and video post production. The *Lurker* shoot coined a new phrase - "We'll fix it in the interactive implementation."

Conclusion

The production environment for *Lurker* had some unique constraints that affected the way it came together. *Lurker* is a research project, not a product. In the research environment at the Media Lab, computation is readily available. Powerful machines could be used to develop software and edit the video. However, labor is a precious resource. Although I was able to devote a large portion of my time to the project, the development team for *Lurker* was small. A reasonable number of people gave five solid days to the shooting of *Lurker*. But once the shooting was done, only three people, Rob Frederick, Rich Lachman, and myself were left to work on *Lurker*. For a project of this nature, three individuals is a small workforce.

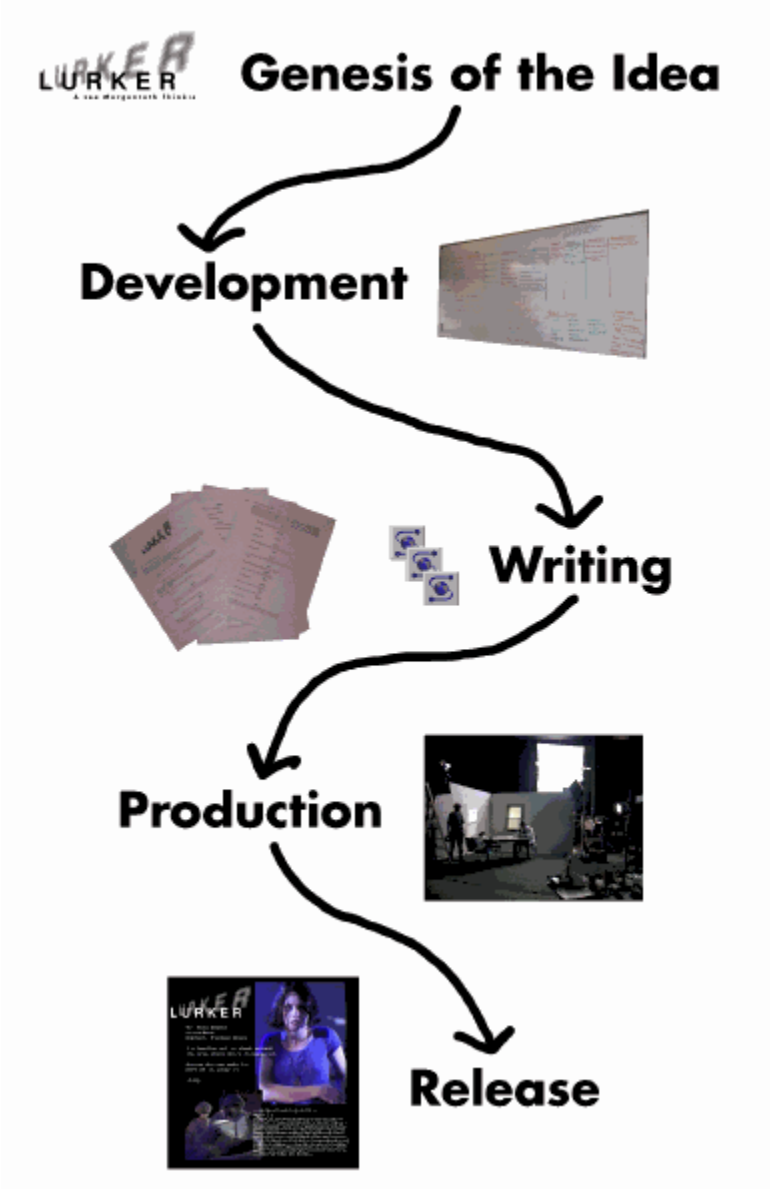

Figure 14. The Phases of the Production of a Thinkie.

Related Work

Three projects are discussed in this section. Three projects alone cannot hope to cover the field of interactive narrative. However, these three projects give some indication of the diversity of experience available in this field. These three works

are: *Dictionary of the Khazars: A lexicon novel* by Milorad Pavic, interactive movies by Interfilm, and *The Wheel of Life* a transformational space developed at the MIT Media Lab. It is informative to look at how these three experiences and the thinkies presented in this thesis relate in terms of relative audience experience.

All these projects can be placed on a continuum of experience. This continuum runs from non-linear explorational environments to linear directed narrative experiences. Elements that affect this scale are: temporality, modes of interaction, and narrative structure. Stricter control of temporality and narrative structure, along with limited modes of interaction, create a more directed experience, while open temporal structures, non-conventional narrative constructs, and broad possibilities for interaction create a more explorational environment. Figure 15 shows how each of the projects in this section, along with the two thinkies, relate to each other with respect to the audience's experience. In the remaining sections of this chapter, the contributions of each of these projects are discussed, along with the type of the experience they provide.

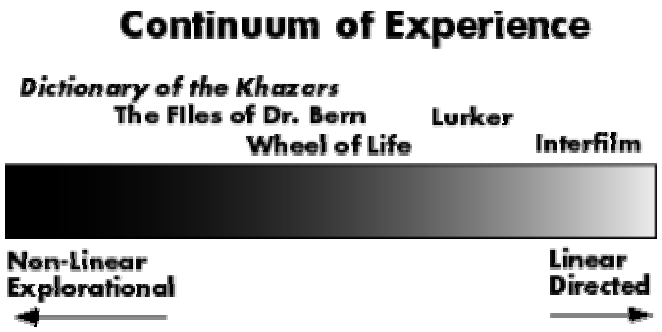

Figure 15. Relative experiences offered by thinkies and related work.

Dictionary of the Khazars

Dictionary of the Khazars is a book that is unique in its form and content. This book is divided into three separate sections. Each section is a self contained dictionary The entries in each dictionary are stories. The entries may also contain cross references to other entries in any of the three dictionaries. The true form of this book is a web of information presented in dictionary form.

The choice of form in Dictionary of the Khazars is critical. By calling the book a dictionary, Pavic has set up an expectation in the reader for how the volume is laid out and how it can be used. Pavic also includes a section of preliminary notes that describe the form and potential uses of the dictionary. However, even this section conforms to the dictionary model, since all dictionaries contain a section describing their layout and use. One advantage of the dictionary form is that the great majority of readers will be familiar with the way a dictionary works. The second aspect that makes Pavic's choice of form appropriate is that the dictionary

form supports the web of interconnected stories and accounts that make up the content of Dictionary of the Khazars.(Pavic, 1989)

A reader of Dictionary of the Khazars is encouraged by the author to read the book in a non-linear style. Since each of the dictionary entries is a self contained unit, there are a large number of possible ways to read this book. The author suggests any number of ways to approach the text, including reading the text backwards, page by page. The flexibility of experience available in Dictionary of the Khazars places this work on the non-linear end of the continuum of experience.

The experience of reading Dictionary of the Khazars goes beyond non-linearity in its design. The reader's experience while immersed in Dictionary of the Khazars is meant to resemble the experience of conducting historical research. Many of the analytical processes that a person experiences while reading Dictionary of the Khazars are integral processes in the field of historical research. These processes include, following cross references, finding matching and conflicting accounts of an event, and rereading passages to find new meaning based on information gleaned from other entries. Readers may not realize that these experiences were part of historical research when they are reading the book. I personally didn't realize this relationship while reading Dictionary of the Khazars. Only when a colleague mentioned to me that the experience of reading the book felt like doing historical research did I realize this aspect of Dictionary of the Khazars. The realization of this imbedded experience gave the book an added sense of closure. This feeling of closure gave me a sense of satisfaction I don't get reading a linear novel.

Interfilm

A number of interactive theatrical experiences have been made available to the public in recent years. The one of these that has received the most media attention is a series of interactive movies funded by Sony Corp. These interactive movies are called Interfilms.

In an Interfilm, an audience watches a movie in a specially equipped theater. Every seat in the theater is outfitted with an input device with three buttons. At numerous times in the movie, the audience is given the choice of three possible paths for the story to take. Each audience member can then vote on which of these paths to take by pressing the button on their seat that corresponds to their choice. This is the only form of interaction that the audience has with the movie.

The makers of these movies have made a conscious decision to enhance another form of interaction - interaction between the audience members. Each audience member is encouraged to try to persuade the other members of the audience to vote for a specific choice at the decision points. This results in members of the audience shouting out which choice they think should be made. It also can result

in members of the audience pressing buttons on multiple unoccupied seats in order to get more votes and sway the path of the story.

The implementation of these movies is straightforward. The votes of the audience members are tabulated by a computer, and a single result is determined. Multiple laserdisc players are used so that any of the possible choices given to the audience can be shown if it is chosen. The computer that tabulates the results of the voting simply decides which section of video to project.

Although Interfilms contain an interactive element, the narrative element of Interfilms remains conventional. Many of the constraints of the film medium remain in the current implementation of Interfilms. The actual interaction in an Interfilm is limited and strictly controlled. The combination of these factors places Interfilms at the most directed end of the spectrum of interactive narrative experiences.

The Wheel of Life

The Wheel of Life was an interactive installation done at the Media Lab. It consisted of three physical environments. Each physical environment was connected to a virtual environment on a computer. Participants explored the installation in pairs. Participants would alternate between exploring the physical and virtual environments. The Wheel of Life was set up to investigate immersive environments, human machine interaction, and machine mediated human to human communication.(Davenport & Friedlander, 1995)

The Wheel of Life is the most difficult project to classify because of the multiple experiences it contained. Each pair of participants in The Wheel of Life was made up of an explorer and a guide. The experience of the explorer was non-linear by definition. This participant was thrown into the unfamiliar spaces in The Wheel of Life, and were expected to discover the meaning of each space. The guide's experience was similar in that they explored a virtual environment. However, the guide, through their activity, was meant to direct the exploration of the other participant. This task was essentially a process of imposing linearity on the non-linear experience of the explorer. If we were to categorize these two experiences separately, they might both be considered non-linear. However, when they are combined within the whole experience of The Wheel of Life, the resulting experience has a relatively more linear structure.

Thinkies

The two thinkies created for this thesis provide dramatically different viewer experiences. The Files of Dr. Bern most closely resembles Dictionary of the Khazars in its structure. This places the experience of The Files on the non-linear end of the continuum of experience.

Lurker ends up falling on the more directed end of this spectrum. Although Lurker is an intensely interactive and dynamic work, it's implementation is a highly structured environment. The story of Lurker has a conventional structure. The time frame of Lurker is fixed. These two qualities would place Lurker at the extreme linear end of the continuum. However, the diversity of interaction pushes Lurker to its current area on the continuum of experience.

The fact that the two thinkies created thus far cover a large area of the continuum of experience bodes well for thinkies as a form. If the theory of thinkies was limited to only a small number of applications, it is likely that they could only provide a small range of possible experiences. The broader area of the continuum that the two works created for this thesis cover points to the potential for future thinkies to offer a wide range of experiences.

Conclusion

Over the course of this thesis, two thinkies were produced. These two works attempted to establish thinkies as a style of interactive cinema. Each thinkie was also a step toward establishing interactive cinema as a medium distinct from all others. These projects alone may not have accomplished their goals. However, they provided some new ideas in the area of interactive cinema and raised a number of questions.

What role does design play in the production of thinkies? The experiments in this thesis showed that all aspects of a thinkie must contribute to the story being told for the experience to be effective. The design phase of production was where the planning of this integration takes place. Both The Files of Dr. Bern and Lurker involved intensive design phases which were relatively unstructured. No real methodology of design has emerged yet for thinkies. However, if the thinkie form is to grow, this phase of production must become more well defined.

Lurker experimented with multiple participants in a narrative experience. Major issues of temporality arose in the testing of Lurker. There were problems scheduling events for multiple participants. There were also more obscure problems, like users' on-line patterns and their effect on a shared experience. Some users were primarily on-line from nine to five, other users were only on-line in the evenings, and some users seemed to always be on-line. How can all these users participate concurrently in a narrative experience?

A globally networked audience of viewers raises additional issues. Incompatibilities exist in such an audience, not only between machine architectures, but also between individuals. These incompatibilities can be as complex as multiple languages or as simple as varying time zones. In any case, these incompatibilities also represent great diversity.

This thesis only deals with very small networked narrative audiences. How will these issues of audience scale to hundreds or thousands of participants in a single experience?

Thinkies may only be a transient concept. However, the ideas used in the implementation of thinkies represent a contribution to the union of interaction with cinema.

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