SHOULD I STAY OR SHOULD I GO?

Developing the Narrative model as a tool for game design

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Abstract

In 2015, the Narrative model was created as a result of a study exploring how episodic games keep player’s interests through combining narrative and gameplay. In this thesis, the Narrative model is used as a framework for designing a language game for children to see whether that makes players more inclined to keep playing than a game not designed based on the model. Two games were created and evaluated in a within subject controlled experiment. Player enjoyment was measured by using GameFlow as a basis for interview questions and Likert scales. The results indicated that the game based on the model more successfully achieved GameFlow than the game that was not. As such, it was concluded that the model can be used as a tool for game design to increase the desire to keep playing a game, but that it needs further study to be validated.

Keywords: Immersion, user experience, HCI, GameFlow, game design, digital storytelling, meaningful play, game research, the Narrative model

1. Introduction

What would your ideal game experience be? Is it a calming walking simulator in a beautiful virtual environment? Or trying to beat your high score in that impossibly difficult game? What game experience would you like to stay in? Perhaps you would not even consider playing a game, as it is not an ideal experience to you? However, games become a more prominent market each year. In 2012, ISFE performed a massive consumer study of the gaming population in Europe, exploring how and where the medium is used. In Sweden alone, 62 % of the online population between the ages of 16 and 64 had played a game during the last 12 months, and 39 % of those considered themselves very or fairly interested in games (ISFE, 2012). More recently, the American trade association ESA estimated that in 2017, 67 % of American households owned a device used to play video games (ESA, 2017). Games as a medium are widely popular and provides opportunities to invent new ways to interact with the digital.

A specific challenge for designers is to understand what makes people play games, and more specifically, what makes them keep playing them. To understand that, we must first understand what an experience is. Defining experience is no easy matter, as it is something subjective and individual. No person experiences the exact same thing as another. However, one could say that experiences are the remains, the memories, of something we have done (Hassenzahl, 2013). Further, experience is the result of interaction between people and products (Forlizzi & Battarbee, 2004).
User experience (UX) research is the study within the area of Human Computer Interaction (HCI) of how technology can fulfil more than just instrumental needs, focusing on the subjective encounters users will have with products, systems and services, and how to make those encounters have positive emotional outcomes (Hassenzahl & Tractinsky, 2006). Simply put, to quote Hassenzahl (2008, p.12), UX is “A momentary, primarily evaluative feeling (good-bad) while interacting with a product or service”.

Player experience is related to UX as it specifically focuses on users’ interaction with games, and game research generally could be said to focus on what makes games good and subsequently makes players keep playing the games.

Game research concerns several areas, for example games as learning (e.g. Gee, 2005), gamification (e.g. Deterding, Sicart, Nacke, O’Hara, Dixon, 2011), serious games (e.g. Michael & Chen, 2005) and virtual reality (e.g. Zyda, 2005). In particular interest to this thesis furthermore, is the research that has been conducted in the areas of flow (Csikszentmihalyi, 2008) and GameFlow (Sweetser & Wyeth, 2005), immersion and presence (e.g., Calleja, 2011; Ermi & Mäyrä, 2005; Lombardo & Ditton, 1997), game design fundamentals (e.g., Salen & Zimmerman, 2004) and digital storytelling (e.g., Miller, 2008; Aarseth, 2012; Bizzocchi, 2007).

The main research topic for this thesis is attempting to understand what makes a player keep playing a game, especially with regards to how gameplay and narrative components are combined. In 2015, I and two colleagues (Ekbäck, Johansson, Mörtsell, 2015) conducted a study exploring how episodic games, with their combination of gameplay mechanics and traditional narrative techniques, made players come back to the game episode after episode. Based on our results, and borrowing concepts from Aarseth (2012), Bizzocchi (2007) and Ermi and Mäyrä (2005), we created a prototype for what we called the Narrative model. The model suggested that a game with both strong gameplay and narrative components adhering to different dimensions of immersion increased the desire for a player to keep playing a game.

To validate the Narrative model and test whether it can be useful as a tool for game design, it needs to be applied and evaluated in a game development scenario. A case study was chosen to simulate such a scenario in this thesis. It might seem obvious at a glance that the combination of gameplay and story yields good game experiences, but do we know exactly how to combine them to yield such experiences?

There seems to be little conclusive research on how gameplay and narrative specifically should be combined, especially in relation to immersion dimensions, to create a more engaging game experience. Game research seems to focus on the broad strokes of game design rather than how to specifically implement narrative in conjunction with gameplay (e.g. Schell, 2014; Koster, 2013; Rouse, 2010; Mitchell, 2012) Furthermore, the research seems to have been focused on what games and stories have in common (or not), (e.g., Aarseth, 2012; Miller, 2008; Bizzocchi, 2007; Salen & Zimmerman, 2004)

Therefore, by implementing and evaluating the Narrative model, I attempt to address this gap. The aim is to understand how we can design a game that keeps a player in a game experience by combining gameplay and narrative in relation to different dimensions of immersion. Therefore, the research question going forward is this:
**How can we combine narrative and gameplay components in relation to different dimensions of immersion in a game scenario to design a game experience that players would like to stay in?**

By answering the research question, I hope to contribute to the field of user experience research as well as to the game practitioner field. It is difficult to gauge what factors contribute to a player to stop playing a specific game, as it differs between players, genres and platforms. However, there should be interest in what makes a player stay with a game. Understanding the reasons why could contribute to a greater understanding of how we can design immersive experiences that players and users would like to stay in. If we don’t stay, we don’t use the products or services that has been designed for us. In the case of games, that might mean that the player never gets the full experience as the developers intended, meaning that a lot of time and resources have been spent to no avail.

Furthermore, understanding what makes us stay in an experience could be useful for UX research as well, as it is important to design other types of digital products and services that users will continue to use over extended periods of time. Finally, this study aims to validate and develop the Narrative model as a tool for game design, so it could be used in future game research and development to understand and create games that player would like to keep playing.

### 2. Related Research

In this section, I will provide an overview of the research that has been made in the area of user experience, especially focusing on how it relates to games. I will also provide background for research that have been done in the areas of games and digital storytelling. Finally, I will describe the Narrative model, its origins and how it is intended to work.

#### 2.1 Games as a medium for experience

To design experiences, we must understand the relationship between the user and the product. This is the purpose of research in HCI, as well as the specific focus for UX research, as it tries to understand how technology can create positive emotional outcomes while preventing frustration and dissatisfaction (Hassenzahl & Tractinsky, 2006). There is discussion on whether an experience can be designed, or if design only provides conditions that make certain experiences possible (ibid). However, technology can be said to be a source for emotions (Hassenzahl, 2008), and emotion affects the way interaction is planned and carried out and perceived (Forlizzi & Battarbee, 2004). By understanding user experience, we can better design products, systems and services. Therefore, the result will be the creation of more positive experiences and emotions, which in turn will improve people’s lives (Hassenzahl, 2008; Forlizzi & Battarbee, 2004).

To design a game experience, we must then understand the relationship between the player and the game. How can a game be a medium for positive experiences?
2.1.1 GameFlow

To describe the optimal experience, Csikszentmihalyi (2008) presents his theory of Flow, based on his earlier work (Csikszentmihalyi, 1990). Flow is a state of mind where one is so completely captivated in the task at hand that they forget about everything else.

Csikszentmihalyi’s Flow theory has been heavily influential in the search for better user experience and is referenced in, among others: Ermi & Mäyrä, 2005; Salen & Zimmerman, 2004; Sweetser & Wyeth, 2005; Sweetser, Johnson, Wyeth, Anwar, Meng, Odowska, 2017; Chen, 2007; and Cowley, Charles, Black and Hickey, 2008.

Sweetser and Wyeth (2005) adapted Flow theory into a model they call GameFlow, with the purpose of providing a set of criteria for evaluating player enjoyment in games. They state that the most important goal of designing a game is to make the player feel enjoyment from playing the game. Without enjoyment, the player will simply not play.

The GameFlow model consists of eight core elements relating to Csikszentmihalyi’s (2008) original elements of flow plus one additional element relating to social play. These are as follows:

- **The Game** - Is in itself a task that can be completed.
- **Concentration** - The game should be designed as to require and to invite the player to be fully concentrated on it.
- **Challenge** - The game should provide challenge and varying levels of difficulty.
- **Player skills** - The game should in an appropriate manner teach the player how to play the game as well as providing the opportunity for mastery.
- **Control** - The game should allow the player to exercise control over their actions within the game and make it feel like their intentions are translated into gameplay.
- **Clear goals** - The game should provide the player with clear goals in a straightforward manner.
- **Feedback** - The game should provide immediate and appropriate feedback as a response of their actions.
- **Immersion** - The game should make the player feel deeply involved in the game, effectively making them lose sense of self and time.
- **Social interaction** - The game should provide opportunities for social interaction. This criterion is not related to an element of flow but is considered to be a cause of enjoyment in games.

A game fulfilling these criteria (See Appendix A for the complete set) makes the player want to play the game by creating a sense of enjoyment (Sweetser & Wyeth, 2005). Beyond the original study, GameFlow has also been explored in topics like: GameFlow in pervasive games (Jegers, 2009); GameFlow in playing tangible games (Faber & van den Hoven, 2012); GameFlow in geocaching (Ihamäki, 2014); and GameFlow in first person shooter games and adventure games (Sweetser et al, 2017).
2.1.2 The difference between immersion and presence

To enjoy a game is to be involved in it. Involvement in turn is a key prerequisite for feeling present in a game because without directing attention and becoming involved in something, we cannot feel present in it. Waterworth, Waterworth, Riva and Mantovani (2015) defines presence as “the feeling of being located in a perceptible external world around the self” (p.36). In a game context, presence would be the feeling of being inside a virtual world (Calleja, 2011). As an interactive medium, games command a higher level of engagement than for example books and movies, which in turn promotes presence (Tamborini & Bowman, 2010).

Ermi and Mäyrä (2005) on the other hand describes immersion as a key component in a gameplay experience, and to understand immersion, Ryan (2001) describes the process of being immersed by comparing the user (or the reader in Ryan’s case) to a traveller.

Applying Ryan’s traveller’s journey to games, it could be described like this: The player performs an action (initialising the game) and is transported (through the act of playing) into a distant world (the game world) that makes the world of origin (our own) inaccessible, effectively making the player become immersed. Salen and Zimmerman (2004) describes this phenomenon as entering the magic circle, the frame that within the game experience takes place whether it be virtual or physical. Chen (2007) on a similar note calls it “to enter the Flow Zone”, referencing back to Csikszentmihalyi’s (2008) Flow theory.

By this account, presence and immersion seem to describe the same thing. The player, through playing (an interactive measure) becomes involved in the game, which leads to both immersion and presence. In literature, these terms seem to be used interchangeably, and Lombard and Jones (2015) even state that in the case of presence, the term is being used differently by different scholars. For the purpose of this thesis, I will define them as follows;

Immersion is the act of being “transported” into the game, entering the magic circle, achieving a state of flow. Presence is thereafter a feeling of “being there”, as mediated through different tools. Therefore, the purpose of game design is to make the player become and stay immersed, and at the same time make her feel present in the virtual world. It is the difference of becoming something (immersed) and feeling something (presence). Both are key to enjoying a game. Immersion will be explored further in this chapter, as the purpose of this thesis is to understand how we can design for immersion and the desire to stay within a game experience. The thesis will not investigate how to make players feel present within a game, and as such, will not explore the topic further.

2.1.3 Immersion

There are several views on how immersion is achieved. Ermi and Mäyrä (2005) describes immersion as a multifaceted phenomenon. Calleja (2011), on a similar note, argues that immersion can be divided into types, as games allow for different kinds of immersion depending on the genre and platform.

Immersion as absorption describes that one could become immersed in a game just as well as one can become immersed in solving a crossword puzzle, for example. It is the act of being focused on something entirely, becoming absorbed by it, no matter the source (Calleja, 2011). Immersion as transportation (ibid) relates back to what Ryan (2001)
described with her traveler-metaphor as well as anchoring the player in the virtual world (Calleja, 2011) through the interaction with a tool (like a controller) and resulting in the player feeling present in that virtual space (Riva & Mantoni, 2014). Pine and Gilmore (2011) also illustrates a spectrum of immersion, from passively absorbing an experience to actively immersing oneself, as players do when playing games.

Ermi and Mäyrä (2005) describes game-specific immersion as something nuanced, that different aspects of it emerge and is emphasized depending on the type of game and the individual preferences of the player. As such, they created the gameplay experience model describing three main dimensions of immersion a player can experience during gameplay.

**Sensory** immersion is how audio and visual imagery contributes to immersion. One can be immersed in the aesthetics of a game, for example getting lost in a lush forest and its accompanying music soundtrack (ibid). Virtual reality is one example of mainly relying on sensory immersion.

**Challenge**-based immersion is when the game provides a balance of challenge and abilities. By providing challenge that the player can overcome through their own abilities, gained both from outside and within the game, the player can become immersed (ibid).

**Imaginative** immersion is how the game allows the player to use their imagination to, among other things, relate to characters, enjoy the story and the world it is set in (ibid). An example of this is when the player can create their own character based on the rules of the game world.

In Ekbäck et al (2015) we identified a fourth type of immersion based on our results. The participants expressed a desire to finish a game for the sake of finishing, to know how the story ends, even though they were discouraged to continue playing by other factors. They became immersed in the desire to complete something and not leave it unfinished, and thus we called it **completionist** immersion. Building further on that definition, completionist immersion could also entail completion in other ways. For example, the player could complete all optional side missions in a game or collect all material to craft the ultimate weapon.

### 2.2 Games as a medium for play

By now, it should be apparent that the act of playing a game gives rise to experiences and how those experiences can take shape. But what is a game? And what does the act of “play” mean?

Salen and Zimmerman defines a game as “*A system in which a player engage in artificial conflict, defined by rules, that results in a quantifiable outcome*” (Salen & Zimmerman, 2004, p.80). A second definition of a game is provided by Cowley et al, which is as follows: “*Gameplay occurs as a rule-bound, reactive, emergent process of action sequences belonging to one or more players*” (2007, p.4). Calleja provides a third definition which is “*Most importantly, a game becomes a game when played; until then it is only a set of rules and game props awaiting human engagement*” (2011, p.8). A game can thus be said, in summary, to be an interactive process defined by its rules and the player(s) that play it.
Further, Salen and Zimmerman also express that the goal of successful game design is to create meaningful play. The concept of play they have borrowed from Huizinga (1955). Through the interaction between the player, the system of the game and the context in which the game is played, meaningful play emerges. This is because the interaction allows the player to take actions which have outcomes that affect the game system, that in turn creates meaning in the game (ibid). For example, to kill a monster in a game is meaningful because the player is rewarded with better weapons and money, and consequently there is one less monster in the game world.

Play is enabled through interactivity. Interaction with the player allows the game to advance (Salen & Zimmerman, 2004). Through meaningful play and the interactivity it provides, the player becomes involved in the game. Play is the medium that sets the stage for player experience.

2.3 Games as a medium for narrative

Not only are games a platform to interact with, they also have the capacity to contain stories as well. Digital storytelling is defined by the way it allows the audience to interact with the narrative material. The audience become active players in the digital narrative and might even affect it to some degree. Compared to the distinguishing features of traditional narratives, which are pre-construed, linear and unchangeable, digital narratives are malleable, non-linear and the ending can change, because the user is co-creating the story. It is through active participation that the user is experiencing the story (Miller, 2008).

As a descendant of traditional narratives such as movies, digital storytelling uses narrative to evoke immersion. In movies, Neuendorf and Lieberman (2010) consider narrative as the strongest contributor to experiencing immersion. Narrative is namely the tool used to bring the audience into the fictional world of the story.

2.3.1 Narrative elements in games

The Variable model as described by Aarseth (2012) identifies four main elements that games, and stories have in common; World, Objects, Agents and Events. The World is the stage where the story is set, and the frame in which the game unfolds (Aarseth, 2012; Bizzocchi, 2007; Salen & Zimmerman, 2004). To make the world believable, the narrative can use either realism, spectacle or a combination of both. Realism reflect the real world while spectacle is making the unrealistic believable, in movies for example it is done through the use of special effects and computer-generated graphics (CGI) (Neuendorf & Lieberman, 2010). A world has a unique setting and can vary from the very elaborate to the very simple. It can, for example, be a space setting or a fantasy setting (Dowd, Fry, Niederman, Steiff, 2013).

Objects are what the player can interact with to exert actions within a game (Aarseth, 2012). Agents, also called Characters, are the virtual entities that the player can communicate with and they populate the virtual world. (Aarseth, 2012; Bizzocchi, 2007).

Characters are the tools which the narrative can use to make the audience connect with the narrative on an emotional and psychological level (Neuendorf & Lieberman, 2010). It is through the character that we are allowed entry into the fictive world and they can play
both the parts of support and obstacle to create tension in the story. (Miller, 2008) Characters can be defined to certain degrees, either players can play a predefined role, or they can to varying extents create their own characters (Dowd et al, 2013). Emotion can be shown by the virtual characters, as well as being elicited in the player by playing (Bizzocchi, 2007). Emotions play an important role to make the experience more immersive and compelling and serves to intensify the connection between the player and the narrative (Miller, 2008).

**Events** are what drives the story forward. If the world contains the overarching narrative, events are individual smaller moments of narrative that generates as the game moves forward (Salen & Zimmerman, 2004). Dowd et al (2013) divides events into main plot, which is the primary story of the game, and subplot, also referred to as side stories.

As a medium for narrative, games can provide experiences that the player can shape themselves, by being the active force that drives the story forward. This in turn should create meaningful play that will make the player feel involved, desiring to keep playing.

### 2.4 The Narrative Model

In Ekbäck et al (2015), we conducted a study evaluating how narrative and game mechanics are combined in episodic games to create the desire to keep playing the game. Episodic games borrow its format from tv-series, and instead of delivering an entire game experience in one package, it is portioned out episode by episode. By being influenced by such a traditional narrative format, we wished to explore how it could support gameplay and vice versa. By observing and interviewing players given the opportunity to play two episodes each of an episodic game, we concluded that a game with both strong gameplay and narrative components increased the desire to continue playing. This is illustrated in what we call the Narrative model (see Figure 1).

![Figure 1: The narrative model and an example of a game that had components of both sides of the model (From Ekbäck et al, 2015).](image)

The model is based on Aarseth’s (2012) variable model and Bizzochi’s (2007) narrative components, containing the four elements of games (**World, Object, Characters and Events**), and Ermi and Mäyrä’s (2005) immersion-dimensions including our own (Ekbäck
et al, 2015). The appearance of the model is inspired by Pine and Gilmore’s (2011) experience realms.

The Y-axis describes a spectrum of how a game is ludologic (gameplay-focused) to how a game is narratologic (narrative-focused). Note that Aarseth considers a game as either narratologic or ludologic, but we (as in Ekbäck et al, 2015) consider games as a medium that can contain both. Furthermore, ludology means the study of games and gaming and is derived from the latin word ludere, which means to play (OED, 2018).

The ludologic side contains two immersion-dimensions, these are challenge-based and completionist-based. We considered these two as more ludologic in nature as they deal more with gameplay (for example, playing a difficult game or completing as many quests as possible). On the narratological side, there is sensory-based and imaginative-based immersion. We consider these two dimensions as more narratologic as they deal more with storytelling (for example, building the environment and creating deep, relatable characters).

As we intended the model to work, a game can be considered to have four main components (world, objects, characters and events) and these can be placed within different immersion-dimensions. A component is placed in a main dimension (challenge for example) but can lean towards the other dimensions. Based on the result of our study, we could see that the game that players were most positive towards had components on both the ludological and narratological side (see Figure 1).

However, the Narrative model is only the result of one study, based upon already gathered data of existing games. As such, it could not reliably be used as a foundation to make game design decisions upon. To change this preliminary state of the model, it must be checked and validated in game development scenarios, evaluated with real users to measure whether the suggested combination of gameplay and narrative components in relation to immersion have any real effect in making the player stay in the game experience. This is described in the next section.

3. Method

To evaluate the Narrative model, I designed two games in collaboration with “Company-X” and “Company” as part of a case study. I chose a case study as it would provide a specific scenario for the thesis to apply the model to. “Company-X” is an IT-consult firm and provided guidance in building the games and “Company” own the rights to the game concept, a language game for children aged four to six. These companies asked to remain as anonymous as possible. Therefore, in this thesis, the games are described in a general sense when it comes to imagery and what types of objects they contain. The focus is instead on how imagery, objects and gameplay was related to the Narrative model. “Company-X” also provided an incentive for participation, all participants received a cinema gift card for their efforts. For clarity, the learning aspect and language task was not evaluated in this thesis, the focus remained on the player experience and whether the Narrative model could increase the player’s interest in continuing to play.
This section will outline how the participants were recruited, what methods were chosen to evaluate the Narrative model, how the games were built and how the Narrative model was implemented, and finally, how the data was analysed. Limitations of the study will be discussed in chapter 5.

3.1 Participants

To be a participant, the criteria was that they should be a child between four and six years old and should not have learned to read. A request (see Appendix B) was sent out by email to 64 principals and managers of preschools in Umeå to reach parents or guardians with children who met these criteria, as well as posting on Facebook. The request was modelled after the example shown in Danielsson Öberg (2010), as her study also required the participation of children and the consent from parents or guardians. It was also deemed an appropriate and good source of inspiration being a dissertation on how to design with and for users, exemplifying it through designing with and for children.

A convenience sample was chosen because of its simplicity and quickness, a sampling method appropriate when time and resources are limited. On the other hand, the sample suffers the risk of not being representative of the population, and that the participants have too much in common (Hartman, 2004).

I gathered twelve participants, eight from a preschool and four from individual parents consenting to participate with their child. The first two evaluation sessions served as pilot studies. As most participants attended the same preschool, the sample presented a limited representation. However, as time did not permit more excursions to more preschools, this was deemed the most appropriate sample for this study.

3.1.1 Ethical considerations

To conduct the study in an ethically considerate way, I followed the four main requirements as outlined by Vetenskapsrådet (The Swedish Research Council, n.d.). The parents of the participants had to sign a consent form for their children to participate, the consent form presented what data would be gathered and how, promised anonymity and that consent could be revoked at any time. Also, that all information gathered would only be used in this study and would not be presented in such a way that individual participants could be identified.

3.2 Data gathering

For this thesis I chose a mixed approach, gathering qualitative data (through interviews and observations) and complemented it with quantitative data (by using a Likert scale as a data gathering method). There are positive and negative aspects in both quantitative and qualitative studies, and especially combining them invites specific challenges. Considering the chosen method (i.e. controlled experiments), it is most often used to evaluate usability and measures performance scores (Sharp, Preece, Rogers, 2015) and usually results in some form of quantitative data (Benyon, 2014; Blandford, Cox, Cairns, 2008). However, as user experience is something subjective, it would be difficult to measure with quantitative data as it is expressed in numerical terms (Sharp et al, 2015). To understand why and how
a participant experiences something, the researcher could interview them and find themes and patterns in their answers, resulting in a qualitative dataset (ibid). Ritchie and Ormston (2014) further argues that qualitative and quantitative methods can be combined when different types of information are required to understand phenomenon. This study measured GameFlow in participants aged 4-6, and as such required the method to be “child-friendly”. Sharp et al (2015) argues that an approach based on chat and images (i.e. different types of information) will improve communications with children. To measure GameFlow, the chat-aspect is what produced the qualitative dataset through interviews and observations. The image-aspect in the form of “smileys” (explained in chapter 3.2.3) produced the quantitative dataset as it were used as a Likert scale.

Finally, another argument for mixing methods is that in game research, Lieberoth and Roepstorff (2015) claims that games are such a multi-faceted experience that could reach beyond the act of play itself, that only using one instrument whether it is quantitative or qualitative will result in limited data. But also, that mixing methods is not always appropriate, as it is costly in time and resources and does not automatically provide more meaningful data (ibid).

In this study, the mixing of methods was deemed appropriate as it would provide two different types of information needed to better understand the participants user experience and whether GameFlow occurred or not during gameplay.

### 3.2.1 Controlled experiment

A controlled experiment was chosen to evaluate the implementation of the Narrative model. Such an experiment is performed in a controlled setting, testing a hypothesis, most often attempting to measure effects of a designed change by looking at performance indicators (Blandford et al, 2008; Sharp et al, 2015). It is appropriate for design research when the purpose is to compare features of different designs to see which one is better (Benyon, 2014). This could also be called experimental design, as it is a test to evaluate a design idea and explore its causality (Cairns, n.d.).

In this study I evaluated the Narrative model as a tool for game design and see whether it had any effect upon the levels of GameFlow that participants experienced. To do so, it had to be measured against a “control”-version that were not designed after the Narrative model. As such, a controlled experiment was deemed an appropriate method to measure whether it would be any differences between the two different designs, from here referred to as the games. In both controlled experiments and experimental design, especially in relation to HCI, the intent is to see how the independent variable affects the dependent variable(s) (Blandford et al, 2008; Cairns, n.d.).

As previously described, Sweetser and Wyeth (2005) provide a set of criteria for evaluating GameFlow. These criteria served as dependent variables, i.e. what would be measured in the experiment. The games were not designed to match these criteria. These criteria were chosen as they were deemed to estimate different aspects of a game that make players more likely to keep playing, which connects to the purpose and research question of this thesis.

The independent variable affecting the GameFlow-criteria was the implementation of the Narrative model. By conducting a controlled experiment, the base assumption is that
there will be no difference between the different designs, or games in this case. This is called the null hypothesis. By failing to show that there is no difference, evidence is gained to support that there is a difference (Blandford et al, 2008). How these versions were designed and built will be described in chapter 3.3.

Possible complications of controlled experiments are confounding variables. Confounding variables are unintentional variations in an experiment that affect the measurement of the dependent variable (Blandford et al, 2008; Benyon, 2014). The task of the researcher is to create an independent variable and vary it between designs, to measure the dependent variables as well as eliminating as many confounding variables as possible (Blandford et al, 2008; Sharp et al, 2015; Benyon, 2014).

The evaluation sessions were conducted as follows: two at the parent’s workplaces, eight at the children’s preschool, and two in the children’s homes. In the studies conducted outside of the preschool, the parents were present in the evaluations. These were confounding variables, as all evaluations had different constellations of researcher, participant, parent and others. However, these confounding variables were to be tolerated to ensure that both parents and participants were comfortable in participating. As for reducing other confounds, a formal procedure was created to ensure that all participants had the same experience of the study from the outset. A formal procedure has a second purpose to allow for other researchers to replicate the experiment (Blandford et al, 2008), see Appendix C for the formal procedure of this study. Certain confounding variables, such as the participants’ moods and energy levels influenced the dataset but could not be controlled by the researcher. When the game bugged, froze or otherwise interrupted gameplay, it was considered a confounding variable, and these were noted down for each participant.

Finally, in a controlled experiment, the researcher measures whether there is any difference between conditions of the experiment (Blandford et al, 2008; Sharp et al, 2015). This could be measured by either having a participant performing under all conditions (within-subject) or only under one condition (between-subject). Within-subject studies are more appropriate for comparing designs, while between-subject studies are more appropriate for evaluating designs where there might occur learning or interference effects between conditions (Blandford et al, 2008, Benyon, 2014).

As the purpose was to compare two games with different designs, it was decided that a within-subject study was most appropriate. By using a Latin square (Blandford et al, 2008), the participants were randomised into starting with different conditions. The two conditions were named Story (because it implemented the Narrative Model) and Control (to be measured against). Half of the participants would start playing Story before playing Control, and the other half would do the opposite (see Appendix D). The reason for doing so was to avoid results being affected by the order of play. Each play-session of a version of the game was timed. If bugs, game lags or other interruptions of gameplay occurred, they were noted down.

3.2.2 Observation
As the participants played the game, I conducted an observation. The evaluation sessions were also recorded with a sound recorder. Observation is a technique appropriate for
understanding how and why a user performs certain tasks located in a specific context (Sharp et al, 2015). By observing, the researcher does not have to rely exclusively on the participants own memories and experiences (Hartman, 2004). By doing this, I could observe behaviours, body language and listen to what the participants said during gameplay. Noting down behaviour during an observation might explain why the participant experienced certain things in certain ways. On the other hand, observations are time-consuming (Hartman, 2004) and relies on subjective interpretation, which is why an interview followed the observation.

3.2.3 Interviews

After each condition, the player was interviewed in a semi-structured fashion. A semi-structured interview follows a basic script, so all participants gets the same base set of questions. What makes it semi-structured is that the researcher can ask follow-up questions to the original questions, to gain further understanding of the topic (Sharp et al, 2015). As interviews require the participant to talk about their own experiences, it is a good way of gaining understanding about behaviours, opinions and emotions (Hartman, 2004).

Cote and Raz (2015) provide instructions for how to conduct in-depth interviews regarding game research. They argue that the reason for conducting an in-depth interview is that it will, like the name suggests, give the researcher in-depth information about a specific topic, in this case user experience in games. To get information about the player and their subjective experience, Cowley et al (2007) argues it is best to ask them directly, but they also warn against asking during gameplay as it would break immersion.

As such, the interview procedure was designed to occur after each condition of the game scenario was played (See Appendix E for the pilot study compendium). The intention was to make it clear to the participants about which game they were interviewed about.

Each participant was asked seven questions each relating to a GameFlow-criterion i.e. the dependent variables being measured in the experiment. For this study, the criterion “Social interaction” was not considered, as the game was not played in cooperation with a second player, nor was it designed to support such gameplay.

For each GameFlow-Criterion, there are several sub-criteria. But to keep the interview short and concise, I only asked one question relating to a main criterion, resulting in seven questions per game, being 14 in total. Naturally, this removes nuance from the dataset. If I had asked a question related to each sub-criterion, it would have resulted in 36 questions per version, 72 in total. This seemed like too much to ask of a young child, so despite the loss of nuance, it was hoped that fewer questions would provide more substantial answers. (See Appendix F for the question table).

For each question related to a GameFlow-criterion, additionally, the participant was asked to rate it with the help of “smileys”, using the Smileometer-method developed by Read (2008, 2012). The Smileometer, consisting of a set of five “smileys”, is a visual analogue scale based on a Likert scale numbered from one to five. Each “smiley” is accompanied by a short descriptive word and is presented in a horizontal row.

The Smileometer is appropriate for younger children as it requires little reading ability and no writing skills (Read, 2008, 2012). A Likert-scale is used for measuring subjective phenomena, such as opinions and attitudes and is often used to evaluate user satisfaction.
In this study, each scale consisting of “smileys” was designed to match a GameFlow-criterion. The Smileyometer was added as a complement to the interview per Sharp et al’s (2015) suggestion to include images when interviewing children, as well as an additional tool for the participants to help verbalise their thoughts.

Before the interviews, I would describe what each “smiley” meant. As the children in the study only understood Swedish, I translated the accompanying descriptive words (see Figure 2). After having rated a question with a “smiley”, I would ask why the participant chose that smiley as a response. After the participants had played both versions of the game scenario, I asked them to tell me if there was anything else they thought of while playing that they wanted to share with me before finishing the evaluation.

![Smileyometer](image)

**Figure 2: The Smileyometer in Swedish.**

### 3.2.4 Validity of study

To design the experiment, I considered the four types of validity as described by Gibbert, Ruigrok and Wicki (2008) and Cairns (n.d.), *Internal, Construct, External and Ecological*.

In this study, I attempted to create experiment conditions where I could measure the dependent variables (GameFlow) depending on the independent variable (The Narrative Model) and decrease as many confounding variables as possible by creating a formal procedure. *Internal validity* refers to how the variables in an experiment affects the results (Gibbert et al, 2008) and is strengthened due to the decrease of confounding variables (Cairns, n.d.).

*Construct validity* refers to whether the study investigates what it claims to investigate (Gibbert et al, 2008). The measurement must have meaning based in the intent of the study (Cairns, n.d.). The measurement used in this study is GameFlow, as it is an indication of player enjoyment which in turn suggests a desire to keep playing a game. As such, GameFlow is measured in each condition of the controlled experiment.

*External validity* refers to how the results of the experiment can be said to be generalised, to also occur in other settings than in the one being studied (Gibbert et al, 2008). GameFlow is a phenomenon that has been studied in other game types and genres, effectively indicating that it occurs in several settings. As such, if and how GameFlow occurs in the setting of this study would be an addition to already existing research.

*Ecological validity* refers to how the results of the experiment is relevant to occurrences in the real world where people interact with digital systems and services (Cairns, n.d.). As player enjoyment is key for positive game experiences, the results of this study will be relevant to those who want to design immersive games and better understand player UX.

Gibbert et al (2008) also describes what they call reliability of a study, which refers to the absence of random error. By following a formal procedure, random errors are
decreased. It also serves as a basis for replication of the study, so if any other researcher were inclined to try and replicate the original study’s result, they can follow the original procedure (Gibbert et al, 2008). Appendix C and G contains the formal procedure and final version of the study compendium of this study.

3.2.5 Changes between pilot study and main study

The methodology was tried out on two pilot participants. One of them was four years old, and the other had recently turned six. One study was conducted at the workplace of the parent, the other at the home of the other participant. Both times the parents were present, sitting either behind or next to the participant.

During both evaluation sessions, it became apparent that the participants had a hard time answering questions. They were confused by the questions posed, as well as not understanding the scaling of the Smileyometer. For example, one pilot participant only picked smileys she thought looked nice rather than one representing her feelings.

This suggested that further research was needed to better prepare for the actual study. Children tend to rate extremes on Likert scales, especially if they are younger (Chambers & Johnston, 2002). This suggests a degree of difficulty in designing questions and corresponding Likert scales in such a manner that decreases the extreme ratings (either very positive or very bad), considering the age span in this study. However, Doverborg and Pramling Samuelsson (2012) provide a set of guidelines of how to conduct structured conversations with children. It is intended for teachers working with young children, as such, it seemed a fitting source of inspiration for the interviews. I also took the opportunity to review my questions with a person who has experience in interviewing children. The following changes was then made to the method;

In conversations with children, they and their responses need to be affirmed by the researcher, by for example nodding and keeping eye-contact. Interviews should mix of general and more specific questions and could benefit from being phrased as a request rather than a question, “Tell me about...” rather than “Could you tell me...” (Doverborg & Pramling Samuelsson, 2012). The suggestion was also made that I should also describe each Smiley-scale to the participant, so they would understand it better. As such, I first asked a general question regarding a GameFlow-criterion, and then when asked to rate with the Smileyometer, the question was more specific.

I removed the descriptive words from the Smileyometer and printed it on a separate paper that could be put in front of the participants. In the study compendium, the descriptive words were replaced with the Likert scale according to GameFlow. See Appendix G for the updated version of the Study Compendium.

Finally, a smaller change was made to the Control-game. A pair of objects was switched from the second round to the first round, because the value of those two objects were alike to another pair in the same round. The participants were a bit confused as to why the incorrect combination did not turn out correct. This was a flaw in the game logic, as two pairs with the same values should not have been in the same round. Therefore, the switch was made. Due to all these changes, the data from the pilot studies were not considered in the data analysis and as such were excluded from the final results.
3.3 The Game Prototypes

In this part, the design process of the prototypes is described.

3.3.1 Core Game Structure

The games were designed to follow a core game structure, as to include the same setting and difficulty as each other. Without the core game structure, it could have been argued that the two games were made entirely different and as such, affected the results in certain ways. The core game structure was divided into four steps. These were as follows:

1. The game is introduced, and instructions are given to the player.
2. The player performs the task.
3. The player completes the task and the game provides a completion prompt.
4. The game scenario ends.

The game scenario consists of a room that the player “enters” as the game starts, initiating an introduction and following instructions on how to play the game. On the other side of the room is a locked door. The player is instructed that to go through the door, she must complete a language task and as a reward will receive the key to the door. And by exiting the door the player is informed that there are more things to do.

The complete prototyping process including creating assets, recording lines and coding the games took around 160 hours during a four week-period. See Appendix H for the game prototype overview, Appendix I for the manuscripts for the games, Appendix J for the attribution list of sounds used in the games and Appendix K for a detailed description of the games.

3.3.2 Story: Implementing the Narrative model

As the Narrative model is not an established framework, this is my attempt at formalising a procedure as to how it should be implemented; a narrative component is inserted into one immersion dimension and game design is based on that combination. I chose to implement the model in this way:

**Step 1:** The Character narrative component is inserted into the Imaginative dimension. The Character is imaginative because it will serve as the player’s entry point into the world and someone the player can relate to, evoking a sense of “friendship”. In the game, this is illustrated by an animal character that explains the setting and provides instructions and feedback.

**Step 2:** The Object narrative component is inserted to the Completionist dimension. The Objects are completionist as they encourage progression and completion in the form of the progression bar, that when full, rewards the player with the key to the locked door. In the game, this is illustrated by objects related to the language task that initialises when the introduction is complete. When the player has dropped two objects with the same value into the drop zones, the player is informed they are correct, gets a compliment, the objects disappears from play and the progress bar with the key in it increases.
**Step 3:** The Event narrative component is inserted to the Challenge dimension. The Event is challenging because it triggers as the player overcome the challenge of the game. Only by clearing the challenge of the language task will the game trigger the ending event. In the game, this is illustrated by the fact that when all objects have been combined and removed from play, the character appears and informs the player that they have succeeded in the task and compliments them on overcoming the challenge.

**Step 4:** The World narrative component is inserted to the Sensory dimension. The World is sensory because it is presented with visual imagery in the form of a map of the “Island of Adventure”. It gives the player a sense of there being something more “out there”. In the game, this is illustrated by when opening the locked door, the player sees a map of an island marked by beaches and forests and mountains, with symbols indicating more places to visit. The character also informs the player that there seem to be more adventures to be had on the island and requests the player to join in the exploration of it.

See Appendix L for how Story is illustrated in the Narrative model. I chose to implement the model in this way as it fit the intended scenario, and at the time seemed most appropriate to design a game for children.

### 3.3.3 Control

In building Control-Version, I followed the core game structure and attempted to build a game scenario that would accomplish the same things as Story but without the Narrative model as a framework guiding design decisions.

**Step 1:** A voice introduces the game and instructs the player how it should be played.

**Step 2:** The player performs the task, combining objects. When a combination is correct, those objects will disappear from the screen and the voice will compliment the player.

**Step 3:** When the task is completed, the voice will tell the player that they have succeeded in completing the task, compliment them, and the key will be “handed” to the player.

**Step 4:** When unlocking the door to finish the scenario, the voice will tell the player that there are more fun tasks to solve, and the scenario ends.

As it can be seen, this scenario does not take any narrative components or immersion dimensions into account. One could certainly argue, for example, that combining the objects to receive a key is still a completionist task. However, the completionist factor is not overtly illustrated as it is in Story, and it is not intentionally designed to adhere to that immersion dimension, or any other. Control is simply playing the same game structure as in Story, but without any intentional Narrative model implementation.

### 3.4 Data analysis

To analyse the data, an approach based on qualitative content analysis was chosen. A content analysis approach is used to analyse, code and report data from studying a phenomenon. By conducting a content analysis, a set of concepts and categories are derived from the data to provide an understanding of how and why a phenomenon occurs (Elo & Kyngäs, 2008). As this study measured GameFlow as a phenomenon during gameplay,
content analysis seemed an appropriate approach. A content analysis can also be used to validate or conceptually extend a theory or theoretical framework by conducting what Hsieh and Shannon (2005) call a direct content analysis. As the purpose also was to validate the Narrative model and possibly develop it further, it too is an argument as to why content analysis would be an appropriate approach for analysing this dataset. An argument against content analysis is that data not relevant to the topic of study might emerge as patterns and themes (Sharp et al, 2015). To avoid that, categories in the analysis were derived from the criteria of GameFlow.

A content analysis process is conducted in three phases; preparation, organizing and reporting. During the preparation phase, a unit of analysis is selected. This could be, for example, a theme (Elo & Kyngäs, 2008). Graneheim and Lundman (2004) more specifically describes observational protocols or whole interviews as the most suitable units of analysis. In this study, each session with a participant was considered as a unit of analysis, 10 units in total. Also, part of the preparation phase is deciding what content to look for in the units of analysis. A researcher can decide to both consider manifest content, the things that are apparent in the text, and latent content, more obscure things such as silence, laughs, posture etc (Elo & Kyngäs, 2008). As observations were conducted in this study, latent content was included in the analysis as well, as it could explain actions and behaviours of the participant. After selecting unit(s), the researcher’s next task is to immerse herself in the data and becoming familiar with it (Elo & Kyngäs, 2008).

The organizing phase is conducted either through an inductive or a deductive approach. A deductive approach was chosen for this study, as it is also part of a direct content analysis (Hsieh & Shannon, 2005). A deductive approach requires a categorisation matrix to be created, that identifies the categories that will be used for analysis. (Elo & Kyngäs, 2008). A matrix was created for each of the games (see examples in Appendix M).

The main categories in the matrixes each outlined a GameFlow-criterion, each corresponding to a participant in the study. For each piece of data from a participant related to a GameFlow-criterion, it was tagged as either fulfilled (data supporting fulfilment of said criterion), unfulfilled (data not supporting fulfilment of said criterion, or non-existent data) and somewhere in between (data not clearly defined as either).

Included in the matrix were average play-time, numbers of bugs, and average smiley-ratings per criteria per game. The purpose was to provide additional context to the categorisation and analysis process.

4. Results

In this section, the results from the empirical studies conducted with children during the period 26th of March until 12th of April 2018 is presented.

4.1 Qualitative Data

In this part I present the qualitative data from the controlled experiments. These consisted of the observation notes during play and the interviews with each participant. The data was analysed using content analysis through a categorisation matrix as seen in Appendix M.
Note that in the quotes from the participants, some words have been omitted to keep certain content in the games anonymous, as per the wishes of the companies, these are marked by [word]. The participants have all received codenames and are referred to with they/them-pronouns as most were from the same preschool and could be identified otherwise. The quotes have been translated from Swedish by me.

4.1.1 Concentration
The Concentration-criterion required a participant to be concentrated on the game. The participants were therefore asked to recount what happened in the game. If the participant remembered what happened in the game, it was assumed they had been concentrated. The criterion was considered to be fulfilled if the participant could recount some parts of what happened in the game, whether that be what objects they combined, the events throughout or talks about the objective of the game. No participant was required to remember everything for this criterion to be fulfilled. It was considered unfulfilled if the participant could not recount anything from the game. It was considered somewhere in between (SiB) if the participant said the game they just played was like the other game they had also played. It was considered such as it was unclear whether the participant thought they had played the same game twice or if they just simply did not remember the specifics for the second game.

For Story, seven participants fulfilled the criterion. They recounted the events of the game, that they had combined certain objects, and that they had to combine objects in order to elevate the key in the tube (the progress bar), so it could open the door.

“I got... I got, there was an animal, and he said like this, if you don't sit in the boat *mumbles*... the water went up when I did it like that. And then the key was up, so I stayed up, and then, the map.” - P4, 5 years old. [Story]

Two participants could not recount the events of the game, saying either “I don’t know” or “I have forgotten”, and thus did not fulfil the criterion. One participant was tagged as SiB, as they said they were supposed to do the same thing as in the previous game (Control).

For Control, four participants fulfilled the criteria. Similar to Story, they recounted events, that they combined objects and needed to unlock the door. Four participants could not recount the events of the game and thus did not fulfil the criteria, most answering with “I don’t know”. Two participants were tagged with SiB, as one just recounted all of their friends that had previously participated in the study and the other only said it was a bit similar to the previous game (Story).

“That you get to [combine objects] so the key, and the door opens” - P8, 6 years old. [Control]

4.1.2 Challenge
The Challenge-criterion required that the game was sufficiently challenging for the participant in terms of both the rules of the game and the act of playing. The participants were asked what they thought about combining objects. It was considered fulfilled if the participant thought it was fun or articulated that it went well. It was considered unfulfilled if their answer did not say anything about the challenge. It was considered SiB in the case...
where one participant suggested the game was a little too easy, not saying whether that was a good thing or not, or when the participant was giving mixed messages about their experience.

For Story, nine participants fulfilled the criterion, most of them saying that they liked combining objects for reasons such as making correct combinations were fun, it was difficult, it was just fun, the combinations were easy and that it felt good to combine objects. The others could not explain why they liked it and were therefore considered unfulfilled.

“Because it was pretty fun, and I liked that you were supposed to [combine objects] and that.” - P2, 6 years old. [Story]

One participant was considered to be SiB, as they suggested the game was a little bit too easy.

For Control, eight participants fulfilled the criterion. Similar to Story, they also said that they liked combining objects for reasons such as managing to complete the task, that it was easy and that it was fun. Others could not explain why they liked it and were considered to be unfulfilled. One participant in particular was observed to be having fun with Control, as they giggled trying different combinations and got excited when they got it right.

“Ehm, because, I completed it” - P1, 5½ years old answering why they liked combining objects. [Control]

One participant did not fulfil the criterion as they only said that this game was a bit harder to play than the previous (Story) and did not say whether they liked it or not.

One participant was considered as SiB, as they were observed to be having a really hard time when playing the game, getting really frustrated. In the interview however, this participant expressed that they thought it was fun to combine objects.

4.1.3 Player Skills

The Player Skills-criterion required that the game support player skill development and mastery. Skill development and mastery were fairly limited as both games were short, however, the participants were asked how they learned to play the game. It was considered to be fulfilled if the participant could explain in some manner how they learned the game or thought it was easy to play. It was considered to be unfulfilled if the participant could not explain or expressed that they did not know. It was considered to be SiB if the participant said they learned from the previous game or if they just “learned by looking”, which is unclear if it meant looking at the instructions or just looking at the interface and understanding what to do.

For Story, six participants fulfilled the criterion, giving explanations such as it was easy because they could combine so many objects, the character provided instructions, the game in general providing them instructions and that the combinations were easy.

“Because that... that animal told me what to do” - P10, 6 years old. [Story]

Two participants did not fulfil the criterion, as they were unable to explain how they learned the game. Two participants were considered as SiB, as one could not explain how they
learned the game but said it was easy to learn it, and the other explained that they learned by playing the first game (Control) and therefore knew how to play the second.

For Control, four participants fulfilled the criteria, giving explanations such as learning from the instructions and more specifically the voice told them what to do, and learning by thinking and figuring out what to do.

“It was sort of the same, they told it and so[...] He was pretty good” - P2, 6 years old. [Control]

Three participants did not fulfil the criterion as they could not explain how they learned the game, saying that the game did not tell them, that they didn’t know how they learned or that they simply “just thought”, not explaining how that contributed to their learning. Three participants were considered SiB as they either said that they learned from the previous game, one specifically saying that the voice gave the same instructions and learning by just looking at the game.

4.1.4 Control

The Control-criterion required that the participant should feel a sense of control over their actions. The participants were therefore asked how they played the game. The criterion was considered fulfilled if the participant could describe to some extent how they played the game (for example, using drag and drop) or if they could explain the result of their actions. The criterion was considered unfulfilled if they could not explain how they played the game. It was considered SiB if the participant could only explain with gestures, saying “I just knew” or if prompted, said they used a part of their body but did not specify how, these all suggest they knew how to play but not to what extent they felt they had control.

For Story, four participants fulfilled the criterion by explaining either in detail how they played and how the game reacted to their input, looking at objects and then drag them to the drop zones, using fingers to drag objects or that the purpose of combining objects was to get the key out of the tube for the character to open the door.

“I put together the [objects] and so, and, he got to tell how it was, and then I knew, and then, and I got to help him make the key and so, and, yeah, I got some different things, and, I got to [combine the objects], and I tried to figure out what it was.” - P2, 6 years old. [Story]

Five participants did not fulfil the criterion, as they were unable to explain how they played the game. One participant was considered SiB as they could not explain with words but instead gestured with their arms and fingers to show how they played.

For Control, two participants fulfilled the criterion, by describing how they played by combining objects to unlock the door and combining different objects in the drop zones. Four participants did not fulfil the criterion, not being able to explain how they played the game. Four participants were considered SiB as they only explained with gestures, or just saying their used a part of their body, or just knew how to play.

“Brawbrabrawabwam BOW BOW” - P6, 6 years old, describing how they played the game with sounds and gestures. [Control]
4.1.5 Clear Goals
The Clear Goals-criterion required that the game should provide clear goals to the participant. The participants were asked why they were supposed to combine objects. The criterion was considered fulfilled if they understood that the purpose was to combine objects in order to get the key so the door could be unlocked. It was considered unfulfilled if the participant did not understand what the purpose was. A participant was considered to be SiB if they understood parts of the purpose.

For **Story-version**, three participants fulfilled the criterion by explaining that the purpose was to help the character open the door to see the map, to combine objects to open the door or that it showed them it went well by elevating the key, therefore the goal was to elevate the key. Four participants did not fulfil the criterion, as they were unable to explain why the game wanted them to combine objects, citing reasons such as no one told them why, remembering that the character had said something but not what he said. One participant even said that the character “tricked” them.

“No, he didn’t tell me” - P4, 5 years old. [Story]

Two participants were considered to be SiB, one explaining that the game wanted them to combine objects just because it was possible to combine objects, the other one understood that the purpose was to open the door but explicitly stated that they did not get why that was the case. One participant was not considered in this criterion as the question was not asked in their interview due to a mistake.

For **Control-version**, four participants fulfilled the criterion, explaining that they were supposed to combine objects so the door would open, get to the other side of the door, and to help the character finish the game. Four participants did not fulfil the criteria, as they did not know why they were supposed to combine objects, one even saying that the instructions just said that they were supposed to.

“Hm, yeah, that I don’t know” - P9, 5 years old. [Control]

Two participants were considered SiB as one suggested the reason for combining objects is that they get to play more and other said that the purpose was to learn all combinations.

4.1.6 Feedback
The Feedback-criterion required that the participant received appropriate feedback. In these games, it would mean feedback displaying in some way that it was going well. The participants were asked how they knew it went well or not in the game. The criterion was considered to be fulfilled if the participants could point to something that alerted them that it was going well or not. The criterion was unfulfilled if they could not explain how they knew if it went well or not. It was considered SiB if the participant said that they just knew or that it couldn’t go bad, as these were indicators of that they knew how it went but it was unclear what type of feedback told them this.

For **Story-version**, two participants fulfilled the criterion, one explained that it went well when the key rose higher and higher, and the other one said the voice confirmed that they had done right. Five participants did not fulfil the criteria, as they did not know how it went in the game and could not explain it or saying that the game did not show it.
Three participants were considered SiB, as they all just said that they “just knew” how it went but not explained how they knew.

For Control-version, one participant fulfilled the criteria, explaining that they knew it went well when the objects disappeared. Two participants did not fulfil the criteria as they did not know how it went when they played, one saying it was hard to know and the other said it didn’t show. Seven participants were considered SiB as they explained that they “just knew” it went well, or that they remember how it went but didn’t remember if it was good or not, or could not explain why they knew, or that they knew but the game didn’t show it.

“I just thought” - P7, 5 years old. [Control]

4.1.7 Immersion
The Immersion-criterion required that the participants should experience deep and effortless involvement. The participants were asked how it felt to play the game. The criterion was considered fulfilled if the participants expressed positive emotions such as “I liked it” or “It felt good”, reason being that this would indicate emotional involvement in the game. It was considered unfulfilled if the participant expressed negative emotions towards the game. It was considered SiB if the participants themselves expressed that it felt somewhere in between.

For Story-version, nine participants fulfilled the criterion. Both because they were observed to be immersed while playing, doing things such as whispering and talking to the game as well as leaning forward, being involved with what happens on the screen, as well as expressing positive emotions towards the game.

“Because it was great!” - P6, 6 years old, explaining why they liked the game. [Story]

One participant did not fulfil the criteria as they expressed that they didn’t want to play it again, at least not there and then.

For Control-version, nine participants fulfilled the criterion. Similar to Story, they were observed to be immersed in the game by whispering and talking to the game, leaning forward, as well as expressing positive emotions towards it. One participant was considered to be SiB because the participant expressed that they felt something between good and bad while playing it.

“Pretty good, because they explained good and that.” - P2, 6 years old. [Control]

4.1.8 Summary
Overall, adding the amount of fulfilled, unfulfilled and SiB-tags of both games, Story ended up with having 40 fulfilled criteria, 19 unfulfilled criteria and 10 somewhere in between-criteria across all 10 participants in the main study. Control on the other hand, ended up with 32 fulfilled criteria, 18 unfulfilled criteria and 20 somewhere in between-criteria across all 10 participants. Looking at the fulfilled criteria, Story performed better than
Control, however, both versions have almost the same number of unfulfilled criteria (Story having one more than Control). On the border between fulfilled and unfulfilled lies the somewhere in between-tagged data, Story having 10 while Control having 20. See Table 1 for an overview of the GameFlow-criteria in this study.

![GameFlow-criteria Bar Chart](chart.png)

**Table 1: Overview of how GameFlow-criteria was tagged in the results.**

### 4.2 Quantitative Data

In this part, I present the quantitative data from the controlled experiments. The intention of this dataset is to serve as a complement to the qualitative data from the interviews. As there were only 10 participants, the ratings cannot be said to have statistical significance.

#### 4.2.1 Time and performance

Table 1 illustrates the time it took for the participants to play the game. In Story, play-time mostly lasted somewhere between three and four minutes, never exceeding five minutes. In Control, three participants exceeded five minutes, the longest session taking eight minutes. The other play-times in Control lasted all around three minutes. Due to this, the average play-time for Control was one minute longer than the average play-time for Story. As for the number of bugs, Story reported eleven bugs in total, while Control reported six in total (see Table 2 for an overview of these numbers). These bugs were either the game not starting properly, only initialising voice and not images and therefore had to be restarted, or objects freezing in place, participants being unable to drag them. These bugs were resolved by clicking on them several times until they “unfroze”. The bugs were distributed evenly across participants, almost everyone having at least one bug occur during gameplay.

<table>
<thead>
<tr>
<th>Game</th>
<th>Average Time to Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>Story</td>
<td>03:52 min</td>
</tr>
<tr>
<td>Control</td>
<td>04:50 min</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Game</th>
<th>Number of Bugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Story</td>
<td>11</td>
</tr>
<tr>
<td>Control</td>
<td>6</td>
</tr>
</tbody>
</table>

**Table 2A: Average time to play each game. Table 2B: The number of bugs.**
4.2.2 Smileyometer Likert Ratings
For each GameFlow-criterion, the participant was asked to rate it with a Smileyometer, representing a Likert Scale. The saddest smiley represented the numerical value of one, while the happiest smiley represented the numerical value of five. The average ratings for both games can be seen in table 4. Both Story and Control were rated with positive scores. Story performed best in the Concentration-criterion with an average of 4.6, while Control performed best in the Control-criterion with an average of 4.2. Story performed worst in the Clear Goals-criterion with an average of 3.2, while Control performed worst in the Feedback-criterion with an average of 3.95. Story performed better in the Concentration-, Challenge- and Player Skills-criteria, while Control performed better in the Control-, Clear Goals-, Feedback- and Immersion-criteria.

Overall, Control performed slightly better than Story, having five out of seven criteria scoring an average over 4.0. In comparison, Story only had three criteria scoring an average over 4.0. Neither versions scored below 3.2 in any criteria.

For one participant playing Story, a smiley-rating concerning the Control-criteria, and a question related to the Clear goals-criteria was missed in the interview. As such, that participants score on those questions were noted down as zero. In Control, one participant picked two smileys as a rating on the Feedback-criterion, insisting on having both. As such, these ratings were converted to the halfway score between the smileys (4 and 5 in this case), so the rating was scored as 4.5.

![Graph showing average ratings from the Smileyometer for Story and Control](image)

*Table 4: Average ratings from the Smileyometer.*

5. Discussion
In this section the data presented in chapter 4 is analysed in detail, as well as the limitations of the study and method is discussed.

5.1 Analysis of data
This section contains an analysis of how the dependent variables (the GameFlow-criteria) fared in each game version, and what that implies as to how the Narrative model in game design (Story) compares to the Control-game.
5.1.1 Concentration
Concentration was deemed depending on how well the participants could remember what they had done and what had happened in the game, as games should require concentration to be played (Sweetser & Wyeth, 2005). As seen in the results, Story performed better than Control in this criterion. This indicated that Story were better at catching and keeping the participant’s concentration than Control was. This could be because of the narrative elements of Story that might have been easier to remember, as it had a prominent Character (Aarseth, 2012), a World (ibid) that the player was invited to explore after the door was opened, and Objects (ibid) that when combined, elevated the key. Namely, elements that stood out compared to Control. The ratings support this slightly as well, as Story scored slightly higher than Control.

For a player to be concentrated on the game, it should provide stimuli from different sources as well as provide important meaningful tasks (Sweetser & Wyeth, 2005) which also indicates meaningful play (Salen & Zimmerman, 2004).

The stimuli found within both games were images functioning as both background and as objects, both games had background music and sound effects when clicking on an object and dropping it into a drop zone. Beyond this, Story had additional stimuli in the form of the Character and how it was animated, which is linked to imaginative immersion (Ermi & Mäyrä, 2005); the sound effect when the key rose in the tube, linked to completionist immersion (Ekábäck et al, 2015); and the map of the island when the scenario ended, linked to sensory immersion (Ermi & Mäyrä, 2005). These additional stimuli that came from design decisions based upon the Narrative model might have led to more participants fulfilling this criterion in Story than Control.

5.1.2 Challenge
The Challenge-criterion was deemed depending on how well the gameplay was received by the participants, as games should be sufficiently challenging (Sweetser & Wyeth, 2005).

Story performed slightly better than Control in this criterion. Why there were similar results in this criterion could be a result of the Event component (Aarseth, 2012) that were supposed to promote Challenge-based immersion (Ermi & Mäyrä, 2005) did not fulfil its purpose in Story or it ended up being too similar to Control. After the participants played the game, it became clear that almost the same event triggered when the participant cleared the task (i.e. completed the challenge). The key was “handed” to the player in both games. This suggests that the connection between the Event and the challenge needs to be more clearly defined, or that in this case, the Event needed to be more clearly distinct and separate from the Control-version. This similarity most likely led to the results looking the way they do.

Another interesting thing is to look at the average play-time for each game, where Story had one minute less than Control. Control’s longer play-time suggests that it was a bit harder to play than Story, or that at least took a bit longer for the participants to clear the task. Despite this, both versions still received similar positive results and ratings. Most participants expressed that it was fun to play in both games, and it indicates that the games sufficiently matched the participants skill levels, which is a sub-criterion of Challenge (Sweetser & Wyeth, 2005). In other words, the Narrative model-implementation did only
slightly improve the fulfilment of the Challenge-criterion as the core game structure was already designed to sufficiently challenge the participants.

5.1.3 Player Skills

The Player Skill-criterion was deemed depending on how well the game versions taught the participants to play, as games must support player skill development (Sweetser & Wyeth, 2005). *Story* performed better than *Control* in this criterion, a possible reason could be that the *Character component* (Aarseth, 2012) instructed the participants on how to play, also effectively giving them a motivation beyond “you need to unlock the door” in the form of “I want you to help me”. Perhaps this way of instructing is better than only using a disembodied voice as in *Control*. However, considering the SiB-participants who said that they learned from the previous game or learned by just looking at the game, it is difficult to say with clarity if they learned the game because the game was good at instructing or if they just played based upon previous knowledge of similar games they have played. The drag and drop-mechanic certainly aren’t unique to these games, and whether that says something about how well the games taught the participants to play is unclear.

This could also be the reason for why some participants did not fulfil the criteria. The drag and drop-mechanic found in both games is found in other games in the genre as well as other games on mobile platforms. When asked to explain how these particular games taught the participants how to play, perhaps they could not explain it due to the fact that they have implicit knowledge, a mental model i.e. knowledge about how a system is intended to work (Benyon, 2014). This would indicate that both games adhered to their mental models of mobile devices and games, and thus successfully taught the participants how to play by linking that implicit knowledge to the game, successfully fulfilling the GameFlow-criterion. As *Story* fared better than *Control*, the difference could have been due to the Narrative model providing more meaning to the task through the *Character*, effectively creating meaningful play (Salen & Zimmerman, 2004). By combining objects in *Story*, the participant effectively helped the *Character* in their quest, which hints at the participant’s actions directly affecting the outcome of that quest, which in turn creates meaningful play.

5.1.4 Control

The Control-criterion was deemed depending if participants could describe how they played the game, if they could describe it and even connect it to the results of their actions, as players should feel that they can control their actions in a game (Sweetser & Wyeth, 2005).

When asked to describe how they played the game, *Story* performed better than *Control*. However, when asked whether it was easy or hard to play the game, more participants thought *Control* was easier to play. This criterion is inextricably linked to the platform the game is played on, as well as how the core gameplay is designed. As suggested in the Player Skills-criterion, due to both games having drag and drop-mechanics, participants immediately understood how they should play the game, and by extension, control it. This is indicated by the SiB-participants who declared they “just knew how to play”. Another factor that could have affected the results this way is that more bugs
occurred in Story than in Control, which could have contributed to players feeling like they had less control and making the game harder to play. When a bug occurred, I would have to step in and help the participant “unbug” the game, which could be read by the participant as if they needed help to “fix” the game, it must therefore be harder to play.

However, as both games were perceived to be easy to play, many participants did not fulfil the criterion as they could not explain how they played the game. That could be, once again, due to implicit knowledge of the gameplay mechanics. As such, “I just knew how to play” could be interpreted as the participant have learned from other games, and as they were children, did not know how to better explain than just saying that they “just knew”.

5.1.5 Clear Goals

The Clear Goals-criterion was deemed depending on how well the game informed the participants as to why they were combining objects, as games should provide clear goals to the players (Sweetser & Wyeth, 2005).

Control fared slightly better than Story in this criterion, despite that the design of Story attempted to provide clearer goals in the form of the Character (Aarseth, 2012) and helping him in his quest and the progress bar that was filled when completing Objects (Aarseth, 2012) to get the key. Perhaps these components were unnecessary or unclear in providing the purpose of the task at hand. Some participants in both games mentioned that the purpose was to help the character, even though it was only Story who had a featured character. Perhaps this was due to the fact that both games had voice recordings from the same actor and sounded therefore the same. For some participants, it might have been difficult to consciously separate the two and thus consider them to be the same character.

Overall, when asked if the game was good or bad to explain why the participants were supposed to combine objects, Story received an okay rating while Control leaned more towards complete fulfilment. But when asked to explain the purpose of the game, most participants did not know or could not explain it in both games, indicating that the games did not provide clear goals to the participants. As such, one could argue that participants did not become completionist immersed (Ekbäck et al, 2015) while combining objects. Reason being that the progress bar born from that part of the model did not fulfil its purpose and that in this aspect, the games did not provide meaningful play (Salen & Zimmerman, 2004). Because why would there be meaning in a game if one does not understand what the purpose of the gameplay is?

5.1.6 Feedback

The Feedback-criterion was deemed depending on how well the game displayed how it was going for the participant i.e. if it went well for them or not, as games should provide appropriate feedback to the players (Sweetser & Wyeth, 2005). When asked how they knew if it went well or not, most participants did not know or could not explain it in both games, indicating that the games did not display feedback appropriately. However, when asked to rate whether the game was good or bad at showing whether it went well or not, most participants rated it positively.

A reason as to why the results looks like this could be because there was effectively no way to “fail” in the game. If the participants made an incorrect combination, the objects
were reset, and the participants encouraged to try again. There were no negative consequences for making an incorrect choice. The games did not have a timer, hit points or anything else that would indicate that they could reach critical failure and initiate a “game over-state”. This was an intentional part of the design as the games were targeted for children. Subsequently, as the participants always succeeded at the game (as they all managed to unlock the door and go beyond, which itself is a feedback that it went well), perhaps the intentionally designed feedback, such as the voice lines (the same in both games), the objects disappearing (same in both games) and the elevation of the key in the tube (Story) that adhered to completionist immersion (Ekbäck et al, 2015) ultimately did not register in the participants minds.

One could argue whether games targeted for children should incorporate negative consequences, critical states and game over-screens. Within the context of this study and the achievement of the Feedback-criterion however, the results indicate that excluding such design choices affect the way that GameFlow is achieved in the aspects of the game feedback.

5.1.7 Immersion

The Immersion-criterion was deemed depending on how the players felt when they played the game, as games should enable players to feel deep and effortless involvement in the game (Sweetser & Wyeth, 2005). Positive feelings were considered as emotional involvement, which in turn is an indicator of immersion (ibid).

During the observations, almost all participants leaned forward and talked to the game, whispering to themselves and such. These were all seen as indicators of immersion as it seemed like they were focused on the task at hand (Calleja, 2011). And as such, when asked how it felt to play the game, almost all participants expressed that it was fun to play both games, which can only be seen as a positive indicator in this context. When asked to rate how “inside” the participant felt that they were in the game, Control fared slightly better than Story. Admittedly, the question was very abstract, but it was also an attempt to not directly ask the participants to rate on a feeling good or bad, as that was already covered in the general question of this criterion. It was hoped the participants would rate on scale on how involved they felt when playing, but it is also acknowledged that posing such a question to a child in a comprehensible way is challenging, and as such was phrased the way it was.

As far as the designing goes, the Narrative model with its design based on different immersion dimensions can be said to have succeeded in this criterion. However, as Control elicited just as much immersion as indicated by the results, it also succeeded. The Narrative Model-implementation as such did not make a difference in this criterion, as the results indicated that both games elicited the feeling of immersion equally well.

5.1.8 Overall summary

Based on the results, Story fared better than Control, having 40 fulfilled, 19 unfulfilled and 10 SiB criteria across all participants, although missing one criteria entirely. In comparison, Control had 32 fulfilled, 18 unfulfilled and 20 SiB-criteria across all participants. Looking at individual criteria, Story performed better in five out of seven criteria, which indicates that Story were more successful in achieving GameFlow.
However, as the sample was small, the result cannot be said to definitive. One should also note that in the ratings, Control had slightly better average ratings in some of the criteria, but as the differences were small, it cannot be said to bear a greater weight on the result than the interview answers. In a larger study with more participants, there might have been more prominent differences in the ratings. Had the model been implemented in a different way (for example, having the Event as imaginative rather than challenging), the results could also have looked different.

The qualitative and the quantitative data each provided a perspective to the experiences of the participants. Some participants were able to verbalise their thoughts when asked general questions pertaining to a criterion, others could not. For those participants, the specific questions linked to the smiley ratings served as a way to express their feelings without having to put them into words. The smileys also could further reinforce the answers provided to the general question. One could however discuss how well children are able to rate their own feelings, and considering the results, what Chambers and Johnston (2002) says about children rating extremes seem to ring true even in this study, as many questions no matter the criterion were rated with the happiest smiley. It is interesting to compare the ratings and the content analysis as they contradict each other at times (see example in Appendix M).

For example, P3 did not fulfil the Feedback-criterion as they did not know whether it went well or not, but rated it a 4, meaning the feedback was clear. Another example is P7 who could explain the purpose of the game and therefore were considered to fulfil the Clear Goals-criterion, but rated it a 1, meaning that the goals were unclear.

This indicates disconnections between the general and the specific question at times. Explaining how something occurred, or was felt, provided a challenge to the participants, while rating on a scale from bad to good seem to have been perceived as easier. The subtle difference between a “how”-question and a “on a scale of”-question might lead to them being interpreted differently, even though they were related to the same criterion. As such, looking at the different types of information at hand as Lieberoth and Roepstorff (2015) and Richie and Ormston (2014) argued, the results provide a better understanding of how the participants experienced the game as it allowed them different options of expressing it.

Finally, as it also has been discussed several times, Story and Control were similar in some ways, despite attempted to be designed differently. The desire to not actively designing one better than the other for the sake of the study seems to have resulted in participants having issues separating the two games, expressing sentiments such as:

“But it is the exact same picture, even though it is not the same game” - P2, 6 years old.

“What second game?” - P1, 5 ½ years old

As to how this affected the results, one could say that Story performing better than Control might have been due to chance if some of the participants mixed up the games. However, it is difficult to know with certainty, and therefore only more studies can attest to whether the Narrative model would perform better or not in relation to player enjoyment.


5.2 Limitations of study

In this section the limitations of the study will be discussed.

5.2.1 Method

First it must be acknowledged that GameFlow are not a complete set of validated criteria yet, but they have been studied for some time. The reason for them not being entirely validated yet is because there is a vast amount of different types of games for different consoles, which only increases with time, and it would take a lot of researchers to conduct studies for each and every one of them. That said, after applying GameFlow to games for children, it might describe too complex feelings for them to properly communicate. Perhaps there is a need of a GameFlow-model based on child-computer interaction research to evaluate UX in games with children. Jegers (2009), Faber and van der Hoven (2012) and Sweetser et al (2017) have come to similar conclusions, as they suggest that in each of their studies, GameFlow-criteria have been or should be adapted depending on what type of game is evaluated.

As for how the method was applied in general, as with most short intense studies, it would have benefitted from being a longer study with more participants. The conclusions drawn from the dataset this study produced is based on an extremely limited sample of participants and does not represent the population as a whole.

In an ideal study, all participants would have been able to participate in the study in the exact same setting, having a calm environment and a parent/guardian as emotional support. The confounding variables in this study contributing to why that was not the case are something that could be avoided in a more thoroughly planned study with more time and resources.

As for observations and interviews, the participants might have been uncomfortable by the fact that they were observed by a complete stranger taking notes and asking questions about the game, and as such felt pressure to perform well and were inclined to answer in a way that was positive. The option to quit at any time were presented to the participants, but one cannot disregard that as an adult, I could have been considered to be in power and should therefore be obeyed. Hopefully this was somewhat negated by the fact that either a parent was present in the same room, or that teachers and friends were just outside the room.

Another thing to consider was that I alone conducted all observations and interviews. As such, I feel like I might have missed important data, especially as the children sometimes seemed to be all over the place both physically and mentally. In future studies, it might be appropriate to be at least two researchers present during the sessions, one that only observes and one that interviews.

5.2.2 Design

As some participants struggled with separating the two games, one solution might have been to design two games with two different themes but still following the core game structure. Say for example, one game had been ocean-themed and one forest-themed. The participants would still solve the same language task to get the key and open the door, but
the games would have distinct aesthetics that would separate them visually from each other. Perhaps then it would have been easier for the participants to separate the two games, and maybe the results would have looked different. However, the games already ran the risk of having one game being “better” designed than the other, especially considering how I could be accused of favouring the game design that implemented my own model.

Would different themes have enhanced the Narrative model-implemented Story in a way that was unfair to Control?

The game scenarios can also both be considered to be extremely limited, as they are both short, bite-sized parts of a bigger fictive whole. Perhaps the games were similar as a result of not having enough time and space to actually design Story and Control to be more distinct from each other, putting more components into the model as a basis for Story, for example. The fact that I alone designed both games could contribute to the games being similar, as they are the results of my ideas, unaffected by external input as they would have been if more researchers/designers had been involved.

Furthermore, the Narrative Model was before this study only a brief foray into what could possibly be a framework for designing games, or at least understand why players keep playing certain types of games. More studies using this model could and should explore different types and genres of games, as the case study for this thesis only focused on one such type. Admittedly, the young participants in this thesis cannot be considered to be the largest demographic of players, however, they did provide a unique perspective on the challenges to design games for children with the Narrative model in mind.

5.2.3 Participants

Finally, regarding the participants. Most participants were from the same preschool, and despite humble pleadings that they would not share the “secrets” of the game with their peers, some participants knew what to expect coming into their evaluation sessions.

As these children were very young, participating in a study for 20-30 minutes was a struggle for some of them. Most were restless halfway through, and as such did not seem consider the questions in the second interview as much as they did in the first. The Latin Square were helpful in this case as it allowed a fair “competition” between Story and Control, as they both were second games for half of the participants. Thus, having two interviews might have been too much to ask of the young participants. However, asking all questions at the same time after the games had been played might have also affected the results in different ways. Considering as the participants already in this study struggled to keep the games apart, having them play both games and then interview them might have increased that struggle. On the other hand, it could have allowed for a study where the participants were asked what game they preferred in different aspects. This approach however would not have been suitable to find out if GameFlow was achieved in both versions of the game and thereafter compare the two, as it would only look at the participants preferences rather than the success rate of fulfilling GameFlow criteria.

Finally, it might be so that children are already biased towards technology. In that regard, UX evaluation with children and games might always lead to a somewhat positive result, as seen in this study. Naturally, this bias might have been avoided if the game had been evaluated with adults or even experts. They might have provided feedback on how
they think the games fulfil criteria of GameFlow without the inherent love of technology biasing their opinions. But if adults like a game that is made for children, it does not suggest that the children will like it. As such, it only felt appropriate to evaluate with the intended target group of the game, as they certainly know best what they prefer in a game targeted to them.

6. Conclusion

In this thesis I studied how we can combine narrative and gameplay components in relation to different immersion dimensions in a game scenario to design a game experience that more players want to stay in. To do that I created a game with design based on the Narrative model and compared it to another game that I also created that was not intentionally designed based on the model. GameFlow-criteria served as measurements as to whether these games could achieve GameFlow, an indication of player enjoyment and therefore a wish to keep playing the game. The purpose was to see if there was any difference in GameFlow between the two versions. The results showed that the game design based on the Narrative model fulfilled more criteria of GameFlow than the game design not based on the model. As the sample of this study was small, it cannot be said to be a definitive result and applicable in a larger context. In the context of this study however, it indicated that the Narrative model-design were better at achieving GameFlow. As such, the answer to the research question posed in the beginning of the thesis would be as follows;

We can combine narrative and gameplay components in relation to different immersion dimensions in the way that the Narrative model suggests, designing a game experience that players enjoy and would like to stay in. The null hypothesis has thus been proved to be false in this study. As to whether that would remain true in other contexts, especially with other game types and targets groups, more studies are required to further validate and develop the model. However, this study contributed with knowledge as to how the model can be used in game research and development. In the future, the model can be studied by comparing two designs from two different designers. This study most likely suffered from having only one researcher/designer that designed both games. More directions could for example be that there are variations of narrative components in the same game. There might be events that are designed to be challenging, and events that are designed to be sensory within the same game. A longer and larger game could not be expected to only contain one narrative component in each immersion dimension. Design is improved through iterations, so that which would benefit the Narrative model most of all is being iterated upon based on new knowledge gathered in more studies. An example of how the model could be used in the future can be seen in Appendix N, where the designer should fill in components of each type into each immersion dimension, and mainly draw narrative aspects from the narratological side and gameplay aspects from the ludological side.

To conclude, to make game experiences that more players want to stay in, we need to further explore how we can utilise the different immersion dimensions in conjunction with narrative and gameplay. Players should not have to ponder the question of whether they should stay or whether they should go while playing a game.
Acknowledgements

This thesis has not been a one woman-journey and along the way I have received some incredible support. Therefore, I want to express my gratitude to some key people that helped make this thesis happen.

First, Dan Johansson, my supervisor, who not only shares my interests for games and pop culture, but also have been a steadfast support and guide throughout the thesis process. I am grateful to you, even though that once promised divan didn't show up this time either.

To everyone at “Company-X” and “Company” – thank you for having me this past semester, I have learned a lot and enjoyed hanging out with you. An especially big thanks to Hanna, who helped me navigate Unity and build the games, and to Ingrid, whose expertise and advice were invaluable, especially when designing the study. Without you this would not have been possible.

Karin Danielsson – For all the advice you provided before the thesis, setting me on the right path. Also, for helping me find participants. I am deeply grateful for your efforts.

Simon Nordsvahn – for lending your voice to my games, giving life to my character in the best Simon-way you knew how.

Lovisa Johansson – For being a good friend and always calling me stupid when I had unnecessary doubts.

All participants – For playing my games and putting up with my questions, even though there were so much more fun stuff to do elsewhere.

My wonderful classmates at the HCI-programme – for two fun and interesting years. Your support and friendship has been invaluable for me, long live the HCI-lab!

Finally, to my parents – because without your support I would never have reached this far. Thank you for always supporting me in my studies. Everything I achieve is because of you.
References


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## Appendix A – Criteria for GameFlow

<table>
<thead>
<tr>
<th>Element</th>
<th>Criteria</th>
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</table>
| **Concentration**| - games should provide a lot of stimuli from different sources  
- games must provide stimuli that are worth attending to  
- games should quickly grab the players’ attention and maintain their focus throughout the game  
- players shouldn’t be burdened with tasks that don’t feel important  
- games should have a high workload, while still being appropriate for the players’ perceptual, cognitive, and memory limits  
- players should not be distracted                                                                                                                                                                                                                       |
| **Challenge**    | - challenges in games must match the players’ skill levels  
- games should provide different levels of challenge for different players  
- the level of challenge should increase as the player progresses through the game and increases their skill level  
- games should provide new challenges at an appropriate pace                                                                                                                                                                                                 |
| **Player Skills**| - players should be able to start playing the game without reading the manual  
- learning the game should not be boring, but be part of the fun  
- games should include online help so players don’t need to exit the game  
- players should be taught to play the game through tutorials or initial levels that feel like playing the game  
- games should increase the players’ skills at an appropriate pace as they progress through the game  
- players should be rewarded appropriately for their effort and skill development  
- game interfaces and mechanics should be easy to learn and use                                                                                                                                                                                            |
| **Control**      | - players should feel a sense of control over their characters or units and their movements and interactions in the game world  
- players should feel a sense of control over the game interface and input devices  
- players should not be able to make errors that are detrimental to the game and should be supported in recovering from errors  
- players should feel a sense of control and impact onto the game world (like their actions matter and they are shaping the game world)  
- players should feel a sense of control over the actions that they take and the strategies that they use and that they are free to play                                                                 |

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Appendix A: Criteria for GameFlow
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<table>
<thead>
<tr>
<th>Clear Goals</th>
<th>overriding goals should be clear and presented early</th>
</tr>
</thead>
<tbody>
<tr>
<td>Games should provide the player with clear goals at appropriate times</td>
<td>- intermediate goals should be clear and presented at appropriate times</td>
</tr>
<tr>
<td>Feedback</td>
<td>- players should receive feedback on progress toward their goals</td>
</tr>
<tr>
<td>Players must receive appropriate feedback at appropriate times</td>
<td>- players should receive immediate feedback on their actions</td>
</tr>
<tr>
<td>- players should always know their status or score</td>
<td>- players should become less aware of their surroundings</td>
</tr>
<tr>
<td>Immersion</td>
<td>- players should become less self-aware and less worried about everyday life or self</td>
</tr>
<tr>
<td>Players should experience deep but effortless involvement in the game</td>
<td>- players should experience an altered sense of time</td>
</tr>
<tr>
<td>- players should feel emotionally involved in the game</td>
<td>- players should feel viscerally involved in the game</td>
</tr>
<tr>
<td>Social Interaction</td>
<td>- games should support competition and cooperation between players</td>
</tr>
<tr>
<td>Games should support and create opportunities for social interaction</td>
<td>- games should support social interaction between players (chat, etc.)</td>
</tr>
<tr>
<td>- games should support social communities inside and outside the game</td>
<td>- players should become less self-aware and less worried about everyday life or self</td>
</tr>
</tbody>
</table>

The game the way that they want (not simply discovering actions and strategies planned by the game developers)
Appendix B: Request for participation

Information om studie gällande utveckling av interaktiva lärospel


Är ni intresserade av att låta ert barn delta i ovanstående beskrivna studie så är ni välkomna att höra av er till mig på: lima0164@student.umu.se
Det går också bra att bara höra av sig om man bara har frågor eller funderingar kring studien innan ni bestämmer er för att delta eller inte. Se nästa sida för en kopia av den formella överenskommelsen ifall ni samtycker att ert barn deltar i studien.

Jag hoppas att ni låter ert barn delta i denna studie!

Mvh
Lisa Mörtsell
Jag har tagit del av informationen gällande studien och härmed intygar jag att mitt barn (namn):__________________________________

får delta i ovanstående beskrivna studie.

Målsmans underteckning:_____________________________________

Umeå den:________________________

Namnförtydligande:____________________________

Telefonnummer: ______________________
Appendix C: Formal study procedure

Appendix C: Formal study procedure

Greet the participant (and parent), attempt to build rapport with the participant (especially important in the case of children). Hand over the consent form for the parent or legal guardian to sign. Inform the participant what they are going to do during the evaluation session.


Translation: "You are going to play two different games, I will record everything with a microphone and I will sit next to you while you play. After each game I will ask you some questions about the game. I will be looking at how the game works, not how well you play. Feel free to ask me anything, and if you want to quit playing, that is okay."

Set up the audio recorder (or data recorder of choice). Hand over the prototype to the participant and give a brief explanation of it.

"Det här är ett spel där du kommer att [kombinera objekt], spelet kommer att berätta för dig hur du ska göra det.

Translation: "This is a game where you are going to [combine objects], the game will tell you how you are going to do that."

The player plays the first version of the game (the participants should have been randomised beforehand with a Latin Square so not everyone starts with the same conditions). During play, observe and take notes. Try not to talk with the participant unless prompted, or if gameplay is interrupted due to bugs or otherwise similar occurrences. Record the time it took for the participant to play, note down how many times gameplay was interrupted due to bugs occurring.

What to look for while observing:

- External influences that might affect the participant’s actions and behaviours
- The body language of the participant
  - How is emotion expressed through gestures?
- Verbal outbursts of emotion
  - Laughs, sighs, exasperation etc.
- Other behaviours that could indicate how the participant is currently feeling and acting

After the first game, interview the participant according to the study compendium. Inform the participant once again about how the interview will proceed.


Translation: "Now I will ask some questions about the game. I want to know what you think about the game and that is why I am here. I want to know how I can improve it. There are no right or wrong answers."
Appendix C: Formal study procedure

Introduce the Likert-scale.

“Här är några smileys, berätta för mig vad för ansikten de visar?”

Translation: “Here is a couple of smileys, tell me what faces they show?”

If the participant is confused, shy or otherwise not inclined to identify the smileys, help them. Then, perform the interview. Try to keep eye-contact as much as possible, and affirm the participants responses by nodding, smiling or humming. Allow them to think on their answers.

After the first interview, inform the participant that they are now going to play the second version of the game.


Translation: “Thank you. Now you are going to play the second game. It is a bit similar to the first one, but it was made in a different way. “

Repeat the procedure. The participant plays the game and after, perform an interview. This time, emphasise that this new set of questions is related to the game they just played.

When the second interview is done, ask the participant if there are anything else that participant would like to tell the researcher. If so, let the participant talk. Then, thank the participant for their participation and conclude the evaluation session.

“Tack för att du spelade, jag uppskattar det verkligen.”

Translation: “Thank you for playing, I really appreciate it.”

Note: In order to keep the games anonymous, omissions have been made from the study procedure. These omissions are marked by [word].
# Appendix D: Latin square with participants

<table>
<thead>
<tr>
<th>Participants</th>
<th>Story-Version</th>
<th>Control-Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot Study</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS1</td>
<td>Story</td>
<td>Control</td>
</tr>
<tr>
<td>PS2</td>
<td>Control</td>
<td>Story</td>
</tr>
<tr>
<td>Study</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1</td>
<td>Control</td>
<td>Story</td>
</tr>
<tr>
<td>P2</td>
<td>Story</td>
<td>Control</td>
</tr>
<tr>
<td>P3</td>
<td>Control</td>
<td>Story</td>
</tr>
<tr>
<td>P4</td>
<td>Story</td>
<td>Control</td>
</tr>
<tr>
<td>P5</td>
<td>Control</td>
<td>Story</td>
</tr>
<tr>
<td>P6</td>
<td>Story</td>
<td>Control</td>
</tr>
<tr>
<td>P7</td>
<td>Control</td>
<td>Story</td>
</tr>
<tr>
<td>P8</td>
<td>Story</td>
<td>Control</td>
</tr>
<tr>
<td>P9</td>
<td>Control</td>
<td>Story</td>
</tr>
<tr>
<td>P10</td>
<td>Story</td>
<td>Control</td>
</tr>
</tbody>
</table>
Appendix E: Pilot Study Compendium

Version:

Speltid:
Antal buggar:

Att observera:
  ● Externa influenser
  ● Kroppsspråk - Hur visas känslor?
  ● Verbala känsloyttringar
  ● Övriga beteenden
**Version:**

Vad var det som hände i spelet? Var det roligt? Varför valde du den smajlisen?

![Smiley faces](image)

Dålig  Inte så bra  Bra  Väldigt bra  Superbra

Vad tyckte du om att [kombinera objekt]? Var det lätt/svårt? Varför valde du den smajlisen?

![Smiley faces](image)

Dålig  Inte så bra  Bra  Väldigt bra  Superbra

Hur var det att lära sig spelet? Varför valde du den smajlisen?

![Smiley faces](image)

Dålig  Inte så bra  Bra  Väldigt bra  Superbra

Hur styrde du spelet? Gjorde spelet som du ville? Varför valde du den smajlisen?

![Smiley faces](image)

Dålig  Inte så bra  Bra  Väldigt bra  Superbra
Appendix E: Pilot study Compendium

Hur förstod du vad du skulle göra i spelet? Varför valde du den smällisen?

Dålig  Inte så bra  Bra  Väldigt bra  Superbra

Hur visste du att det gick bra för dig när du spelade? Varför valde du den smällisen?

Dålig  Inte så bra  Bra  Väldigt bra  Superbra

Hur kändes det att spela spelet? Var du som “inne” i spelet? Varför valde du den smällisen?

Dålig  Inte så bra  Bra  Väldigt bra  Superbra
# Appendix F: Question table

<table>
<thead>
<tr>
<th>GameFlow-Criteria</th>
<th>Questions</th>
<th>Likert Scale</th>
</tr>
</thead>
</table>
| **Concentration:**  
Games should require concentration and the player should be able to concentrate on the game. | Tell someone that hasn’t played the game what happened in it?  
Look at this row of smileys, if you thought it was very easy to remember what happened, you can point at the happiest mouth. If you thought it was very hard, you can show it by pointing at the grumpiest. Did you think it was somewhere in between you can choose one of the other smileys. | From unconcentrated (1) to concentrated (5) |
| **Challenge:**  
Games should be sufficiently challenging and match the player’s skill level | What did you think about [combining objects]?  
Look at this row of smileys, if you thought it was very easy to [combine objects], you can point at the happiest mouth. If you thought it was very hard, you can show it by pointing at the grumpiest. Did you think it was somewhere in between you can choose one of the other smileys. | From easy (1) to challenging (5) |
| **Player skills:**  
Games must support player skill development and mastery | How did you learn to play the game?  
Look at this row of smileys, if you thought it was very easy to learn playing the game, you can point at the happiest mouth. If you thought it was very hard, you can show it by pointing at the grumpiest. Did you think it was somewhere in between you can choose one of the other smileys. | From difficult to learn (1) to easy to learn (5) |
| **Control:**  
Players should feel a sense of control over their actions in the game | How did you play the game?  
Look at this row of smileys, if you thought it was very easy to play the game, you can point at the happiest mouth. If you thought it was very hard, you can show it by pointing at the grumpiest. Did you think it was somewhere in between you can choose one of the other smileys. | From little to no control (1) to much control (5) |
| **Clear goals:**  
Games should provide the player with clear goals at appropriate times | Why did the game want you to [combine objects]?  
Look at this row of smileys, if you thought the game was very good at explaining why you should [combine objects], you can point at the happiest mouth. If you thought it was very bad | From unclear goals (1) to clear goals (5) |
<table>
<thead>
<tr>
<th><strong>Feedback:</strong></th>
<th><strong>Immersion:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Players must receive appropriate feedback at appropriate times</td>
<td>Players should experience deep but effortless involvement in the game</td>
</tr>
</tbody>
</table>

**Feedback:**
Players must receive appropriate feedback at appropriate times

How did you know if went well or bad in the game?

Look at this row of smileys, if you thought the game was very good at showing how it went for you to play, you can point at the happiest mouth. If you thought the game was very bad at showing you how it went to play, you can show it by pointing at the grumpiest. Did you think it was somewhere in between you can choose one of the other smileys.

From unclear feedback (1) to clear feedback (5)

**Immersion:**
Players should experience deep but effortless involvement in the game

Tell me how it felt to play the game!

Look at this row of smileys, if you thought it felt like you were very inside the game, you can point at the happiest mouth. If you thought it felt like you weren’t inside the game at all, you can show it by pointing at the grumpiest. Did you think it was somewhere in between you can choose one of the other smileys.

From a weak sense of immersion (1) to a strong sense of immersion (5)
Appendix G: Main study compendium

Version:

Speltid:
Antal buggar:

Att observera:
- Externa influenser
- Kroppspråk - Hur visas känslor?
- Verbala känslomyttringar
- Övriga beteenden
Version:

Berätta för någon som inte har spelat spelet vad som hände!

Titta på den här raden med smileys, om du tyckte det var jättelätt att komma ihåg vad som hände så kan du peka på den allra gladaste munnen. Om du tyckte det var jättesvårt så visar du det genom att peka på den allra suraste. Tycker du att det var något mittemellan kan du välja någon av de andra smileysarna.

![Smiley Faces]

Vad tyckte du om att [kombinera objekt]?


![Smiley Faces]

Hur lärde du dig att spela spelet?

Titta på den här raden med smileys. Om du tyckte det var jättelätt att lära sig spelet så kan du peka på den allra gladaste munnen. Om du tyckte det var jättesvårt kan du visa det med att peka på den allra suraste munnen. Tycker du att det var något mittemellan kan du välja någon av de andra smileysarna.

![Smiley Faces]
Hur spelade du spelet?

Titta på den här raden med smileys. Om du tyckte att det var jätte lätt att spela spelet så kan du peka på den allra gladaste munnen. Om du tyckte det var jättésvårt kan du visa det med att peka på den allra suraste munnen. Tycker du att det var något mittemellan kan du välja någon av de andra smileysarna.

<table>
<thead>
<tr>
<th>Lite/ingen kontroll</th>
<th>Mycket kontroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varför ville spelet att du skulle [kombinera objekt]?</td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Otydliga mål</th>
<th>Tydliga mål</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hur visste du om det gick bra eller dåligt i spelet?</td>
<td></td>
</tr>
</tbody>
</table>

Titta på den här raden med smileys. Om du tyckte att spelet var jättebra på att visa hur det gick för dig att spela, så kan du peka på den allra gladaste munnen. Om du tyckte att spelet var jätte dåligt på att visa hur det gick för dig att spela, så kan du visa det med att peka på den allra suraste munnen. Tycker du att det var något mittemellan kan du välja någon av de andra smileysarna.

| Otydlig feedback | Tydlig feedback |
Berätta hur det kändes att spela spelet!

Titta på den här raden med smileys. Om du tyckte att det kändes som att du var väldigt inne i spelet, så kan du peka på den allra gladaste smileyn. Om du tyckte det kändes som att du inte alls var inne i spelet, så kan du visa det med att peka på den allra suraste smileyn. Tycker du att det var något mittemellan kan du välja någon av de andra smileysarna.

Svag känsla av immersion

Stark känsla av immersion
Appendix H: Game prototype overview

Core Game Structure

1. The game is introduced and instructions are given to the player.
2. The player performs the task.
3. The player completes the task and the game provides a completion prompt.
4. The game scenario ends.

<table>
<thead>
<tr>
<th>Story-Version</th>
<th>Control-Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A character introduces the game and instructs the player in an imaginative manner.</td>
<td>1. A voice introduces the game and instructs the player how it should be played.</td>
</tr>
</tbody>
</table>
| 2. The player performs the task and the closer they come to success, the closer the key comes to the player. | 2. The player performs the task, combining objects. When a combination is “correct”, those objects will disappear from the screen and the voice will tell the player; “good job!”.
| 3. When the task is done, and the key is received, an event is triggered where the character tells the player that they have succeeded with task. | 3. When the task is completed, the voice will tell the player that they have succeeded in completing the task, and reward them with “Good job, you made it!”, and the key will be “handed” to the player. |
| 4. To finish the scenario, the character hints that there is a bigger world beyond the door to discover and invites the player to keep playing. | 4. When unlocking the door to finish the scenario, the voice will tell the player that there are more fun tasks to solve, and the scenario ends. |
Appendix I: Manuscripts

Note: These manuscripts have been edited to omit details from the games that might identify them. These omissions will be marked by [word]. The manuscripts have also been translated from Swedish.

Story-Version:

Introduction:

Character:

“Hm, hm. Oh, are you here? Hi! I am the [leader] of [this quest], good that you’re here!”

“Look what a mysterious room that we have ended up in. And there is a door there that seems to be locked…. I wonder what’s on the other side!”

“There’s a key in that tube over there, but how do we get it out... I know!”

“There are a lot of [objects] in this room, if we combine them the key might come out of the tube! I can’t do it without your help.”

“Click on an [object to know its value], drag then the [objects] down to the slots on the lower side of the screen and [combine them so they have the same value], until the key falls out of the tube and then we will see what there is on the other side of the door! I believe in you!”

Outro:

“We have the key now, well done! I would have never figured this mystery out without you. Let’s unlock the door and see what’s behind it...

-The screen switches to the Island of Adventure-

“Look what an exciting world! There must be more mysteries to solve, you and I make a pretty good team. Come with me and let’s explore more!”

Control-Version

Introduction:

Voice:

“Now you are in a mysterious room... and there seems to be a locked door on the other side.”
“Combine [objects] so that [they have the same value]. Then you will get a key so that you can unlock the door so that you can go through it and see what exciting things there are on the other side.”

“Click on an [object to know its value], drag then the [objects] down to the slots on the lower side of the screen and [combine them so they have the same value] until you get the key.”

**Outro:**

“Well done! You [combined all the objects], how clever you are!”

“Here is the key so you go through the door!”

-When the door has opened-

“There are more fun things you can and more mysterious rooms to explore, what do you want to do
Appendix J: Attribution List

"Door Squeak, Normal, E.wav" by InspectorJ of Freesound.org
The sound was recorded using a "H1 Zoom recorder".
Originally recorded on 19th May 2016.
From <https://freesound.org/people/InspectorJ/sounds/346211/>

"Enchanted Valley" Kevin MacLeod (incompetech.com)
Licensed under Creative Commons: By Attribution 3.0 License
http://creativecommons.org/licenses/by/3.0/
From <http://incompetech.com/music/royalty-free/music.html>

"Unlock door mono.wav" by wly of Freesound.org
From <https://freesound.org/people/wly/sounds/404505/>

"(f)re-sounds >> menuSel.wav" by RunnerPack of Freesounds.org
From <https://freesound.org/people/RunnerPack/sounds/87035/?page=1#comment>
Appendix K: Game Prototypes

The game and its two different versions were built using Unity¹ and Visual Studio 2017². The game was based upon a previous game made by “Company-X” and “Company”, which I modified and wrote new code to for this thesis. The images used in this appendix does not show the final version of the prototype, but a wireframe version. This was done to anonymise the game.

Core game structure:

The player enters the room. The game provides instructions.

The objects are initialised.

The main task of the game is to drag and drop objects into specific slots. If the slots contain the right combination of objects, the objects are removed from play and the game compliments the player. Each object contains a specific value, and if both objects dropped into the slots has the same value (for example, value x and value x), the game deems it a correct combination.

¹ https://unity3d.com/
² https://www.visualstudio.com/
Appendix K: Game Prototypes

If the combinations are correct:

The objects disappear from play.

If the objects have different values (for example, value x and value y), the game deems it an incorrect combination and put the objects back out into play. The game indicates with voice lines that the combination was incorrect.
The position of the objects reset.

Each scenario contains twelve objects in total, divided into two rounds. Six objects instantiate in the first round, the next six objects instantiate when the first have all been correctly combined. When all objects are removed from play, the game initiates the ending of the game scenario. Each version had the same number of objects, but these differed between the versions. The player would not encounter the same objects in Story as they did in Control.

At the end of the scenario the door is opened.

The core game logic was divided into two separate versions, Story-Version and Control-Version. These would both contain the main task but present it in different ways as well as end differently. Logic unique to each version, such as the progression bar for Story-Version, was coded into the Story-Version-logic, and not the core game logic. This was done to prevent overlaps in the code structure.

**Story Version:**

The player meets the *Character* as inserted to the *imaginative* immersion dimension.
In Story-Version, there is a progress bar. If the combination of objects is correct, the progress bar increases, *Objects* are thus inserted to the *Completionist* immersion dimension.

If the combination is correct, the key is raised.
When the key is at the top of the tube, the ending is initialised. The ending is an *Event* that informs the player that they have succeeded in overcoming the *Challenge* (as connected to the immersion dimension).

The character appears with key in hand.

The door is unlocked.

The ending screen is displayed. The player sees the *World* as illustrated by a map decorated with symbols and pictures, adhering to the *Sensory* immersion dimension.
Control Version:
A voice introduces the game:

Objects are initialised.

When all objects have been removed from play, a key appears
And the door is unlocked:

Building:

External assets such as images and sound were produced by me. Images were drawn in Clip Studio Paint³ with a Wacom Intuos Pro⁴. Sound was recorded in a sound studio at Umeå University, an amateur actor was asked to read the lines. It was then edited in Adobe Audition⁵. Some additional sound effects were downloaded from FreeSounds⁶ as they were free to use under an Attribution license. Background music was downloaded from Incompetech⁷, also under an Attribution license. The game was built to an ASUS tablet.

³ http://my.smithmicro.com/manga-studio-ex-5.html
⁴ https://www.wacom.com/en-us
⁵ https://www.adobe.com/se/products/audition.html
⁶ https://freesound.org/
⁷ https://incompetech.com/
Appendix L: Story in Narrative Model

How Story-Version looks as inserted into the Narrative Model. On the ludological side (gameplay-focused), Event is inserted into Challenge and Objects are inserted to Completionist. On the narratological side (story-focused), World is inserted into Sensory and Character is inserted into Imaginative.
## Appendix M: Example of Categorisation Matrix

<table>
<thead>
<tr>
<th>GameFlow-criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average score for Criterion</td>
</tr>
<tr>
<td>Participant Code</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

A snippet of the composition of the categorisation matrix.

<table>
<thead>
<tr>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average score</td>
</tr>
</tbody>
</table>

- **P1**
  - Rating: 5
  - Tag: Fulfilled
  - Comment: P1 recounts that they needed to unlock the key to open the door.

<table>
<thead>
<tr>
<th>Player Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average score</td>
</tr>
</tbody>
</table>

- **P7**
  - Rating: 2
  - Tag: Unfulfilled
  - Comment: P7 can’t explain how they learned to play the game, "I just thought".
### Appendix M: Example of Categorisation Matrix

<table>
<thead>
<tr>
<th>Clear Goals</th>
<th>4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average score</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **P3** | Rating: 5  
Tag: Somewhere in between  
Comment: P4 suggests that the reason for combining objects is because they get to play more then. |

Three examples with data inserted.

<table>
<thead>
<tr>
<th>Clear Goals</th>
<th>4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average score</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **P9** | Rating: 5  
Tag: Unfulfilled  
Comment: "Hm, yeah that I don't know." P9 is unsure what was the objective of the game. |

Example of when the ratings contradicted the content analysis.
### Appendix N: Suggested changes to the Narrative Model

<table>
<thead>
<tr>
<th>Components</th>
<th>Narratology</th>
<th>Ludology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Imaginative</td>
<td>Sensory</td>
</tr>
<tr>
<td><strong>World</strong></td>
<td></td>
<td>Overworld that indicates that the player can explore and click on different things. Looks like a map.</td>
</tr>
<tr>
<td><strong>Character</strong></td>
<td>The character is the player's friend and entry point into the world. Requests help from the player and provide incentive to play.</td>
<td></td>
</tr>
<tr>
<td><strong>Event</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Objects</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How **Story** in this thesis would fit into the reworked version of the Narrative model. For future studies, researchers/designers should try to fill in more boxes in each immersion dimension. Narrative aspects of the game should be drawn from the narratological side while gameplay aspects should be drawn from the ludological.