Lost Cause, an Interactive Film Project

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ABSTRACT
One of the challenges in designing an interactive cinematic experience is to offer interactive choices, which does not distract the user from immersion into the story. The interactive film *Lost Cause* focuses on the life of the main character explored through the perspectives of three characters. The correlated design of interface, interactions and narrative structure in *Lost Cause* uses different techniques to support an immersive yet engaging interactive story experience. One technique is to build an interface which encourages smooth viewer oscillation between the content of the story and interactivity of the interface. Another technique is challenged-based immersion created through viewer's navigation to discover the story. A user study was conducted to analyze how well interactions in *Lost Cause* affect viewer understanding and immersion into the story. The results from this study suggest the overall design is versatile and provides various degrees of viewer immersion.

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Documentation, Design, Theory.

Keywords
Interactive cinema, interactive narrative, interface design, split-screen, interactivity, and immersion.

1. INTRODUCTION
Interactive cinema produces new and engaging story experiences for viewers by combining elements from traditional linear forms of storytelling and from interactive digital media. Voting systems in theatres and menu options in DVD systems are different interface designs made for interactive movies. These interactive movies are entertaining, but at times may not allow viewers to become immersed into story or sustain enough pleasure for repeated viewing. For example, the interactive movie *I'm Your Man* [6] allows viewers to decide which direction the plot should move forward. The film has a choose-your-own-adventure structure, where a choice must be made from a list of options each time the story-tree reaches a branching point. While interacting with *I'm Your Man* [6], the movie halts and viewers must make a choice that will move the plot forward. In this type of cinematic system, when viewers interact, they may be taken out of the immersive experience. This example demonstrates how interactive film-making may not provide viewers with the same immersive experience a viewer feels when engaged with the narrative of a linear film.

The goal of designing an interactive movie is to create a successful experience for the viewer. A successful experience includes both the enjoyment of interacting and the ability to be captivated by the story. However, it is difficult to create an interface and a narrative structure, which provide active choice without distracting the viewer from the immersive experience. There are two main issues when creating a successful experience in an interactive narrative. The design should maintain narrative coherence, and the viewer should be immersed while interacting. If an interactive narrative is unable to maintain narrative coherence, it is also unlikely that a viewer will be immersed into the same experience. If both of these problems are solved, the design of an interactive narrative will most likely generate a successful experience.

A few different theories of viewer immersion in digital environments can point to solutions for these two issues. One such concept is viewer oscillation, which utilizes both the immersive nature of the story and the engaging moment of interaction. Another concept is challenge-based immersion or a state of flow, where viewers are focused on discovering the narrative content through their interactions. These theories may be put to practical use and some concepts can help to design an immersive yet engaging interactive story experience.

The interactive short film *Lost Cause* attempts different solutions in the correlation of its interface, interactivity and narrative structure. A user study evaluated how well an immersive interactive experience was achieved. Participant's actions were observed while interacting with *Lost Cause* and a questionnaire and a short interview were conducted to better understand the viewer's experience and their comprehension of the story. The results from the study evaluate the success of immersion with respect to story and the enjoyment of interactivity. The findings from *Lost Cause* suggest it has a successful design that accommodates different preferences for interaction style.

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2. BACKGROUND RESEARCH

2.1 Immersion

The basic concept of immersion can be understood as a metaphor of being completely submerged into water. Immersion can describe the act of transporting a person into a different reality through a sensory experience, such as the experience of reading a book. Immersion can also describe the feeling of active engagement while working. Ermi and Mäyrä divide these experiences into three different types of immersion; sensory immersion, imaginative immersion and challenge-based immersion [4]. This section will describe the first two; sensory immersion and imaginative immersion. The third category challenge-based immersion will be discussed in section 2.6 as a solution between interactivity and immersion.

Sensory immersion affects all senses and makes a viewer feel they are completely surrounded by a different reality [8]. It is "the sensation of being surrounded by a completely other reality as different as water is from air, that takes over all our attention, our whole perceptual apparatus" [8]. This type of experience commonly occurs in virtual reality, where all the senses of the participant can be affected. This experience usually covers the entire perceptual apparatus, creating an illusion and transporting the mind to a different space. In 'cinema of attractions', a viewer can become visually immersed into a landscape or different environment presented on a giant screen. In game play, a player can become immersed into the game world and different realm through its "audiovisual" component [4]. Many types of media have different sensory outputs that can immerse and surround the viewer.

Imaginative immersion occurs when a text or story transports a reader's mind into another place or time, and can identify with a character. The text of a book acts as a window which "exists outside language and extends in time and space beyond the window frame" [9]. Therefore the reader is immersed into the content interpreted in the imagination rather than the sensory output of the media. Coleridge describes this experience in theatre as "the willing suspension of disbelief", suggesting that viewers forget everything except what is happening on the stage by surrendering their mind to the imaginative world [8]. In order to sustain this illusion of the story world the fourth wall [8] where the audience resides should never be broken. The world should exist on its own undisturbed by the audience.

In cinema, viewers can feel immersed and become lost within the viewing experience through sensory immersion and imaginative immersion into the story. The theatre is dark, the screen is the only thing illuminated and the room is surrounded by the sound of the movie. These aspects of the environment maintain the illusion and engulf the audience with audiovisual. As well film techniques can help maintain the illusion of the fourth wall. An actor will never look directly at the camera and thus at the audience, instead an actor will gaze a little to the side of the camera when looking in the direction of another actor. "This over-the-shoulder position of the camera is a standard film technique that keeps us identified with the characters while also distanced enough so that we are reminded of the presence of the other actor in the frame and of our own exclusion from it" [8]. Film techniques also maintain clear causality and narrative coherence through continuity editing.

2.2 Interactivity

The characteristics of interactivity can seem opposite in nature to those of immersion. When users interact with an interface they are drawn out of the immersive experience. They become aware of the medium and their ability to make choices. Bolter and Grusin describe the state of being aware of the interface as a "hypermediated" experience [1]. Hypermediation is also used to describe the visual "fragmentation" of the interface to provide users with multiple windows and random access to different parts of the media. The screen which was then immersive in time and space now has its fourth wall removed and requires attention from the user. Interactivity uses both procedural and participatory properties from the user. The procedural property presents a set of rules a user follows to get to an end point and the participatory property is responsive to user input and requires action to proceed [8]. The system requires the user to be actively engaging in an activity instead of being passive watching it.

2.3 Immersion and Interactivity

The differences between an immersive experience and interactive experience pose the challenging design problem for interactive narrative. Narrative is passively immersive transporting readers to another time and space, while interactivity is actively engaging dealing with the immediate moment. Incorporating interactivity into a narrative affects the experience of the interface and the active progression of story. By understanding these two processes and how they can be combined a successful configuration for interactive narrative may be created. A narrative can be broken down into "the story being told (content) and the conditions of its telling (structure and context)" [3]. The interface is part of the narrative telling which allows viewers to navigate the narrative content organized into an interactive structure. The interface is where the balance between the narrative and interactivity come together. It can offer choice in an interactive structure and maintain the illusion of story. A successful experience may be possible for the viewer when all the pieces; the interface design, interactive structure and content, function well together. For the correlation between these components to support immersion and interactivity, there are certain techniques or methods that can be applied.

2.4 Immersive Interactive Digital Properties

Murray claims that there are four essential properties (procedural, participatory, spatial and encyclopedic) in a digital environment that can produce an interactive yet immersive experience [8]. She states that both procedural and participatory are the properties of "interactive". Encyclopedic and spatial are immersive properties that "make digital creations seem as explorable and extensive as the actual world, making up much of what we mean when we say that a cyberspace is immersive" [8].

The concept of a spatial environment can be portrayed in the imaginary story world. However according to Murray a digital environment can actually present navigational space. She states that "linear media such as books and films can portray space, either by verbal description or image, but only digital environments can present space that we can move through" [8]. In digital environments the encyclopedic property suggests a wealth of detailed information which can be stored, organized and easily accessed by the user. Murray suggests that the encyclopedic

nature of digital environments "offers writers the opportunity to tell stories from multiple vantage points and to offer intersecting stories that form a dense and wide-spreading web" [8]. Many hypertext stories successfully use this property to provide readers with interesting plots and options to explore a web of narrative information. However, having a lot of information can sometimes be too overwhelming for the reader, break narrative coherence and make readers feel they are lost within it. The amount of information presented to the reader should be limited to keep a reader within the frame of the story.

During immersion, viewers are usually passive in their engagement with an interface by not actively interacting with it or being aware of the medium. This experience is described by Bolter and Grusin as immediacy, where an interface becomes transparent and "erases itself, so that the user is no longer aware of confronting a medium, but instead stands in an immediate relationship to the contents of that medium" [1]. Therefore, the system should have a transparent interface to maintain the immersive illusion of the story world but provide opportunities to interact through a hypermediated environment. An invisible interface should be "natural not arbitrary", "become part of the mediums content" and have "no recognizable electronic tools-no buttons, windows, scroll bars or even icons" [1]. Buttons and interactive elements should be minimized and become part of the media or content in order to be less distracting for the viewers.

2.5 Viewer Oscillation

A well-designed interactive experience should allow viewers to oscillate between a state of immediacy (immersion) and a state of hypermediacy (interaction). This experience allows a subject "to oscillate between the roles of viewer and user, shifting between perceiving and acting, between following the story and actively participating in it" [8]. Oscillation can occur in virtual reality systems or games where the interaction becomes a part of a first person activity. The players focus on their actions, while paying attention to the world presented in front of them. They are in control and their actions affect the overall experience. They "become characters in a cinematic narrative. They have some control over both the narrative itself and the stylistic realization of it …they can … decide where to look … so that in interactive film, the player is often both actor and director" [1].

An experience of oscillation can be smooth when a viewer's interaction becomes an integrated part of the content. Murray suggests that "the screen itself is a reassuring fourth wall, and the controller is the threshold object that takes you in and leads you out of the experience" [8]. The body is integrated into this virtual realm as the controller and its effects become an extension of the body. Their actions become integrated with the story world and control is "very closely tied to an object in the fictional world, such as a screen cursor that turns into a hand…" [8]. To support oscillation a designer can constrain how much participation a viewer has with an interactive medium. Murray declares that, "participation in an immersive environment has to be carefully structured and constrained" in order to sustain the illusion [8]. By restricting the degree of participation and keeping a traditional narrative structure there may be more chances that a reader will not be distracted by the interactions and be able to follow the story.

Oscillation can also occur during split-screen effects in movies. The viewer becomes aware that the screen is fragmented and their attention is hypermediated between the multiple windows. However there is no explicit interactivity involved in the process. The viewer's interaction is cognitive, and a viewer can make choices over which screen they prefer to observe. By focusing on one screen, or moving between screens the viewer can oscillate their focus across the multiple events or stories presented on the screens. Viewers can become absorbed into the overall story when multiple screens are united through connecting content or context. The movie *Time Code* [10] and the TV series *24* [5] use split screen effects as an important visual structure to emphasize the connections between time, space and characters. Screens in these examples unite when multiple characters are connected through physical or emotional situations.

2.6 Challenge-based Immersion

Immersion can also occur when users feel engrossed or focused on their interactions. Challenge-based immersion is fundamentally based on interactions and occurs when there is a "satisfying balance of challenges and abilities" [4]. Therefore a user can feel immersed into an action when they feel the success of accomplishing a task because of his or her capabilities. Csikszentmihalyi suggests a similar concept in his theory of Flow. Flow is a state where a user has neither anxiety nor boredom but is right in the middle of the experience. It is a state of "constant inputs of attention" creating an equilibrium between skills and challenges [2].

According to Csikszentmihalyi, there are eight major components of flow. The first condition is there should be a challenging activity that requires skills. Secondly, there should be merging of action and awareness. The third component is to have concentration on the task at hand. When a user has all attention focused on the task at hand, they will "become immersed in the activity" [2]. Fourthly, flow requires clear goals which provide motivation for user's choices. A user should be able to know exactly what it is that he or she is trying to accomplish, otherwise the task becomes meaningless. This experience becomes enjoyable when a user feels in control of the immediate state, and feels a sense of progressively achieving their goal. Fifth, these goals should provide immediate feedback, which can also be referred to as agency. Agency is the "satisfying power to take meaningful action and see the results of choices" [8]. The sixth condition is to allow users to feel in control and have no worry about failure. This condition also coincides with agency. Agency allows users to feel the importance of their actions, see the results of their choices and make them feel they are in control. This strong sense of control while interacting with a medium enables a viewer to feel more immersed into the experience. The seventh condition is the loss of self-consciousness, where a users concern for self disappears. The eighth condition is the transformation of time. For users focused or in a state of flow hours can pass by in minutes.

3. PROJECT STUDY

3.1 *Lost Cause* an Interactive Film

Lost Cause is an online interactive movie which explores navigation between the perspectives of three main characters at anytime throughout the duration of the story. The story in *Lost*

Cause is about three main characters that live in the same apartment complex and each have a different relationship with Chloe, a young woman. Colin is Chloe's husband. The couple lives on the second floor. They have a rocky relationship which he attempts to resolve. Arie is Chloe's lover. He works as a maintenance worker at the apartment complex and is convinced that Chloe should leave her husband for him. Tina is Chloe's elderly mother. She lives on the third floor and investigates why her daughter has grown distant from her.

3.2 Narrative Structure of *Lost Cause*

The narrative structure of *Lost Cause* organizes the plot into a database of three parallel storylines representing each characters perspective. The database is divided by the character's spatial relationship and time. The film lasts fifteen minutes, the three parallel storylines play simultaneously in real time and at times can intersect and cross the others path. Although there are three individual storylines, the connections between the stories suggest one overall story. The connections between the characters are tied by their relationships with Chloe, the main female character. Each character's perspective is different from the perspective of the other characters creating ambiguity throughout the duration of the film. As viewers interact they piece together narrative fragments of these three characters and build their own interpretation of the story. Different choices will present varied sequences creating new interpretations of the story.

While navigating the narrative database, time is linear and all events occur in real time. Viewers will end up missing narrative information as the plot keeps advancing forward as there is no jumping ahead or moving backwards in time. A viewer will navigate through the three storylines generating her own path (plot) and her own understanding of the story. The narrative database can be thought to contain two types of plot. The first type of plot is told by the author listing all possible events organized into the database. The second type is plot as enacted by the reader. Different choices will present different sequences and create varied interpretations of the story. The reader chooses particular narrative events from the database and determines her own path to experience the plot. The story is then defined by the reader and is dependant on which narrative segments is selected and viewed. Each viewer will then have a different understanding of the story depending on which parts they have seen. This construction of story can suggest the viewer is an editor of the film itself.

Although the overall structure is an embedded design, it has some elements of emergence. The embedded structure consists of all the components structured into a consistent narrative database. The experience becomes emergent because the viewer's interactions are not determined, and the interpretations of the story are different for each viewer. As well there are three predefined endings for each character, but it is unclear to the viewer which ending will be chosen. The time spent on each storyline will be tallied, and the one which has the highest number will have its ending played.

3.3 Interface of *Lost Cause*

The interface of *Lost Cause* has one master screen in the center and three thumbnail screens below, as shown in Figure 1. The master screen displays the main video and sound of the selected video. The three thumbnail screens function as buttons and display thumbnail videos of each character's storylines. These three screens play simultaneously and a viewer can navigate between any one of the storylines at anytime. Navigation is controlled through the movement of the mouse. When the mouse cursor is over a thumbnail screen, the video from the same screen will be mirrored onto the master screen with its corresponding audio. The function is similar to a picture-in-picture mode of channel surfing on a television. It enables viewers to see multiple channels at the same time and flip back and forth between these channels at any time. The thumbnail screen will become slightly darker when selected, to notify the viewer of its selection.

Figure 1. Interface of *Lost Cause* an interactive film.

Each storyline and thumbnail screen has its own soundscape. The melody is consistent across the three channels. However there is a difference in the variation of tone and a different instrument to represent each character. A cross-fade occurs as viewers navigate between storylines. Therefore the tail end of the sound from one storyline can be heard when navigating and listening to a second storyline. The film can be paused or played by clicking the pause-play button. The split-screen interface sustains a viewer's attention and manages fluid navigation while viewers interact.

4. USER STUDY

Different theoretical elements, which promote an immersive but interactive experience, were attempted in the design of *Lost Cause*. These elements and the overall experience of the design were evaluated through a user study. The goal of the study is to understand if the design could support viewer immersion into its interface, narrative structure, and narrative content. However, because it is not easy to measure a viewer's immersion into the experience, the study evaluates different factors in the design that could lead to an immersive experience. The study focuses on the viewer's ability to navigate the interface, their interpretation of story and character and their reactions to interactivity. The feedback evaluates the success of the interface and method of navigation in generating viewer oscillation. It will also evaluate if viewers had difficulty understanding the narrative or if they were focused into a challenge-based immersion. The study also

discovers if each viewer had a different interpretation of the story. The user study provided data that could be evaluated to determine how successful the design of the interactive system was towards the viewers' overall experience.

Twenty participants who had no previous knowledge of the system participated in the study. The participants were of both genders and ranged from ages twenty-two to sixty-five years old. Just over half of the participants were graduate students and the rest were not students. The participants were recruited from within the university and outside of the university and ranged in a variety of experience with interactive cinema. The study lasted about 40 minutes for each participant.

The user study was constructed into two parts. The first part allowed participants to interact with the film while observations of their interactions were recorded in notes. The study took place in an office. The film was installed on a computer allowing the participants to interact with a mouse and watch the film on a computer screen. The second part of the study consisted of a questionnaire and a brief interview of the experience. Before the participants interacted with the film, a brief animation demonstrated how they were to interact with the piece. All participants were encouraged to interact.

During the viewing of the film the participants' interactions were observed and recorded in notes. The notes listed specific parts of the plot that were selected by the viewer and displayed on the large screen. The notes also included which of the three endings they watched and whether or not the viewers interacted a lot or not at all. If a participant took their hand off the mouse or hardly moved the mouse, this was noted as not interacting with the piece. There was no time limit, as the length of the film is played straight through for fifteen minutes and then stopped. The participants were allowed to interact and experience the interactive movie only once and were then required to complete the questionnaire and interview. Those who wanted to watch the movie again, could do so once the questionnaire and interview was completed. The questionnaire contained questions with yes or no answers regarding their interactions and ability to focus on the story. Another section of the questionnaire had the viewers rate different reasons that could have motivated their interactions in the split-screen interface. The participants were then briefly interviewed on their interpretations of the story, their understanding of characters and what they enjoyed or didn't enjoy about their overall experience while interacting with the film. The interview encouraged open ended responses by asking the participants to describe or summarize. The user study results combine the questionnaire and interview answers with the viewer observations to provide data which could be analyzed. Together the questionnaire and interview sections determined the experiences of the overall film regarding interactivity, the viewer's interpretation of the story and whether or not this created a pleasant or successful experience.

4.1 User Study Results

A few questions try to discover if the interactive structure affected the viewer's experience of the story. For example, the structure of the film may cause some viewers to miss narrative information. Just over half of the twenty viewers claimed they had missed important narrative events, which may have impeded their understanding of the story (see table 1). Of those twelve viewers, who claimed to have missed important events only one of them said they were dissatisfied because of this experience. Of the same twelve viewers, all except one of them wanted to view the film again in order to gain a full understanding of the story. Although many viewers claimed to have missed narrative information all viewers were able to recite a summary of the plot during the interview. During the short interview questions, many viewers mentioned they especially enjoyed the interactivity and the structure of the three parallel stories. This demonstrates that regardless of their understanding of the story they still enjoyed the interactive experience because of the design. This also reveals how viewers are in favor of watching the film more than once and that the design supports repeated viewings.

Table 1. Viewers understanding in *Lost Cause*

Question	Yes	No	Not Sure
Missed important events leading to not understanding the story	12	5	3
Dissatisfied because of not understanding the story	1	8	3
Wanted to view film again to understand full story	11	1	0

The questions try to uncover whether or not the viewer's ability to interact may cause them to not understand the story. The twenty participants were asked if their interactions distracted them from the story about half claimed that they were distracted (see table 2). However, when asked if they were focused in discovering the story, most of the participants claimed to be focused. Of the viewers who were distracted, these viewers said they either enjoyed being able to interact or they enjoyed seeing different perspectives at the same time. It seems that viewers were not used to interacting when watching a film and felt it was distracting. However the organization of the narrative made the interactions helpful in navigating and discovering the story built into the structure. Even though viewers considered interactions to be distracting they still enjoyed the interactive experience. These results can also be an interpretation of how viewers were able to oscillate. Those participants who did not find the interactions to be distracting and were able to focus on discovering the story could oscillate between the content and the interface. Those participants who were focused in discovering the story, but found the interactions to be distracting wanted to oscillate but could not.

During the observations of the participants' engagement with the film there was a varied reaction in how frequently they interacted. Some participants were very active in navigating and seemed focused following all three storylines. Other participants were moderately active in interacting and at times may have had a hard time following all three. However a small number of viewers did not interact at all and instead watched one storyline all the way through. The variance may be due to differences in the participant's ability to focus while navigating between the screens at their own personal preference.

Table 2. Viewers focus vs. distraction

Question	Yes	No	Not sure
Interactions were distracting from the story	9	7	4
Focused in discovering the story	16	1	3

The questions also focus on the participants' responses to the interface by determining which part of the screen they focused on and how the split-screens motivated their interactions. The questionnaire asked the participants which screen they focused on the most. The responses had a range of answers. Five participants focused mostly on the larger screen, eight focused mostly on the smaller screens and seven focused on both equally. When comparing these responses with the viewer observations, the range in answers seemed to correspond with the viewer's ability to follow the multiple storylines and how frequently they interacted. The participants who were able to monitor all three storylines watched the smaller screens the most or both large and smaller screens equally. These participants were more likely to interact and claimed to be focused while discovering the story. Those who had a harder time following all three storylines at the same time were more likely to watch the larger screen the most and just follow one of the storylines. These viewers were unable to balance their understanding between the three storylines and preferred watching a linear movie.

Table 3. Rating scale for interactions

Motivation for interaction	Rating
Desire to see or follow action or movement	4.5
Desire to hear conversations	4.3
Desire to see detail	3.2
Desire to read text	3

The questionnaire listed possible reasons to navigate between screens and a rating scale (1-5) to rate how much these reasons influenced their interactions. Participants were then asked if there was any other reason that motivated them to interact that was not mentioned. From the responses, most participants claimed that action and movement on a screen attracted them to navigate the most (see table 3). Secondly viewers were strongly motivated to navigate to particular screens to hear conversation or sound related to that screen. To support this, participants mentioned they were more likely to follow screens where there was more than one person in the scene because of higher chances of witnessing action or dialogue. Participants also provided other reasons which motivated them to navigate between screens. Some of the responses mentioned were; to gather more narrative information, to compare differences in characters point of view, or to switch to a more interesting event when the action became boring. One participant mentioned that their ability to navigate between the three screens produced a fourth storyline, which was their own edit of the film. From the responses it appeared that viewers were motivated to learn more about the narrative through their selections. The narrative motivations were displayed through visual clues suggesting that viewers would discover more information if they viewed or heard particular screens over others.

The interactivity and the structure of the narrative may have altered the viewers understanding of the story. The interview questions determine how viewers understand and follow the story and if there were any differences between each viewer's interpretation based on their different experience with the film. Participants were asked in a few short answer interview questions to determine the traits which best describe each of the three main characters in the film.

Table 4. Viewers' interpretation of Chloe's black eye

How did Chloe get a black eye?	# of responses
Chloe fell	3
Colin accidentally hit her while struggling	5
Colin beat her	9
Not sure	2
Arie hit her	1

Participants, who considered Arie to be a dreamer, had viewed the dream sequence or fantasy sequence in Arie's storyline. However viewers, who had seen Arie strangling Chloe or Arie fighting Colin, considered him to be an aggressive character. Most participants considered Colin to be an aggressive character because of the higher chances of seeing him act in an antagonistic manner. Viewers who stated that Colin was aggressive either saw the fight between him and Arie, or saw him pull out and carry a gun, or saw the scenes where he appeared to be beating Chloe. Other viewers who saw different combinations of sequences considered Colin to be protective of Chloe, rather than being aggressive. Participants would consider either Colin or Arie to be aggressive depending on which combination of sequences they viewed. One participant mentioned that at first it appeared that Colin was the antagonist in the story because he beat Chloe, but later in the film it was revealed that Arie was the bad character because he was trying to choke Chloe as Colin tried to save her.

The participants were also asked to state a brief summary of the story, and recite two main plot events. The observations of the participants' interactions also provided some insights to their different interpretations of the story. All viewers understood the overall storyline; however the details of specific events were different for each viewer because of the different sequences viewed. The participants were asked for their interpretation of how Chloe got a black eye. There were different types of answers which seemed to correspond with the different scenes viewed. The sequence where Chloe gets her black eye occurs in both Arie's and Colin's perspectives. Viewers who saw Arie's point of view thought Chloe's black eye was a result of Colin beating her. However the viewers who saw Colin's point of view realized he had accidentally hit her eye as he was struggling with her. Other

viewers, who didn't see how Chloe got a black eye, thought she had fallen. These participants saw other sequences later in the film. In one scene Chloe explains to Tina that she had fallen, and in another Colin tells Tina Chloe may have fallen. Another participant suggested that Arie was the one who had hit Chloe. This same participant considered Arie to be aggressive, based on the combinations of sequences he had watched.

Table 5. Viewers' interpretation of *Lost Cause* ending

What happened to Chloe at the end?	# of responses
Tina tried to shoot Arie, accidentally shot Chloe	6
Colin tried to shoot Arie, accidentally shot Chloe	5
Arie shot her	2
Two guns, both Arie and Chloe were shot	1
Not sure	6

During the climax of the movie the three storylines come together and it may be a little difficult for the viewers to understand exactly what had happened. Thus, the participants were asked how Chloe had died at the end of the film, to determine the different interpretations of this event (see Table 5). The viewers interpretation of the climax of the film depended on which sequences they watched. Participants who watched Tina's perspective understood that Tina tried to shoot Arie but accidentally shot Chloe. Participants, who saw Arie's point of view, thought that Colin tried to shoot Arie and accidentally shot Chloe. The participants who watched Colin's point of view thought that Arie had shot Chloe. One person thought that both Arie and Chloe were shot and had died. Because this participant had viewed Arie's ending and could interpret this scene as the afterlife for both Arie and Chloe. Other participants were not sure exactly what happened and did not want to speculate. These different results in the interpretation of the traits and events suggest that viewer interpretations can be determined based on the combination of different sequences the viewer selects.

During the interview, participants were asked what was most enjoyable and most un-enjoyable from their experience. Most participants stated they really enjoyed being able to "interact" and experience a film with three concurring storylines. They enjoyed being able to oversee everything happening in the story at the same time. When asked what was least enjoyable about their experience viewers mentioned that they didn't want to miss any events that were happening. Viewers were also asked what they wanted to change about the interactive movie. The most common answer was developing a rewind feature. The participants' suggestion to include a rewind feature supports the fact that viewers did not want to miss important events in the story, but wanted to find an alternative to go back in the film.

5. FINDINGS

The findings of the project are derived from the user study results and my own observations by evaluating the results with the ideas presented in the theoretical background. This analysis suggests that an immersive yet interactive experience is supported in the overall relationship between the interface (split-screens) and narrative database (content and structure). The immersive experience is supported by incorporating different strategies in the design of *Lost Cause*. The findings also suggest that the design of *Lost Cause* promoted a successful experience, which was flexible for the viewers.

5.1 Immersion in *Lost Cause*

Immersion is enhanced in *Lost Cause* because of two strategies. The first strategy is to maintain consistency between the different elements in the overall design. The second strategy was to create a set of conventions in the design to modulate agency in the user's interactions. The narrative structure consists of three parallel threads containing interlocking characters over the same time span. The interface parallels this and includes a three-screen layout and rollover interactions which reveals the narrative content. The linear and parallel structure of the storylines makes it easier for viewers to keep track of the story between the three threads. The set of conventions in the design that modulate agency, occur in the method of navigation through the database. Viewers can only navigate between the three storylines, and cannot jump forward or backward in time. Time is the organizing structural component that modulates agency and minimizes random choice. The design motivates random access between the three storylines through the reliance on linear time. Similar to watching a traditional film, time in *Lost Cause* remains constant and progresses forward. Restricting navigation in time also generates motivation for viewers to make wiser choices in selecting the narrative sequences they watch. These conventions maintain narrative coherence and promote an immersive experience.

Imaginative immersion occurs in the display of the movie's narrative across multiple screens. In a multiple screen environment, the viewer's attention can be focused onto the story content on one screen at a time. However, viewers can also be absorbed into the narrative across all three threads or all three screens. The parallel narrative structure allows viewers to easily make connections between the storylines. When the content displayed on the screens unites by being in one location at the same time, the separate storylines entwine and it becomes possible for viewers to connect the multiple screens and focus on the overall story. Connections across the screens can also occur when the content or dialogue relates to the other characters, displayed in other screens. This can generate an immersive experience as viewers discover narrative information and narrative relationships connecting the three thumbnail screens and thus the whole narrative.

5.2 Viewer Oscillation in *Lost Cause*

Oscillation between navigation and story is possible through the combination of a split-screen interface, and the design of a parallel narrative structure, which both supports fluid navigation and switching. The interface supports immersion in the content on the big screen and offers choice in the thumbnail screens. Viewers will oscillate between focusing on the content displayed on the master screen, watching options on the thumbnail screens and then navigating to one of the screens they choose. The buttons are the screens themselves and have a representational characteristic, which creates a simple and transparent interface design. These

screens provide viewers with easy access across the database narrative as the film plays. The multiple windows hypermediate the viewer's attention and provide an overview of the three parallel storylines. The mirroring of the thumbnail screen onto the master screen easily allows a viewer to situate themselves in the three storylines as they navigate between screens. The ease of selection and fluid navigation of the mouse allows the viewer to seamlessly switch between threads to experience the unfolding story. The smooth rollover method minimizes the cost of interaction. If the interaction had been more noticeable, such as a click instead of a rollover it would be more challenging to navigate between the multiple storylines. Using simple devices for interactivity prevents distracting the viewers further from the story and makes it easier for a viewer to oscillate between the narrative content and the interface.

According to the results from the user study, interactions can distract from narrative pleasure; however, the design of *Lost Cause* mitigated that problem for half of the participants. The user study results suggest that viewers wanted to oscillate between focusing on the narrative and making choices. While all participants wanted to enjoy and focus on discovering the narrative, half of the participants mentioned that the interactions were distracting. However, the other half did not find the interactions to be distracting and were therefore able to oscillate. Therefore, half of the participants were able to oscillate and the other half wanted to oscillate but was not able to.

The spatial and encyclopedic properties of the narrative and interface also support the immersive quality of *Lost Cause*. Space on the screen interface reflects the narrative spaces traversed by the three characters. This spatial relationship between the screens easily allows viewers to navigate from one space to another. Complexity is designed into the narrative to be interesting and to support various interpretations, but it is not so complex as to be overwhelming. The interface allows viewers to navigate this moderately complex and moderately encyclopedic narrative space. Exploration becomes pleasurable as viewers discover character connections and begin to piece together relationships, histories, and chains of causality. The amount of complexity, which is in the database narrative, can affect how much a viewer is hypermediated by the interactions and immersed into the content. Having three screens in *Lost Cause* seems about the appropriate amount for viewers to manage the particular content. Any less may not be challenging enough and any more would risk being too overwhelming. As well, the complexity of narrative content presented in the three screens was manageable for most viewers to follow the plot events. There were enough layers of information to be dynamic and to maintain interest for all viewers. As well, complexity in the design supports a replayable narrative, allowing the viewers to discover new content each time the film is played. By having an appropriate amount of complexity in the overall design, the viewers will feel some sense of challenge in their experience, which could lead to an immersive experience.

5.3 Challenged-based Immersion in *Lost Cause*

The combination of narrative coherence and viewer oscillation support a challenge-based immersive experience. The fluid method of navigation plus the immediate progression of story between the multiple screens in *Lost Cause* increases the chances that a viewer will experience challenge-based immersion or flow while engaging in navigation to discover the story. Challenged-based immersion is maintained through the modulation of agency, by limiting navigation through time. The viewer's goal is to figure out the causality between the three storylines. Viewers are allowed to access only what is displayed on each of the three screens as time progresses. The challenge for the viewer is to keep up with the story through their navigation. As the events unfold, a viewer must pay attention and navigate when necessary to understand the relationships between the three screens and discover the overall narrative. The viewer's skill is his or her ability to focus and understand the connections between the multiple stories through the interactions. This temporal limitation maintains the traditional format of linear movies and attempts to keep viewers focused on the progression of events. Restricting time so that it remains constant creates more intensity in the moment of interaction as the plot develops. This intensity would be lost if the viewer were able to navigate back and forth in time or investigate back-story. The temporal limitation creates a challenge towards the viewer's goal in understanding story and supporting the experience of flow. It also restricts the kind and the number of decisions the viewer can make, leaving them freer to enjoy the experience of the story as it unfolds. The temporal constraint generates motivation for viewers to make wiser choices in selecting narrative sequences. Since rewinding is not possible, choice is irrevocable. However if nothing is selected there will always be a default path which can lead to imaginative immersion. Viewers of *Lost Cause* were disappointed they could not rewind, however not having a rewind function made them more attentive and required them to consider their choices more wisely.

A viewer's interactions can be motivated through narrative desire. Narrative desire can include a goal to solve a puzzle by sorting through clues to understand what the story is about and to decipher the causality between events. Each interaction would allow the viewer to get closer to the goal of solving the mystery of the story. The immersive experience was more enhanced as viewers discovered narrative information and narrative connections in the characters' relationships. The visual and narrative content displayed on the screens can encourage interactivity. Visual content on the screens can be used as an incentive to interact. A screen with a lot of action, with detail in the composition, or with a conversation between two people motivated viewers to navigate from one screen over another in *Lost Cause*. According to the user study data, most viewers were more strongly motivated to move to other screens because they wanted to see the action that was taking place or to hear the conversation.

When combinations of these contents are displayed at the same time on multiple screens, viewers are forced to decide which screen they prefer to watch. These combinations can make it more challenging for viewers to make choices between multiple screens, but can be a useful design strategy for motivating interactions. For example, a viewer may have trouble choosing between a screen that displays a lot of action and a screen that reveals important narrative information. At one point in *Lost Cause,* there is text being written on one screen and on the other screen there is a lot of dramatic action. The viewer is left to decide if they prefer to read text or watch action. Each viewer would have their own preference of which content to view, customizing their experience. More than half of the viewers were

attracted to the struggle between Colin, Chloe and then Arie, rather than being attracted to the note written by Tina. However once those participants who were reading the note realized that a lot of action was occurring in another window, they quickly switched perspectives.

5.4 Successful Experience of *Lost Cause*

According to the user study, almost all the viewers enjoyed the experience of the interactive movie *Lost Cause*. Although the narrative structure of *Lost Cause* is designed in such a way that some narrative information will be lost while viewing the movie, most viewers still enjoyed the experience. Of the viewers who did miss narrative events, only one participant mentioned they were dissatisfied because of not understanding the story. Many of the participants mentioned they really enjoyed both the interactive process and the narrative structure of the piece. Although missing some narrative events clearly frustrated some viewers, the challenge of solving the narrative within the restrictions of time motivated viewers to interact, building a successful interactive experience.

The interactive design yielded narrative pleasure for both those users that were able oscillate frequently between storylines and other users that tended to follow a single path. The structure and the interface were flexible and allowed viewers to interact as little or as much as they wanted. There were viewers who preferred not to interact and wanted to watch the large screen. The viewers who watched only the larger screen were less likely to interact. These viewers tended to follow an individual path of the story and were more immersed into the content they watched. This individual path was sufficiently satisfying for the viewer to receive enough narrative pleasure from their viewing experience. Other viewers who were able to focus between the multiple screens were more likely to follow the entire story, oscillate and interact.

The restriction in the interactions and the complexity of the layered narrative content and structure gives the work a "replayable" quality. Viewers wanted to watch the film again in order to gain a better understanding of the characters' motivations and the plot events. By viewing all possible storylines through repeated viewings, viewers can go through a hermeneutic process to develop a deeper understanding of the overall story. Initial viewing will tease out a sense of character and an understanding of action. However, multiple screenings can reveal even deeper pleasures.

Viewers were able to feel satisfaction when they had a sense of closure during the experience. Viewers who watched the movie once were able to get a sense of closure once they understood the structure and the story's conclusion. Other viewers gained closure once they had a deeper understanding of the structure or the story through repeated viewings. Therefore, *Lost Cause* is pleasurable for single or multiple viewing. This type of structure is efficient because it adapts to all types of viewers. The overall design provides a successful experience for viewers by accommodating various viewing styles and offering different levels of immersion and exploration within the story.

6. CONCLUSION

The conclusions in this thesis which are derived from the theoretical background, the analysis and findings of the *Lost Cause* case study and the user study. The results from the user study suggest that interactivity can distract viewers from being immersed into the narrative. However, the study also suggests that it is possible to create an immersive experience in an interactive movie by including the following attributes in the design of the system: a coherent relationship between narrative structure, narrative content and interface, appropriate conventions for navigating the system, viewer oscillation, challenge and narrative desire and motivations to interact.

Another conclusion based on the analysis and findings, is that *Lost Cause* had a successful design and included: a system which accommodated different viewing styles, a dense narrative database, which supports repeatability and narrative closure.

It is possible to support immersion during an interactive narrative experience when the elements in the design have a coherent relationship between narrative structure, narrative content and interface. In *Lost Cause*, the parallel structure between the narrative structure, narrative content and interface allow viewers to follow the narrative content across the three threads and maintain narrative coherence between the narrative events as viewers interact. Each of the three screens relate directly to each of the three threads in the narrative structure, which allow viewers to easily oscillate between the interface and the content.

An immersive experience can also be supported if there are appropriate conventions or limitations for navigating the system to support narrative coherence between each of the plot events. Ryan (2001) states that narrative coherence can be guaranteed and structured "by controlling the general path of the reader, maintaining a steady forward progression, limiting decision points, or neutralizing the strategic consequences of decisions" (p. 257). Constraining agency by limiting navigation through time is one convention which can maintain narrative coherence. *Lost Cause* did not allow viewers to navigate back and forth in time and the linearity of plot maintained narrative coherence between each of the narrative events. By maintaining narrative coherence in the design it is more likely that viewers will become immersed during the experience.

An immersive experience is encouraged if the design of the system maintains viewer oscillation between narrative and interactivity at all times. If a viewer is able to oscillate constantly, it is less likely that the viewer will be distracted from interactions while observing a narrative. The relationship between the narrative structure and the interface made it easy for the viewer to navigate the system and follow story supporting an immersive experience. To support viewer oscillation the interface should be transparent and include a seamless method of navigation. If the method of interaction is fluid, it is more likely that a user will not be distracted by the interactions and will be more focused on the content making it easier to oscillate. Oscillation was possible in *Lost Cause* through the combination of the split-screen interface and the parallel narrative structure, which supported a fluid method of navigation.

An immersive experience is also possible when the design includes some level of challenge in the interactivity leading to a challenged-based immersive experience. If a viewer is able to easily oscillate and has some element of challenge in the design, then there are more chances that the viewer will experience a challenge-based immersive experience leading to Csikszentmihalyi's state of flow. This challenged-based

immersive experience can be possible if it includes Csikszentmihalyi's eight components: challenge that requires skill, action and awareness, concentration, a clear goal, agency, control, loss of self, and loss of time. The challenge in *Lost Cause* was for the viewers to figure out the narrative based on the specific restrictions in the design. The viewers could only navigate between these three screens as the steady flow of the narrative was maintained by a linear progression of time. The combination of limitation in the design and a goal in the overall experience generated a simple challenge for the viewer.

Providing viewers with a motivation to interact is very important if designing for a challenged-based immersive experience. Motivation to interact can be encouraged in the system if there is an overall narrative goal. Goals can be encouraged by having the narrative contain some sense of mystery, or challenge. In *Lost Cause* the overall narrative and the connections between the four characters were not clear providing an element of mystery which motivated viewers to interact in order to discover and understand the narrative. Motivation to interact can also occur by placing narrative desire in the interface. *Lost Cause* contained motivations for viewers to interact by using split-screen techniques to attract viewers to particular screens over others. The content displayed across the split-screen effects provided narrative information for the viewers.

A successful design is one which is versatile and offers viewers pleasure by allowing them to interact as frequently as they wish and without making a commitment to their choices. A successful narrative structure can contain many layers of narrative content and offer complexity to generate different experiences for each viewer. Complexity in a successful structure can make repeated viewings pleasurable. It can create a hermeneutic experience and provide more insight when repeating the story. Finally, the experience should conclude a sense of closure that provides viewers with a feeling of satisfaction. In *Lost Cause* this satisfaction may occur when the viewer completely understands the connections between the three characters or when all the story elements have been resolved at the end of the movie.

The positive feedback from the user study confirmed that *Lost Cause* has a successful design. Almost all the participants enjoyed being able to interact with the system and enjoyed experiencing the overall narrative structure. Each viewer was able to interact as much or as little as he or she wanted. The design's ability to accommodate each viewing style may have contributed to the overall pleasure of the interactive experience. The design of the system accommodated each viewer to interact according to his or her ability.

These conclusions and the specific findings, which arose from the case study, suggest that *Lost Cause* can be used as a template for designing a successful interactive movie.

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