Implementing implicit interaction in interactive film

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ABSTRACT
In this paper, an user study will be taken on in order to explore how different types of interaction affect the levels of immersion and experience within interactive film. The two different types of interaction that will be compared in this study are implicit interaction, and explicit interaction.

The format of interactive film has not experienced too many changes the last years, and the user could experience a loss of immersion when using the format as it is shaped today. Usually, interactive films interrupt the flow of the narrative in order to give the user the time to make a choice. This makes the immersion get lost, and in some way, even part of the experience. In this paper, implicit interaction will be implemented within interactive film, and it will be tested by several participants from different disciplines.

One hypothesis is that the user experience implicit interaction and how designers should approach to this type of interaction.

Author Keywords
Interactive film; Implicit interaction; Explicit interaction; Immersion; Experience

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous; See http://acm.org/about/class/1998 for the full list of ACM classifiers. This section is required.

INTRODUCTION
The basis of interactive video is to give the user the possibility to choose and be part of the development of the story. The choices of the user affect how the story unfolds, which gives the user certain power in the narrative.

In 2008, Youtube implemented annotations as a new function in their system [8]. The new function allowed the users to create their own interactive videos easily by placing buttons and annotations that linked to another video. The viewer could get the option to be linked to alternative continuations, and in that way be involved in the development of the story. Interactive videos had increased in popularity some years earlier, and the users could now create their own interactive stories. Youtube popularized the format of interactive video by making it possible to create interactive narratives through annotations and links. To click on links, or buttons, was one of the most popular structures within interactive video. In my search for opinions and insights about that format, I asked people in my surroundings about their own impressions when trying it. Even if they experienced the format as amusing and entertaining, they also expressed some discontent with the interference in the flow. In the popular platforms that allow interactive video, the video stops in order to wait for the user to choose an option and when the user has clicked on the annotation or the button, the video continues playing. In Youtube, the page has to load again every time the user chooses an option, and in the worst of the cases, an advertisement starts playing and interrupts the flow of the interaction. This is clearly not an user-friendly solution, and in my believe, one of the core reasons why users don’t see interactive film as a clear option as traditional linear film.

Interactive video is the result of blending interactivity and narrative. Maybe that is the reason that it has been hard for the format to be clear with its purpose. Finding the balance between interaction and narrative can make it hard for the format to find its own place. In a way, it could be related to a gaming experience since it puts the users in such place that they affect the events in the story by their actions. At the same time, the format is also film, with a narrative. We should also keep in mind that interactive video contains interaction design as well. Therefore, the interactivity that is implemented should remind the user of other similar digital experiences on the web and be challenging enough in order to make the user willing to interact. Making an interactive video with the balance between experience, challenging interaction and narrative, is not an easy thing to achieve since several disciplines (e.g UX, interaction design, filmmaking) are involved.

Taking into account the difficulty to place interactive video in a determined field, interactive video should be carefully compared to traditional linear video. The two formats are different, but one option is to see interactive video as a type of evolution of traditional linear video. Another option is to see it as a different kind of media. In any case, interactive video has not challenged traditional linear video in any way, and the community still watch films without interacting. It could be said that the community has not accepted interactive video as a standard in that sense. I mentioned the problem with the interfered flow when interacting with the video and I believe that this issue could probably affect the level of immersion of the experience, and the experience itself, which could make the user lose interest in the format.
In this article, a new type of interaction within interactive video is going to be explored, challenging the established idea of clicking on buttons or annotations. By doing this, I am going to explore the role of that type of interaction when affecting immersion and experience within interactive video. The study in this paper will explore implicit interaction within interactive film, making the format come closer to traditional linear film and the traditional experience of watching films whilst still being interactive, challenging the established type of explicit interaction that is usually implemented in interactive video.

This contribution could provide a new dimension to the field of interactive video. I consider that the format has not been used to its full potential by limiting the interaction to happen on screen, and that there are aspects to develop further. Focusing more on the interaction than on the narrative, could show a new perspective of the format. Implementing implicit interaction in computer entertainment could also reveal some characteristics of that type of interaction, and contribute to the field of interaction design.

RELATED WORK
There are several interesting articles that raise relevant qualities within computer entertainment systems and that could work as basis for a research within immersion and interaction within interactive film. It is also relevant to mention the types of interaction of implicit and explicit interaction, to understand their significance within the field of interaction design.

Film in Computer Entertainment
Hale explored the experience of film in his research from 2005 [3]. Even though the research was made from a psychological perspective, it was directly connected to computer entertainment and how this area could be inspired by movies. Hale argued that movies offered the possibility to create a design language that could be useful when designing interactive devices and other digital media. The influence of movies creates a collection of grammars that structure other mediated experiences. Hale states that film and video are also useful tools to use in research, when exploring mediated experience.

The research in this article focused on the participants reactions and impressions on a short film. Hale came up with several conclusions after interviewing the participants, and among those conclusions, he raised the importance of the theory of mental models when analyzing the experience. Viewers have a mental model that comes into play in certain situations during their experience. For example, when the viewer hears a dramatic music in the background, the viewer theorizes about what it is going to happen. The dramatic music fits into a mental model that is familiar to the user. The idea of a summary is also based on a mental model. When summarizing the film, the viewer omits parts of the film that could have been memorable, but that doesn’t fit into the idea of a summary. Hale questions the fact that our memory of the experience is the real one, by asking “Do they remember their actual experience and its enjoyment or does the summary organize those parts of the movie that fit into a mental model of ‘summary’ and therefore structures the memory of the enjoyability of the film?”

Hale gives several suggestions to the designers of computer entertainment based on his findings. Hale suggest to the designer to understand the mental models of the users. In this way, designers could take advantage of that understanding by shaping the experience, and making it more enjoyable. Hale argues that every element in the design has a meaning for the user. Therefore, it is important that the designer makes every visual and sonic element totally clear for the user. Lack of clarity can affect the immersive the experience of the viewer.

Designing a Successful Interactive Film
In a research from 2008, the relation between interaction and immersion within interactive film is explored, as well as an interactive film (“The Lost Cause”) is presented as a solution to the loss of immersion when interacting with a narrative [4].

In the paper, Johnson points out the contrast between interactivity and immersion as an issue to be solved when designing interactive narratives. When interacting the user is completely aware of his actions and the device, whilst when being immersed the user is not aware of those elements since the user is absorbed by another reality. Interactivity in a system usually interrupts the immersive experience. This could be an issue within interactive film, since it is about designing an interactive interface that doesn’t interrupt the immersive experience of the user.

The goal of interactive film is to create an experience, a successful experience for the user, satisfying the parameters of immersion and interactivity. According to some related research [6] there are some ways to keep the experience being immersive whilst still making it interactive. A well-designed interactive experience should offer the user the possibility to oscillate between two states. The state of immediacy (immersion), where the awareness of the system disappears, and the state of hypermediacy (interaction), where the user becomes aware of his actions and the system. This oscillation could also lead to what is known as challenge-based immersion. This is immersion that occurs when the user becomes engrossed in the interaction [2].

Immersion, experience and interactivity are explored in a project study, with the interactive film “Lost Cause” as the main ingredient. The film had an interface where one larger screen was being displayed on the top, with two smaller screens below. The three screens represented three parallel stories, and the user could choose at any time which story to follow (displayed in the larger screen, with the audio on). This setup seemed to be successful when measuring immersion and interactivity. The interface didn’t interrupt the narrative, offered oscillation, and was challenging enough for the users, since they have to figure out which story that deserved their main focus.
According to the findings of the study, an interactive narrative could still be immersive if the user finds the motivation to interact, if there is a relation between the narrative structure, the narrative content and the interface. In this case, the parallel narrative seemed to be successful in this design, along with the interface, which probably was intuitive enough to interact with it. The conclusion of the study was that the interactive film “Lost Cause” was an enjoyable experience for the users, a successful experience because of the oscillation, the immersion and the challenge-based immersion.

The study delivers suggestions to take into account when designing a successful experience within interactive film. However, I would not agree that the design is completely flawless. The results of the study showed clearly that the interaction was distracting (9 participants answered that the interaction was distracting and 7 answered that the interaction was not distracting). If the participants got distracted by this, if they even thought about that the interaction could be distracting, their immersive experience was obviously interrupted at some point. The researcher argued that the participants didn’t miss principal events of the story, which doesn’t mean the viewer was immersed during the whole experience. Therefore, I still believe the interface design and the interaction design could be improved to achieve a higher level of immersion.

Immersion
It is hard to find a single definition of immersion, mostly because the term is used in different disciplines, such as gaming, film and interaction design. Brown and Cairns [1] took on a qualitative study on gamers in order to find a grounded definition. Taking into account that the study is based on the gamers own experiences, one can deduce that the results approach how gamers actually experience immersion. In this research, the authors present three levels of immersion:

Engagement: The first level of immersion is engagement, and it is based on the interest that the user has from the first beginning. It could be about the game genre, the controls, the previous knowledge that the user has of the game, and whatever affects the attention of the user. To be engaged, the user must feel that it is worth to spend time on the game.

Engrossment: If the first stage is based on the game and how it catches the users attention, the second stage is more about the user and his emotional investment in the game due to the game construction, graphics and more.

Total immersion: At this stage the participants in the study experienced being cut off from reality and forgetting that they were playing a game. Everything that effects the users emotions and thoughts is caused by the game.

Immersion is hard to define, and one could go into complex dimensions discussing the term. However, the levels of immersion provided by Brown and Cairns are simple to digest and translate to other fields. Immersion is about how absorbed the user is by an experience and how aware the user is of his surroundings during that experience.

The authors also reach an interesting discussion when they point out that none of the participants described immersion as something unpleasant and that almost all of them (excluding the ones thinking about their waste of time) as something enjoyable. This sets immersion and pleasant experiences as parameters that go together.

Implicit interaction vs Explicit interaction
It is relevant for this paper to raise the term of “implicit interaction”. The advantages of such type of interaction have been expressed by the community [7] and the interest in this topic should not be ignored. Implicit interaction is basically interaction that is embedded in the users activity and where the user doesn’t need to actively interact with a system.

Wiberg raises an interesting point by taking the interaction at a gas station as an example. In the gas station, the user faces a payment system with a touch screen that has several options. The users has to navigate through the options, bring up the payment card, insert a PIN-code and so on. Wiberg argues that this process is inconvenient. This type of explicit interaction makes the user (once again) adapt to a computer system in order to fulfill the action (using the gas bump) that the user really wants to do. The user must go away from the activity and start to interact with a computer screen, take of the gloves, insert pin codes. The interaction becomes an obstacle within the activity, instead of a solution.

Implicit interaction, on the other hand, responds to the users needs automatically. Winberg gives the example of making the camera at the gas station sense if the user is a member, sense if the user has a valid payment card and in that way realize the payment without interfering with the users activity. Wiberg describe that in implicit interaction “Interaction with the system happens while I do the things I really want to do.”

One of the disadvantages with implicit interaction could be the lack of control. When the user lose awareness of what he is doing, the user automatically loses control, which makes implicit interaction not always be a safe option when designing appealing interaction.

The Design of Implicit Interaction
Ju and Leifer went on and presented an useful framework when designing implicit interaction in their research from 2005 [5]. The researchers mean that implicit interactions are based on sequences from the everyday life. These sequences are called "interaction patterns". An automatic door is actually mimicking the situation of a doorman opening the door. The doorman catches the attention of the person and shows that he is about to open the door by putting his hand on the handle, in the same way that the automatic door opens when the user is approaching to it.

However, implicit interaction includes several dimensions. The researchers talk about "attention" and "initiative". Attention is related to how much attention the action is
catching, and initiative is about what is that triggers the action. A computer could start installing updates on its own, or it could install updates when experiencing long periods of inactivity. Both these activities do not catch so much attention and are running in the background. However, the initiative is different. Installing updates on its own is a proactive activity, where the computer takes initiative. Instead, installing updates by reacting on long periods of inactivity is a reactive activity, reacting on the users long period of inactivity. Both of the scenarios could be defined as activities running on the background due to the low levels of attention that they catch, but they still differ in what is that triggers the action.

The previous example could be transferred to an everyday situation, supporting the theory of implicit interaction mimicking real-life scenarios. Sitting at a cafeteria, the waiter could see that my coffee is low and refill it. This is a proactive activity, where the waiter acts by its own and is the one taking initiative and assuming I need more coffee. If I instead place my coffee cup near the edge of the table and the waiter refills it when he passes by, it is a reactive activity. The waiter reacts on my action and I am the one triggering off the action with my signal. Both of the activities don’t catch much attention and therefore they are running in the background.

If I choose to install software updates on my computer, or ask the waiter to refill my cup, the action is taken to the foreground, which makes it explicit interaction. To make it "less explicit" the computer could ask me if I want to install updates, or the waiter could ask me if I want a refill. The trigger (initiative) is changed and it automatically changes the interaction.

The conclusion of this paper is to raise the fact that implicit interaction is not necessarily better. It is up to the designer to determine when implicit interaction should be used by having in mind the interaction pattern. Ju And Leifer argue that presuming could result into obnoxious devices, and that the designer should have the interaction pattern in mind (i.e real-life scenarios). The interaction pattern is the pattern that is included in everyday interactions, which is what creates conventions, making implicit interaction be reliant on conventions. A waiter that refills my cup when he decides is almost as obnoxious as a computer interrupting a presentation to let everyone know that a software update is available. The waiter could see that my coffee is low and refill it. This is a proactive activity, where the waiter acts by its own and is the one taking initiative and assuming I need more coffee. If I instead place my coffee cup near the edge of the table and the waiter refills it when he passes by, it is a reactive activity. The waiter reacts on my action and I am the one triggering off the action with my signal. Both of the activities don’t catch much attention and therefore they are running in the background.

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RESEARCH QUESTION
The mental-models explored by Hale can contribute to the development of computer entertainment. Analyzing and taking components from movies and apply them during the process of designing interactive systems, is something that could enhance the experience of the users. It would also help the designer understand the user and his associations. Besides mental models, the elements used in the interactive film “Lost cause” are also elements to take into account when trying to achieve a successful experience. The design of the interface in that project managed to solve the issue with the interfered narrative in an interactive film, and it also offered the possibility to oscillate and even an interactivity that was challenging enough for the user.

Both the articles seem to agree on that immersion and experience are parameters that go together in computer entertainment, something that is also raised by Brown and Cairns. An immersive experience, according to the researchers, is a successful experience.

Interactivity and immersion are parameters that contrast with each other, and in interactive film that could be the main issue. The user should be immersed in the narrative and still feel motivated to interact. In the project study “Lost Cause” the participants found the interaction interfering with the narrative, even though the designers tried to achieve immersion with a well-reasoned interface design and interaction design.

Winberg explained how explicit interaction made the users go away from the main activity and interact with a system that is more of an obstacle than a solution in the flow. This could be compared to what happens within interactive video, where the user has to go away from watching the film (the main activity) and has to interact by choosing several options in order to continue watching. Therefore, it would be interesting to implement implicit interaction within interactive video, to see if the levels of immersion and experience could be increased. When measuring immersion, we now have a bases of three stages going from engagement, to engrossment, to total immersion. It is basically about measuring involvement. When designing an implicit interaction one should take into account the different dimensions that the interaction consist of, and also the interaction patterns that are based on real-life scenarios.

This paper will compare two different types of interaction, in order to study how the different types of interaction affect the levels of immersion and experience in interactive film. The different types of interaction will be implicit interaction, and explicit interaction.

The purpose of this study is to increase the knowledge about the possibilities of interactive film as format in order to achieve a similar level of interest among the community compared to traditional linear film. Implementing implicit interaction within interactive film could be a way to come closer to traditional linear film, whilst still keeping the format interactive. One hypothesis is that the user becomes more immersed in the narrative with this type of interaction.

The research question in this paper can also contribute to the interaction design research and how different types of interaction are experienced by users in a passive status.

PROJECT STUDY
Interactive film with implicit interaction
The design work that is used to explore the research question in this paper, is an interactive short film that allows implicit interaction with the narrative. The user
interacts with his instinctive behavior when watching films; i.e eating snacks.

The film consists of two narratives, two storylines that the user can oscillate between. One with a soothing tone in terms of colors, story, music and one with a more dramatic tone. The initial film, with the soothing tone, is about a young man waking up on a Monday morning and getting ready for his job. The other film, with the dramatic tone, is about another young man that is ending his working day and is getting ready to go out a Friday night. The two stories are playing parallel but only one is originally visible in the screen, the one with the soothing tone. To see the other story and oscillate, the user has to interact using his/her instinctive behavior when watching films; i.e eating snacks.

Every time the user grabs the box of popcorn that is in front, the film will change state and become more dramatic. This, based on the fact that viewers usually eat their snacks during less interesting parts of the movie, e.g. commercials. When the user puts the popcorn back, the film will go back to its original state. The film is around one minute long, which could be a short time to get completely immersed in a narrative, but still enough time to interact and grasp the story. There is not going to be enough time to reach the third level of immersion (total immersion), but there is going to be enough time to catch the users attention and (at least) reach the first level of immersion; i.e engagement. The reason for choosing a shorter film has to do with the time that it takes for the participants to find out the function of the popcorn box. As soon as the participants find out the purpose of the popcorn box, the interaction becomes explicit since the users start to "ask" for the change of state of the film. A shorter film has also the virtue of being an effective way to catch the very first and spontaneous impressions and reactions of the users, and it also gives the possibility to do more tests in a shorter amount of time.

Implicit interaction could be interpret as a less noticeable interaction, where the user is not that aware of his actions. However, one could argue that eating popcorn when watching film is not implicit interaction. To find a common ground for this definition, we can go back to the framework of implicit interaction provided by Ju and Leifer. The interactive film in this study changes state and becomes more dramatic as the user grabs the popcorn. The film reacts on the users initiative of grabbing popcorn, assuming the viewer is bored. The film becomes more dramatic as a background task, and even though the user gives an input (grabbing popcorn), he doesn’t ask for it, which makes it implicit interaction according to the framework by Ju and Leifer. Compared to the mentioned examples of an interaction pattern, it would be as if the customer at a cafeteria placed his coffee cup near the edge of the table and the waiter refilled it when he passed by.

The interactive film can also be controlled with the keyboard, so this will be the other type of interaction to test. Every time the user press the right arrow key on the keyboard, the film will change to the dramatic story. The user has to hold the key pressed down to stay in that story. When the user releases the key, the film will go back to its original state.

**USER STUDY**

A new dimension in terms of interaction within interactive film, has been taken on by the interactive film described in this paper. Through an user study, that dimension will be tested in order to explore the parameters of immersion and experience within interactive film.

Two types of interaction will be explored to make a comparison and to determine how the the levels of immersion and experience in an interactive film could be affected by the interaction. Each type of interaction will be tested by 5-6 participants (different groups of participants), who will watch the film, interact and participate in a short interview. One type of interaction will be implicit interaction, where the user interacts with his/her behavior (i.e eating snacks), and the other type of interaction will be explicit interaction, i.e controlling the film with the arrow keys on the keyboard.

**The Participants**

The participants are students from different fields, including the fields of design, tourism humanism, and game development. They are between the ages of 20-25 and there is a reasonable balance between males and females (5 males, 6 females). The reason of choosing students is that they are a group of people that is easy to reach and also, they are familiar with interactive systems. Additionally, I assume that the group of people within this range of age have more daily contact with interactive and digital services, which has several benefits. The participants will carry through the study easily, they will be familiar with the situation, and for that reason they will also answer to the interview questions with a deeper analysis of their experience.

**The Study**

The participants will watch the interactive film and get as little information as possible about the project, in order to make their reaction be as natural as it can be. The participant will be told that he/she is going to watch an interactive film that is one minute long, and that he is available to either eat popcorn or press on the arrow key whenever they want, depending on which type of interaction that is tested. One can assume that the participants react different to the option of either grabbing a popcorn box or pressing a key on the keyboard. Telling a participant to grab a popcorn box will be a familiar situation for the user. Pressing a key on the keyboard will make the participant wonder what that key could do.

In the case of testing the type of interaction with the popcorn, the user will be connected to a Makey Makey controller by putting a ring made of copper tape on his/her finger. This, to make the Makey Makey react on the touch of the user when he/she grabs the popcorn box. When testing the other type of interaction, the participant will be told to press the arrow key when he desires, as the film is an interactive film.
Observation and Interview
During the test, an observation will be taken on in order to analyze the participants behavior and their interaction to the film. The observation will focus on the participants reactions, gestures, face expression and how many times they choose to interact. Exploring this parameters could give a deeper insight on the participants experience. I assume that their reactions and actions during the test are spontaneous, and in that way, that could reveal certain part of the participants response.

After watching the film and testing the interactivity of the interactive film, I will complete the study by doing a short semi-structured interview. The participants will answer to ten interview questions about their experience and their participation in the interactive film. The purpose of the interview is to give the participants the opportunity to describe their experience in words openly. Therefore, the questions will be formulated to provide open answers and are focused on making the participants talk and describe their individual experience. Based on those comments and thoughts, relevant insights could be discovered. Even though the answers do not necessarily reflect the participants “real” experience, the answers could still reveal insights and understanding, and especially if its added to the data provided by the observation. The interview part is separated in three sections; Discovering first impressions, discovering the levels of immersion and analyzing the experience. At the end of the interview the participants are asked to rate their experience and their immersion in a 1-10 scale.

RESULTS
The results of the user study will be presented by dividing how the partipants interact with the film in the two different types of interaction. Results based on the participants answers could be read at the table below (Table 1).

Implicit Interaction - Interacting with the Popcorn Box
Participants who didn’t grab the popcorn (2):
There were two participants who didn’t grab the popcorn during the study. One explained that she became too aware of the popcorn during the study, which made her not grab the popcorn box. The other participant usually doesn’t eat popcorn during films so she didn’t do anything else than what she usually does in that situation. This provoked that the two participants only saw one of the storylines, the storyline with the soothing tone. Both participants followed the narrative well and didn’t experience that they missed any details. They could explained the events in the film and seemed concentrated when watching. However, when they rated their level of immersion, the result was between 4-6, as well as their experience.

When I showed the participants what the popcorn box could have done, they reacted surprised and impressed.

Participants who held the popcorn box during the whole film (1):
The participant who was holding the popcorn box during the whole film only experienced the other side of the story, the exciting storyline. The participant grabbed the popcorn box almost from the start and seemed immersed during the film. He experienced that he was totally engaged in the film and rated his level of immersion as 8. He considered that his experience was on a level of 5 according to the scale, since he wanted to see more. He wanted a longer film.

Compared to the participants that only took part of the soothing side of the story, this participant was more immersed. An explanation to this could be the narrative and the fact that one story was more interesting than the other. This participant had a middling experience because he actually wanted to see more of what he was seeing and not because the film was not captivating enough.

Participants that oscillated regularly (3):
Three of the participants oscillated regularly. Two of those participants didn’t understand what the popcorn box did and that they had control. They were not completely immersed since they were thinking too much about the popcorn and could not concentrate fully on the film when eating it. They rated their level of immersion as 4 and 6, respectively. Both these participants thought that they had missed events of the film. However, their experience differed. One of the participants felt confused during the study (rate of 5), probably because of the continuous jumping between stories that he caused by grabbing the popcorn for only some seconds in several occasions. The other participant had a better experience (8), and his watching was more constant.

One of the participants that oscillated regularly understood that he had the control when eating popcorn. He explained that he grabbed the popcorn the first time and felt that something happened that made him grabbed the box again.

<table>
<thead>
<tr>
<th>Type of interaction</th>
<th># of participants that interacted</th>
<th>Missed out important events</th>
<th>Completely focused on the story</th>
<th>Found the interaction distracting from the story</th>
<th>Average rate of engagement in the narrative</th>
<th>Enjoyed the experience</th>
<th>Average rate of experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explicit interaction</td>
<td>4/5</td>
<td>0/5</td>
<td>5/5</td>
<td>0/5</td>
<td>8</td>
<td>4/5</td>
<td>8</td>
</tr>
<tr>
<td>Implicit interaction</td>
<td>4/6</td>
<td>2/6</td>
<td>3/6</td>
<td>2/6</td>
<td>6</td>
<td>1/6</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 1. Results based on the participants answers and testimonies.
After the third time he realized that he had control, which he thought was exciting. He was immersed in the narrative and decided to continue oscillating since he wanted to have tempo and thrill. He rated his immersion level as 9 and his experience as 10. He expressed that he was having fun during the whole interactive experience.

**Explicit interaction - Interacting with the Right Arrow Key**

*Participants who didn’t press the arrow key (1):*

Only one participant chose to not interact with the film, this because she didn’t know what the key was going to do. She could follow the story well and was alert to details in the narrative. This participant rated her level of immersion as 10, and her experience as 8. One can deduce that the rate of the experience depends on her perception of the narrative and that the interaction is not taken into account when measuring this parameter.

*Oscillated successfully between the stories (3):*

It took different amount of time for the participants to realize how the key worked, and that they had to hold it pressed down to stay on the other side of the story. Some realized directly what the key did, and other needed some few tries before they had full control. When the participants realized that they had full control, they wanted to continue pressing and oscillating. The participants explained that they oscillated because they were curious to see what happened on the other side of the story. One of the participants said that the experience was like a game, where she had the power of choosing.

The participants also came to think about those parts of the film where they had not pressed the arrow key and therefore missed some parts of the parallel film. They also wanted to know what happened after the film and about the continuation of the story.

The participants gave different rate about their levels of immersion in the narrative. The rate varied between 5, 7 and 10. The participant that didn’t feel immersed explained that the narrative was not interesting enough. All the participants had a fairly good experience (7, 8 and 8). The participant that rated her experience as a 7, also pointed out that the narrative was not thrilling enough.

*Pressed the arrow key, but didn’t understand how it worked (1):*

One participant pressed the arrow key several times during the film, but didn’t hold it pressed down, which resulted in a constant jumping between the stories that was too short to perceive that there was another story going on. The participant pressed the key to make something happen and come away from “the boring film”. She realized that something happen, but didn’t understand what.

She experienced it as she was engaged in the film during the whole time, but she also admitted that she felt nervous, fearful and curious because of the interaction with the key. However, she expressed that she was absorbed by the narrative and rated her level of immersion as 10. She rated her experience as 9.

Eventually, when I showed how the key affected the film on screen, she reacted with surprise and admitted that she wanted to try again.

**DISCUSSION**

**Implicit interaction**

The implicit interaction delivered different interesting outcomes. The majority of the participants (4 out of 6) chose to interact with the popcorn box, assuming an instinctive approach towards the situation, by either holding the box during the whole film or grabbing it regularly. Being connected through the Makey Makey did not affect their usual reaction towards the situation of watching film with a popcorn box in front.

**Immersion**

This type of interaction didn’t always provide high levels of immersion. The popcorn box, and eating popcorn as an activity, could interfere with the users perception of the narrative and their level of immersion, as they expressed during the interviews. In terms of implicit interaction, based on Winbergs argument, the activity of eating popcorn is not embedded enough in the activity of watching films. Some users will find it as interfering and as a separated activity from the main activity; i.e watching film. Besides, some of the participants experienced confusion by not understanding the effects of their actions, or what was happening with the film when it oscillated. This could be because of the lack of clarity. As Hale stated, lack of clarity can affect the immersive the experience of the viewer, which applied perfectly to this situation.

The participants that experienced high levels of immersion, according to their rates and their explanations, were the participants who had a more constant watching, like the participant that realized that he had control, or the participant who chose to hold the popcorn box during the whole time. Those participants had a balanced experience and a constancy in their watching. The participant who held the popcorn box during the whole study was probably immersed in the narrative since he mainly took part of the exciting side of the story. He was not aware of the popcorn or the activity of eating it. The participant that experienced full control was aware of the popcorn box, but only as a tool to change the narrative, and not as a main activity. He was immersed in the film, since he wanted to see the outcome of his interaction and how he could change what he was seeing on screen.

The participants that chose to not grab the popcorn box and not interact, could describe the events in the film in detail and did not consider that they had missed anything important in the story. However, when asked about their engagement in the film, they rated their immersion as 4 and 6, respectively. The reason to this could be that they only saw the soothing side of the story, which was not as capturing as the other side.

**Experience**

The experience also seem to depend on the constancy of the situation. One of the participants caused the film to jump
abruptly between the two stories, which caused confusion and a less successful experience.

The participants who interacted with the popcorn box and that had a more successful experience were the ones that somehow experienced some kind of control and constancy during the study. The only participant that realized that he could control the film with the popcorn box was the one who had the most successful experience as he expressed that he was having fun and that he enjoyed the film, rating his experience as 10. The participant who held the popcorn during the whole time also achieved some kind of balance during his experience by keeping one single state during the whole study. The only reason he rated his experience as 5, was that he wanted to continue watching.

**Explicit Interaction**

Even during the testing of the explicit interaction, the majority of the participants chose to interact (4 out of 5). The participants didn’t react strangely to the fact that they were going to interact with a key on the keyboard and seemed familiar with the situation.

**Immersion**

The participants who interacted successfully and oscillated with full awareness, were immersed during their experience and focused on the happenings on screen. Their engagement increased when they realized that they had control, as well as their curiosity, since they wanted to know what happened on the different sides of the story. The participants could tell what the different stories were about and showed interest on the continuation of the story. To have control seems to lead to high levels of immersion and engagement in the narrative.

In this interaction, there was not popcorn box, or any other object interfering with the narrative. The participants who pressed the key and didn’t understand what it did, and the ones who chose to not interact, were still immersed in the narrative. They did not lose engagement even though they mainly saw the soothing side of the story.

**Experience**

Almost all the participants that tried out this type of interaction, had a successful experience. They enjoyed oscillating and did it regularly, showing that it was something they wanted continue doing. One of the participants even compared the experience with the experience of a game.

The excitement of the key was also a significant element, since the participants find it fearful and curious at the same time to not know what the key did. They had the option to make something happen or to not, which gave them certain power in the situation but still a disconnect that made the experience more exciting. Compared to the interface in the interactive film Lost Cause, this type of interaction was not as distracting from the narrative and it still provided a challenging interaction. The user could satisfactorily oscillate between the two states of immediacy (immersion) and hypermediacy (interaction).

**Comparison**

**Immersion**

In terms of immersion, the explicit interaction provided engagement in the narrative, while the implicit interaction was depending on a constant watching and a controlled situation. The participants could not grasp the narrative when their interaction with the popcorn box was too accelerated. The activity of eating popcorn also seemed to have taken some of the participants attention and making them lose engagement in the film.

The explicit interaction was more successful in terms of immersion, and the participants became even more engaged in the narrative when they realized that they had control. Their engagement in the narrative was also showed when the participants explained that they were curious about the details in both of the stories, and about the continuation of the story, which made them be involved in the main characters and speculate about the main characters eventual future.

**Experience**

The experience was more successful in the explicit interaction than in the implicit interaction. Almost all the participants testing the explicit interaction had a successful experience, showing curiosity and excitement, something that increased as they realized they had full control. In the implicit interaction the watching could get inconsistent, something that made the participants confused. The experience depended on what they saw on screen and if what they saw was unclear, the experience could get affected by that.

The only participant who had a fully enjoyable experience was the one who understood that he had control, which could be interpreted as explicit interaction as he "asked" for the dramatic side of the story when grabbing the popcorn.

**Analysis**

The negative experience in this type of implicit interaction could be caused by different aspects related to mental-models and conventions that were mentioned earlier in this paper. If the system cannot fit into the mental-model of the user and offers something unexpected, the user is not going to have a successful experience. In the same way, taking into account the framework by Ju and Leifer, the popcorn-box-interaction doesn’t consist of a common convention within an interaction pattern. The viewer doesn’t expect a more dramatic story when eating popcorn. According to the implicit interaction framework, this type of interaction would be defined as obnoxious and not a well designed implicit interaction. The opposite happens in the explicit interaction, where the user has full control and appears to be familiar to the situation.

It is also interesting how the awareness of control increases the levels of immersion and makes the user end up in a game-alike situation. This happened in the explicit interaction. When interacting with the key, the user was absorbed by the narrative, feeling part of it and being curious about how the actions affected the narrative. In the
implicit interaction, when interacting with the popcorn box, it only happened when the interaction became explicit and the user had full control as well. Otherwise, the popcorn box seemed to be a distracting object in the experience.

The success of the explicit interaction could be related to the parameters achieved in the interactive film Lost Cause, i.e challenging interactive and a structured narrative. If these two parameters are carried through, the user could experience challenge-based immersion, which could be related as a key element in video games.

CONCLUSION

This paper's purpose was to compare two different types of interaction, in order to study how the different types of interaction affect the levels of immersion and experience in interactive film. The different types of interaction explored in this paper were implicit interaction and explicit interaction.

According to the results of the study, it was found that the implicit interaction produced various outcomes. The levels of immersion and experience, when trying out this type of interaction, were affected by the situations instability and inconstancy when the users were watching. Besides, the popcorn box, as an object, became sometimes an interfering element in the interaction. When not knowing the purpose of the object, the user found it hard to understand the interactive experience.

The explicit interaction, seemed to be successful in terms of immersion and experience among most of the participants. The users were familiar to the situation, and learned the functionality of the system in order to get full control. Once they had the control, they became immersed in the narrative and enjoyed the experience.

The purpose of implementing implicit interaction within interactive film was to make the format come closer to traditional linear film, remind the user of that experience, and make interactivity fit into a situation that the user was familiar to. My hypothesis was that the user would be more immersed in the narrative with this type of interaction since the user had the control, they became immersed in the narrative and enjoyed the experience.

It has to be mentioned that this result is only valid for this particular type of implicit interaction, and that implicit interaction could be applied in other different ways to interactive film. Examples of that could be, making the film react on the viewers position, react on where the viewer looks, on how he sits, his gestures, and more. Implementing a new activity, as eating popcorn, is not optimal in order to achieve a successful experience or high levels of immersion.

Implicit interaction might not have its place in computer entertainment since the users experience relies on control and awareness of the inputs and outputs in the interaction, i.e explicit interaction. Implicit interaction might be more optimal in interaction patterns linked to our everyday situations, such as making our wake alarm clock go off as soon as it senses that we are awake, or letting the coffee machine sense that the cup is placed to start pouring the coffee.

This paper has explored the levels of immersion and experience within interactive film, implementing two different types of interaction. The results of the study could be used to increase the knowledge of implicit interaction within computer entertainment, but also to show how implicit interaction might affect the users in a scenario where they don’t expect to get a response. The results of this research could also be meaningful for future work on interactive films, and how to make films interactive. It is shown that the interaction doesn’t have to make the user lose the immersive experience, and that interactivity within interactive film could be implemented in several ways, making it less obvious for the user that "it is time to interact". The knowledge provided by this paper could also be useful for the interaction design field in order to help designers design successful implicit interaction.

REFERENCES