Effect of Developed Story on Mobile Gamers’ Motivation

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We would like to thank North Kingdom for the opportunity to do our bachelor thesis in collaboration with them, as well as for providing the mobile game and the materials necessary for the study. Also thanks to the employees who let us interview them and for the help with the implementation in the game.

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Abstract

Only a decade ago, research was limited regarding enjoyment and player motivation in digital games. The aim of this study was to investigate the effect of a developed story in a mobile puzzle game. The main research question was if a developed story can affect the motivation to play a mobile puzzle game, and the secondary question was if a developed story can affect players’ overall impression of a mobile puzzle game. The sample size was eight participants (five men, two women, one non-disclosed), who enjoys playing mobile games, and were between 20-28 years old. A semi-controlled field study was performed with a between-group design consisting of experimental group and control group. Participants played freely a mobile puzzle game with a pre-existing or a developed story for a week, then returned for an evaluation interview. Their total playtime was measured with on-screen time trackers and their motivation and overall impression with subjective ratings on a five-level scale, as well as their reasonings to the ratings. The results showed no main difference between the two conditions. However, exploratory analysis found that participants who were interested in a story had lower motivation to continue playing compared to those not interested in a story, possibly due to their player type. This study makes way for future research regarding story and video games, mobile games in particular. In the long run this research could contribute to make mobile games more immersive and enjoying to play for the public.

Keywords: mobile games, mobile puzzle games, immersion, story, motivation

Abstrakt


Nyckelord: mobilspel, mobila pusselspel, inlevelse, berättelse, motivation
Effect of developed story on mobile gamers’ motivation

Research about the underlying psychology of what motivates players and makes them enjoy playing video games were few before the last decade (Wang, Khoo, Liu, & Divaharan, 2008). Studies appears to vary about what factors motivate players and makes them enjoy playing video games. The concept of motivation from gaming has developed beyond entertainment into other fields of society as well, in the form of gamification (Huotari & Hamari, 2017). However, in order to understand how gaming could motivate us in society, one should first look at what makes video games so engaging in the first place. Recent statistics shows that the global gaming market revenue have grown from 106.5 billion in 2016 to 121.7 billion in only one year (Wijman, 2018), suggesting video games engage gamers more and more. Gamers could, according to Newzoo (n.d.), be defined as “All people that have played games on a PC, console or mobile device in the past six months.” (p. 2). One of the factors to engage in a game is the feeling of immersion (Jenette, 2008). Jenette describes the term as “Immersion involves a lack of awareness of time, a loss of awareness of the real world, involvement and a sense of being in the task environment. Most importantly, immersion is the result of a good gaming experience.” (p.17). One of the ways to induce immersiveness in a game could be through in-game storytelling, as observed in a recent study (Bormann & Greitemeyer, 2015). Having immersion in a story world could mean that “…one or more features of the story are engaging to the extent that you are mentally absorbed into that virtual environment” (Zhang, Hoel, & Perkis, 2016). Zhang et al. provided a framework for measuring virtual quality of immersive experience through storytelling. The framework is described in the following paragraph:

Three types of data are fed into the analytical system: human factors, system factors, and design factors. Human factor data includes the physiological, neuropsychological and behavioral measurements, which could then infer the cognitive and emotional processing of the participants. System factor data suggest the user's optimal requirements of the system, which may include, but are not limited to, haptic feedback, graphical fidelity, screen size, and most important of all, quality of service… Design factors are storytelling tactics including narrative, interactivity, spatiality, challenge, and many others as discussed above. These data could be obtained through qualitative research methods, such as ethnographic study, interviews, subjective report, questionnaires, etc. Finally, all three aspects constitute an operable framework for measuring quality of immersive experience in storytelling. (p.2)

The human factors, according to the authors framework, affects the cognitive and emotional processing contributing to the immersiveness of storytelling in the virtual world. This implies that storytelling has a cognitive effect. Gazzaniga (2008) writes that stories are what made us imagine what might happen in the future and allowing us to prepare for it. Previous advancements in neuroscience suggests that the brain is hardwired to respond to story, and the pleasure we get for it is the reward for paying attention to it (Tooby &
Cosmides, 2001). The story should also grab our attention fast (Boyd, 2009) otherwise we do not pay attention.

The cognitive effect of stories helping us imagine the future and our preparation for it could be through understanding other people. An analysis of 86 fMRI studies concluded that the brain’s networks for understanding stories and the network for interacting with other individuals overlapped with each other, especially the area of analysing people’s thoughts and feelings (Mar, 2011). This finding supports the definition of story from Cron (2012) as “how what happens affect someone who is trying to achieve what turn out to be a difficult goal, and how they change as a result” (p.10) in her book Wired for Story.

However there is an ongoing debate between two study fields whether games can be narrative stories or should be seen as its own medium. One is the field of narratology, which approaches games from narrative literature theories, while the other field ludology approaches games as its own entity, not lending itself to classical narrative theories. This is due to the interactive aspect of games that are not present in other media such as books and movies (Natkin, 2010). This discussion has been limited and have not been in the context of the recent boost of mobile gaming. In 2017 mobile gaming had 46% of the gaming market revenue, and is forecasted to increase to 51% in 2018 (Wijman, 2018). For mobile games the puzzle game genre is one of the most popular (Hwong, 2016), which could be described as games focused purely on solving puzzles usually without much narrative (Genre Definitions, n.d.). Most often these games in the purest form do not have extensive stories in them and mostly utilize a story at the start of the game to establish the objective.

This study aims to investigate the effect of developing a story in a mobile puzzle game. The authors suggest, from the review of the research fields about the cognitive effect of story and immersion, that a more developed story could have an effect on the players. The main research question was if a developed story can affect the motivation to play a mobile puzzle game, and the secondary if a developed story can affect the players overall impression of a mobile puzzle game.

This study was in collaboration with the Swedish experience design company North Kingdom. The project started as a proposal of investigating the effect of a story in their mobile puzzle game. The company originated the game idea and has been a part of the development process. In order to perform the study, a semi-controlled field study design was utilized. The participants played the mobile puzzle game freely for a week, and then returned for an evaluation about their impression and their motivation to play the game. This approach was chosen due to the challenges posed by simulating the user habits of mobile gamers (Vertico Analytics, 2015). This improved the ecological validity which also allowed the players a longer period of play time and to unlock more of the developed story. Two conditions were compared with a between-group design, assigning participants to play either the game with the developed story or the control version with the pre-existing story. There was no prediction of the results due to the lack of research in the area of mobile games and the scarce literature about story as a motivator in games.
Method

Participants

Eight university students at Umeå University (age range = 20-28 years, $M = 22.25$ years; five men, two women, one non-disclosed) participated in the study. The participants were recruited at the campus through oral requests, posters and a mailing list. The authors offered refreshments as a compensation at the end of the study. Inclusion criteria were: 1) never played the game before, 2) between 18-35 years old, 3) enjoys trying out games, and 4) enjoys playing mobile games. The authors chose these criteria to obtain participants who enjoys playing mobile games and also fit into the demographic of mobile gamers (Vertico Analytics, 2015).

A between-group design was chosen for the study, dividing participants into an experimental- and a control group. The experiment group played a version of the mobile game with a developed story, while the control group played with the pre-existing story. The two game versions were otherwise identical to each other. The assignment of participants to the two groups were pseudo-randomised. All participants owning a smartphone using iOS were automatically assigned to the control group due to time constraints and the complications with beta game testing.

Ethical considerations were taken. The authors requested informed consent from the participants in order for them to participate, and all participants were made anonymous. It was made clear that the study was in collaboration with an external company, and that the study primarily was for a bachelor thesis in cognitive science. The authors made sure that no physical or psychological harm could be done to the participants. Participants’ privacy was also kept by only observing app usage for the mobile game and participants had to give the authors permission. The participants were debriefed at the end about the full purpose of not only investigating motivation in mobile games, but specifically the effect of a developed story on player motivation. They were also told what condition they had been assigned to. Time was given at the end for the participants to ask further questions about their participation and the study.

Materials

The official game Sparks. The official game Sparks, version 0.708, used for this study is a single-player mobile game in the puzzle genre. It is owned by the company Cubetopia AB and currently available on Google play (Sparks Games AB, 2017) and Apple store (Cubetopia AB, 2017).

The game consists of 78 levels divided into three worlds: 20 levels in world one, 29 in world two, and 29 in world three. The game play involves moving one or more cubes on a platform to its corresponding place as marked by the same color as the cube (see Figure 1). The game is described as the following on its website:
Visually stunning and intellectually challenging, Sparks is a game that appeals to all corners of your mind. Set across futuristic landscapes, Sparks draws you in to a rolling adventure as you are called upon to save a tribe of mysterious creatures from the agony of perpetual day. Living in harmony from the beginning of time until their world suddenly stopped spinning, they now face a life without rest from which only you can save them. Light and day is all they know. They can't think. They can't stop. Over the course of one hundred levels the game evolves into an epic challenge, an adventure with traps and hidden bonuses. Roll the cubes to solve the puzzles and bring back the night for our creatures. Restore their balance. End their insomnia. ([Official home page to the mobile game Sparks], n.d.)

The story in the game is presented through two animation sequences. The first one is when the user opens the game for the first time, and the second is after completing the first level in world one. The game was released to the public in 2017 and currently requires Android 4.4 or iOS 9.1 to run.

*Figure 1. Photo with four images from the mobile game Sparks. From top left to bottom right image: overview of world one; a puzzle from world one, level two; a puzzle from world three, level two; a puzzle from world two, level two. Taken from: [Official home page to the mobile game Sparks] (n.d.). Retrieved from http://sparksthegame.com/.*
Modified game version. The modified version of the game was similar in all regards to the official one except the addition of 10 images (see appendix A). The images were laid out over the first 29 levels, spanning world one and part of world two at irregular intervals, appearing on-screen when completing certain levels (see Figure 2). The images displayed on-screen continued the pre-existing story and was written according to the principles described by Cron (2012) and Weiland (2016).

The story was about Spark, a young child filled with physical energy, who had to leave his village and go on a journey to save his people from the inzomnia. In the story he meets up with a bird that briefly joins him, gets lost in a thick fog and eventually he find his way out. The last image ends with a cliffhanger continuing the story.

The images were made to fit the game with text and complementary illustrations. Interviews were held with people from the developer team to get the background of the game and the pre-existing story. The vector graphics software Inscape version 0.92.3 was used to create the images. The resolution of the images was 1280x720, the most commonly used resolution in smartphones. The text was black with font size 27.65. The tools and the visual effects were included in the software’s default sortiment.

The modified game with the images was converted to a 66.41 MB sized .APK-file (Android Package Kit).
Figure 2. The distribution of images over the first 29 levels in the modified mobile game version of Sparks. When completing certain levels an image appeared on-screen. The squares with a number are the levels where the images were placed at, while the grey squares are the levels without an image in-between. The images appeared on average two levels apart from each other.

**On-screen time trackers.** Participants’ play time in the game was used to measure their motivation to play. On Android smartphones, the play time was tracked with the on-screen time application Quality time - My Digital Diet, version 2.3 from the Google play store (ZeroDesktop Inc., 2015). For smartphones with iOS the built-in on-screen time tracker feature was used, available in the more modern versions.

**Interview templates.** Two interview templates for semi-structured interviews with the participants were created: one for the first session (see Appendix B), and one for the second session (see Appendix C). The purpose of the interview template for the first session was to collect background data of the participants, focusing on habits regarding mobile gaming, initial motivation to playing the game, and initial overall impressions.

The purpose of the interview template for the second session was to measure the experiences of the game, focusing on participants’ motivation to continue playing, overall impression of the game, and impression of the story.

The interview templates have open-questions and ratings on a five-level scale. The higher rating indicates a more positive response to a question and lower a more negative
response. The rating is followed up by asking why to probe for the participants’ reasoning behind the rating.

Procedure

**Introduction session.** All participants attended an introduction session lasting about 30 min. The purpose of the session was to gather information about their mobile gaming habits and provide them the game. The participants signed an informed consent form for the study, and were interviewed for 5-10 min. The authors asked for permission before the interview started to record the audio from it.

At the end of the interview a 30 s long game trailer (Sparks Game, 2017) was presented to introduce the game and increase motivation to play. The participants answered questions regarding how they felt about the game after watching. The official or the modified version was then downloaded to their smartphone. Participants were instructed to not buy extra lives with real-life currency, otherwise they were allowed to play the game freely for seven days of testing. Android users who granted permission downloaded also the Quality Time app. iOS users were asked to give the authors permission to check the built in on-screen time tracker at the evaluation session. To ensure accurate logging of playing time throughout the testing period, battery optimization settings were adjusted.

**Evaluation session.** The participants returned after seven days for an evaluation session lasting about 30 min. The session started with offering refreshments for taken part in the study and to provide a friendly atmosphere. The purpose of the session was to know how much they had played and their experiences of the game. The authors began the session with informing about the purpose of the interview and asking the participants for permission to record the audio from it. The participants were interviewed for about 10 min and then the authors checked what level they had reached in the game. The total play time was noted from the on-screen time tracking applications. The participants were informed about which group they had been assigned to during the notetaking of their play time. Both the pre-existing story group and the developed story group were shown all the images of the developed story on a smartphone and asked about them for feedback (see Appendix D). The participants were lastly briefed about the purpose of the study and asked if they had any more questions. Those with the modified version were asked to erase the game from their smartphone for legal reasons, along with the .APK-file they had downloaded for the installation.

**Results**

The main results was data from the second interview of participants’ ratings of motivation to continue playing the game, their overall impression, the impression of the story, the level reached, and the measured total play time. Also participants’ reasoning behind their ratings were analysed. The results were analysed with descriptive statistics comparing means between the groups and summarizing session notes and transcriptions of the participants’ answers.
Four participants were excluded from the comparison. Technical problems with the story animations were found out post-test for some participants, giving the authors reason to believe that they had not seen them in the game. Two participants who could not confirm they had seen the animations were excluded. One more participant was excluded due to non-representative interest in playing the game, having an occupation as a mobile game developer. Five participants remained after the exclusion, three with the pre-existing story and two with the developed story. There were also technical difficulties with the built in feature in iOS for on-screen time tracking, resulting in lower data than expected for two participants. The on-screen time tracking measurements for those participants were adjusted at the days where the play time was too low with estimates given at the second interview with the participants. All participants estimates of play time were used to make sure that the play time measured by the on-screen time trackers were valid within a rough estimate.

The results of the developed story compared to the pre-existing story was as a whole similar between the groups (see Table 1). There was a small difference between the story conditions in motivation, overall impression and story. The developed story group had 23 min more of total play time and reached about 22 more levels compared to pre-existing story group.
Table 1

*Means (and standard deviation in parentheses) of motivation to continue playing the game, overall impression and story on a scale of 1(negative) - 5(positive). Also total play time and level reached. Comparison of means between the condition pre-existing story and developed story.*

<table>
<thead>
<tr>
<th>Dependent measure</th>
<th>Developed story</th>
<th>Pre-existing story</th>
<th>$M_\Delta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation to continue</td>
<td>3.50 (2.12)</td>
<td>3.00 (1.00)</td>
<td>0.50</td>
</tr>
<tr>
<td>Overall impression</td>
<td>3.50 (0.71)</td>
<td>3.33 (0.58)</td>
<td>0.17</td>
</tr>
<tr>
<td>Story</td>
<td>2.50 (0.71)</td>
<td>3.00* (1.41)</td>
<td>-0.50</td>
</tr>
<tr>
<td>Total play time (min)</td>
<td>102.50 (27.56)</td>
<td>79.83b (87.99)</td>
<td>-22.67</td>
</tr>
<tr>
<td>Level reached</td>
<td>38.50 (3.54)</td>
<td>17.00 (12.12)</td>
<td>21.50</td>
</tr>
</tbody>
</table>

*Note. Developed story n = 2; Pre-existing story n = 3.*

* One participant was excluded for misinterpreting the question
* Two participants’ total play time was complemented with their own estimate

When comparing the reasonings to their ratings between the two groups the within-group variance of each group was too great to find any patterns separating them. The results from the analysis showed the groups’ responses did not differ and instead overlapped with each other.

**Exploratory analysis**

No differences between the pre-existing story group and the developed story group could be found. The data collected was instead analysed with all participants who could confirm seeing the story images or the animations in the game as a combined story group, given the two story versions were similar in ratings. Two participants were excluded, one participant who could not confirm seeing any of the story in the game and one participant for having an occupation as a game developer. After exclusion six participants remained.

The results showed that participants overall had a neutral perception of the game, suggesting it to be an average game (see Table 2). The story group overall was moderately interested in continuing playing the game, overall impression of it was good, found the story to be neither bad nor good and reached level 27.
Table 2

Means (and standard deviation in parentheses) of motivation to continue playing the game, overall impression and story on a scale of 1(negative) - 5(positive). Also total play time and level reached. Means of all participants as an overall story group.

<table>
<thead>
<tr>
<th>Motivation to continue</th>
<th>Overall impression</th>
<th>Story</th>
<th>Total play time (min)</th>
<th>Level reached</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.17 (1.17)</td>
<td>3.50 (0.55)</td>
<td>3.00a (1.00)</td>
<td>106.58b (72.43)</td>
<td>27.00 (13.56)</td>
</tr>
</tbody>
</table>

Note. N = 6

a One participant was excluded for misinterpreting the question  
b Two participants’ total play time was complemented with their own estimate

The participants’ reasonings to their ratings were summarized regarding the motivation for the game and their thoughts of the story images. Comments about the implementation of the story images for the participants who saw them in the game were also summarized.

**Motivation to play.** Two of the participants (7 and 8) said that they had not played as much as they wanted during the week, the others were satisfied with how much they had played (3, 4, 5, and 6). The reasons for them not playing as much were due to an occupied schedule. Four participants rated their motivation to continue playing as moderate or below while two rated fairly motivated or higher. The reasons for the lower rating was because of the game’s system regarding lives (participants 4 and 5), grew tired of the game (participants 3), not enough feedback (participant 7) and the game mechanics (participant 4). Those who were more motivated to continue playing explained their rating because it was fun to solve the puzzles (participant 8) or wanting to finish the game due to its short length (participant 6).

Four of the participants (3, 4, 5, and 7) said the story affected their motivation to play the game while two (6 and 8) said it did not. The following are some quotes translated from Swedish by the authors from the interview regarding if the story affected their motivation to play the game:

Hmm, a little bit in the beginning actually. Like “Mm, this is nice”, I wanted to see what's going to happen next. But then after the first 24 levels, it felt like I didn’t really care anymore. (participant 3)

Yes, I thought it was very nice to add a story and not just that you only clear levels, there’s something else as well. I thought that was really nice. (participant 4)

Eh, you get more motivated if it is a good story. If there is more you can learn, things that you don’t know and get to know. Or just if it is interesting. (participant 5)
Not really, but I was a little disappointed because I didn’t read the story because I pressed the screen all the time and skipped the story without wanting to skip it. So I was a bit disappointed I couldn’t read the story but it didn’t change my motivation to play the game. (participant 6)

Yeah, I believe so. In the beginning I was like “Oh!”; it’s always nice with a story to immerse yourself in something, some world. So when I think back to last week, I think so. (participant 7)

I didn’t notice it that much. I thought that it was “Oh, solving cubes. in the right place… sounds like problem solving, seems fun, let’s go.”. I did not put that much thought into the story. (participant 8)

**Evaluation of story images.** All participants at the end of the session were given a smartphone with images of the developed story and allowed to scroll through them and then give it back. Four participants reported that they liked the story (2, 4, 7, and 8), while two participants reported that they disliked it (3 and 5) or were unsure (participant 6), when asked what they thought about the story. Participants who liked the developed story thought that it was good (participant 2), simple and easy to understand (participant 7) funny, (participant 8), and made them curious about what was going to happen next (participant 4). Those who disliked or were unsure about the developed story thought that it was uninteresting (participant 5), was not really needed in the game (participant 3), and the connection between the characters were unclear (participant 6).

Seven participants reported that the text and the illustrations matched each other when asked. The reason for why they did was because the illustrations were descriptive of what happened in the text (2, 3, 4, 5, 6, 7, and 8). One participant said that more context is needed to the developed story in regards to what the characters are feeling and other such things (participant 4).

**Implementation of story images.** Some of the participants were also asked about whether the developed story images fit in with the rest of the game. Two participants thought that they do not fit with the game (2 and 7), one participant thought they do (participant 8), and one thought both (participant 6). The following are some quotes from the interview regarding the question if the developed story images fit in with the rest of the game:

Hmm, I felt like it was kind of a different style. A bit “off”, but almost… In that case, you have to work on it so it has the same aesthetical expression. So that it feels like it is the same world, so that you do not feel like… to get the world into it and put it in so that it becomes the same atmosphere is important… Otherwise it becomes like, that you have been playing in a world, and then this becomes a little comic showing up on the side. (participant 7)
Well, the game has for example the same character, the purple guy. But the game, it looks better than the images… I feel like they are connected to the game because it’s the same character… I think that the pictures of the story are not as developed as the game when in the terms of graphics. I think the story could fit in the game, it’s just that it’s not evident to me. (participant 6)

Several participants who played the game with the story images also reported difficulties with the ways the images were presented in-game. Three participants cited clicking away the presented story image by accident on one or more occasion due to not knowing it would appear (participant 3, 4, and 6). Two participants had difficulties gaining access to the presented story images afterwards (participant 4 and 6), one even chose to replay 30 levels in order to find out the whole story (participant 4).

**Group comparison of interest in story.** Two groups were formed for additional data analysis given earlier the strong division among the participants whether the story affected their motivation or not. The participants who reported being affected by the story were grouped together as interest in the story while those who did not report interest in the story were grouped as non-interest.

The results of the interest group compared to the non-interest group showed a trend of lower averages for the interest group, except the noticeable difference in their story rating (see Table 3). The interest group showed moderate motivation in continue playing the game, thought the game was neither bad or good overall, and thought the story was neither bad or good. The non-interest group showed great motivation in continue playing the game, thought the game was good overall and thought the story was bad.
Table 3

Means (and standard deviation in parentheses) of motivation to continue playing the game, overall impression and story on a scale of 1(negative) - 5(positive). Also total play time and level reached. Comparison of means of story group between interest and non-interest.

<table>
<thead>
<tr>
<th>Dependent measure</th>
<th>Interest</th>
<th>Non-interest</th>
<th>$M_A$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation to continue</td>
<td>2.50 (0.58)</td>
<td>4.50 (0.71)</td>
<td>-2.00</td>
</tr>
<tr>
<td>Overall impression</td>
<td>3.25 (0.50)</td>
<td>4.00 (0.00)</td>
<td>-0.75</td>
</tr>
<tr>
<td>Story</td>
<td>3.25 (0.96)</td>
<td>2.00$^a$ (0.00)</td>
<td>1.25</td>
</tr>
<tr>
<td>Total play time (min)</td>
<td>84.38$^b$ (78.83)</td>
<td>151.00$^c$ (41.01)</td>
<td>-66.62</td>
</tr>
<tr>
<td>Level reached</td>
<td>23.25 (14.91)</td>
<td>34.50 (9.19)</td>
<td>-11.25</td>
</tr>
</tbody>
</table>

Note. Interest group n = 4; Non-interest group n = 2.

$^a$ One participant was excluded for misinterpreting the question
$^b$ One participant’s total play time was complemented with their own estimate
$^c$ One participant’s total play time was complemented with their own estimate

Discussion

The aim of this study was to examine the effect of developing a story in a mobile puzzle game. The main research question was if a developed story can affect the motivation to play a mobile puzzle game, and the secondary research question was if a developed story can affect the players’ overall impression of a mobile puzzle game. The research questions were aimed at Sparks - a mobile puzzle game adventure. The results showed that there was overall no difference between the conditions pre-existing story and developed story for the game. The participants’ ratings of motivation to play, overall impression, and the impression of the story did not differ between the conditions. This could imply that the developed story was not an improvement to the pre-existing one, and contributed the same way to their experience in the game. It could also have been caused by a non-representative sample of the chosen target population and the pseudo-randomized assignment of participants to the conditions, making the results a coincidence. However, participants with the developed story overall reached 22 more levels and played 23 min more, seemingly more motivated to play. Although, their rating of the story was about the same as the pre-existing story group. This suggests that the reason they played longer was for something other than the story. Alternatively, it could be that they were more motivated to play, but only somewhat
motivated to continue playing after the testing. Given their rating of overall impression, they might have thought of the game as decent and worth playing during the testing, but not good enough to continue playing afterwards. The results could though be due to the higher standard deviations, which were not as present in the developed story group, making it hard to draw any definitive conclusions of the results. Analysis of the participants’ explanations to their ratings displayed that the answers within each group varied too much to find a common theme. Also, the answers were similar between the groups. The authors cannot currently give any clear answers to neither their main- nor secondary research question, in regards to the results from developing the story in the mobile puzzle game.

Since the authors could not find answers to the research questions, an exploratory analysis was performed to further examine the results regarding participants’ motivation for the game and their experiences. The analysis combined the groups due to the similar rating of the story between the story conditions. The results showed that the participants were fairly motivated to continue playing, had an overall good impression of the game, thought the story was neither bad nor good, and played the game at a fair length of time. None of these measurements suggest that the game itself was too bad to play and could therefore be classified as an average mobile game. The participants had different reasons for their motivation to continue playing. However, when looking at if the story had affected their motivation to play and if they felt more immersed, there was a clear distinction between the participants. Either they felt that the story did affect their motivation to play, or it did not. This warranted the further analysis of dividing the participants in regards to being affected by a story or not.

The results showed a trend of lower averages for the interest group, suggesting overall lower motivation. This due to lower rating of motivation to continue, overall impression, lower total play time, and reaching lower level. The most apparent was the interest group’s lower rating of motivation to continue playing. This could be due to the story not leaving a good enough impression for those who were interested in it, and therefore also affecting their motivation to continue. This supports previous advancements in neuroscience that the brain is hardwired to respond to stories, making us receive pleasure when paying attention to it (Tooby & Cosmides, 2001). Though, the story must catch our attention fast (Boyd, 2009), otherwise we do not pay attention to it. The story in the game might not have caught the attention of the interest group enough, having them receive less pleasure and lowering their motivation, due to feeling that the story could have been better. This supports their average rating of the story and their overall impression of the game.

The exploratory results suggest that there are different preferences about having a story in a mobile puzzle game depending on what motivates you to play it. Depending on your preference, it might affect how you perceive a mobile game that has a story. People who are interested in a story might rate it differently or having more demands to engage with it. This is supported by the interview when asked about the story, seeing that some did not seem to care for it and saying that it did not have an affect on them. This finding supports the well-known taxonomy of player types proposed by Bartle (1996). The author’s classification of players from their motivation was further examined in the empirical study by Yee (2006)
about motivation in regards to online gamers. The study could not support identifying players motivation as a single type, though their motivation could be grouped in three main components: achievement, social, and immersion. The most prominent components in the authors’ game Sparks would be: achievement (by solving the puzzles and getting the highest ratings), and immersion (by the world and the storytelling).

One aspect of the study that could have affected the results is the images for the developed story. Interview answers from the participants regarding the story images suggest limitations within two main areas: design and implementation. Designwise, using an artstyle different from the one in the game seems to have triggered a sense of disconnect between the story images and the rest of the game. The implementation of the images also might not have been ideal. The frequency and distribution of the story over the levels, in combination with accidentally clicking away the images, seems to have made the developed story hard for the participants to follow. All in all, these observations from the interview answers suggest proper integration of the story into the gameplay in order to feel as a whole. This supports the ludology view of games as its own medium compared to movies or books, and that it is due to the interaction aspect (Natkín, 2010). The interaction aspect is also part of the framework of immersion by storytelling (Zhang, Hoel, & Perkis, 2016). This framework could explain why the participants thought that the developed story did not, or would not feel integrated with the rest of the game. The authors prioritized, given the time frame of the project, on the humans factors, somewhat the design factors, and lesser on the system factors, suggesting it lowered the feeling of immersion in the game.

This study had some limitations affecting the results as well. The authors had no control of other dependent variables that could affect the participants’ opportunities to play the game and their experience of it. This was due to having a semi-controlled field study. The results might not be replicated if repeated again, possibly having low reliability. Also regarding reliability, there was a low number of participants, making it difficult to apply our sample to the target population (18-35 year-olds, enjoying mobile games) and provide an opportunity to statistically test the results. This study was originally designed to collect data from 20 participants or more, with statistical analysis as main focus. Also, some of the participant data was excluded due to technical loss of the story animations. There was also time restrictions due to the study being a bachelor thesis, which limited how many participants could be recruited, and also the work resources the authors could supply to the project. The field study design does however support ecological validity having the participants playing freely on their own, except not being allowed to buy things in the game. This applies well to mobile games which are different from other game mediums, when analysing their playing habits and locations (Vertico Analytics, 2015). The authors classifies the study as a semi-controlled field study mainly due to having the between-group design, allowing for comparison between an experimental group and a control group. There was too much variance within the groups than between in this study. This could be avoided by having criteria for assigning participants to the groups, such as story preference. There were also factors related to playing the puzzles possibly lowering the enjoyment of the game and the immersion. Most noticeably was the life system that irritated some of the participants,
dictating how much they could play the game. This supports the finding of a study there participants who felt competent and in control of a game had a better immersion in the game world, increased self esteem, and were more likely to engage again with the game in a period of free-choice (Przybylski, Rigby, & Ryan, 2010).

Another limitation to the study were the rating system which was not standardized and were the authors own creation, inspired by the Likert scale. However additional data was taken with reasonings to the ratings and the possibility to follow up the answers due to the interview settings.

The on-screen time measurement was a complement to the ratings, though it had some flaws as a measurement of play time. Having the game app on the screen did not mean that the participants were using it actively, the amount of on-screen time for the game could potentially be somewhat inaccurate. Using on-screen time is still a good measure of play time since it excludes when the game app is not on the screen. Two participants with iOS noted that their total registered time was lower than what it should have been. The measured play time was adjusted with different estimates depending on how many days of data that were missing. For one participant only six days of play time were registered instead of seven, and the second participant’s total play time was faulty due to playing the game while charging the phone. The participants’ estimates seemed reasonable; only one day was missing for one, and the other basing it on its own logging of free time between projects.

Lastly the possibility to generalize to other types of games is limited. Since this study focused only on motivation in relation to mobile puzzle games, it cannot be generalized to motivation in games in general. Also the authors cannot generalize motivation to all mobile puzzle games since there are many variations in the genre. However, there might be similar findings in mobile games that are closely related to the same puzzle solving and adventure theme as present in Sparks. This study does contribute to the overall field of motivation in video games though. Both as contributing to the research about story as a motivation factor and for the mobile game genre.

Future studies could continue the work either examine what would happen if a story is removed from a game or how a story could be integrated better. The authors advice to take into consideration the participants’ preference of having a story or not, especially for puzzle games, and as well maybe consider testing player types of the participants. Further investigation of personality and motivation when playing mobile games would also be regarded as an interesting contribution to the research field. More controlled experiments regarding mobile games would also be encouraged to further investigate the phenomena and what motivates users to play, giving insight to this growing industry.

In conclusion the study could not determine if a developed story in a mobile puzzle game could affect the player motivation or the overall impression of the game. However the exploratory analysis did suggest that participants’ interest in having a story in the game could affect their motivation to play. If the story is not seen as more than average, the authors speculate that the group who preferers story could possibly be less motivated to continue playing the game. There was also some findings about the implementation of story that suggests that games are its own medium and should preferably be seen as separated from
other mediums, such as literature and movies. This supports the ludology side on the debate saying games are its own medium and not narrative stories only, in contrast to the narratology view (Natkin, 2010). The authors conclude that further research needs to be done in the field of motivation in games, especially for the effect of a story, perhaps making some of us enjoy the game more, making us having more enjoyable gaming experiences.
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Appendix A

*Note.* Developed story images used in the modified game of Sparks. The images are in chronological order.

Spark, a young child filled with physical energy at the time, began his self journey to save his village and end the insomnia.

Not long after leaving the village, he met a bird. They started to chat and Spark invited it to join him. The bird went along.
Spark enjoyed having company, but the bird was complaining about the constant daylight. It made him feel quite uneasy.

The further they traveled, the bird became very unfriendly. One day, without a warning or goodbye, the bird had left.
The bird is gone, though it might be better this way, Spark thought. “It was bad company anyways.”

Spark continued alone but a thick fog caught up to him and he couldn’t see anything or anyone.
The fog made him quite uncomfortable without knowing why. But he thought about his people who counted on him, so he pushed on.

The feeling within grew bigger and bigger. "Why does this make me feel so uncomfortable?" He thought to himself.
Suddenly, the fog started to clear and maybe he understood. This feeling and his encounter with the bird earlier was connected to why this journey would be a struggle for him.

As the fog cleared, he saw a deep blue color appearing. He had a feeling that his physical energy would come in handy.
Appendix B

Note. This is the translated English version used from the Swedish version.

*Italic* = follow-up question

**Bold face** = additional information to the question

( ) = The rating scale

Interview: First session

We’re going to ask a couple questions to you about your habits with mobile games. Is it okay for you if we record this interview to go back to the answers later?

Okay, let’s start the interview now. We’ll start with a few easy questions:

Background questions

- How old are you?
- What gender do you identify as?

Interview questions

1. Roughly how often do you usually play mobile games per month?
   
   a. *What would an average be for you in a week?*

2. What types of mobile game genres do you play?

Before we move on to the last questions, we want you to watch a short video clip first. This is the game you’ll be test playing. *[Sparks Game (2017, December 4)]*

Now the last questions of this interview:

3. How motivated are you to play this game right now? (1-5) *Why?*
   
   [ask to get rough estimate of the participant’s motivation to start playing]

4. What is your overall impression of the game right now? (1-5) *Why?*
   
   [ask to get participants to think about the game, and see if they have a positive image of wanting to start playing the game]
   
   a. *Visually?*
   
   b. *The game idea?*
Appendix C

Note. This is the translated English version used from the Swedish version.

*Italicics* = follow-up question

**Bold face** = additional information to the question

( ) = The rating scale

Interview: Second session

The purpose of the interview is to hear how it’s been this week playing the game and how you perceive the game after this week. Is it okay for you if we record this interview to go back to the answers later?

Okay, let’s start the interview now.

**Interview questions**

1. How’s your week been? *Did you get to play as much as you wanted?*
   a. If no, *why?*

2. Approximately how far did you get in the game? *What level/world?*
   *[ask to get participant to recall their time playing the game]*

3. Approximately for how long have you been playing the game on average each day?
   *[ask to proof-check the measured total play time later, participants choose their own time units (most likely minutes or hours)]*

4. How motivated are you to continue playing the game? (1-5) *Why?*
   (Rating scale: Not motivated - a little motivated - moderately motivated - fairly motivated - very motivated)

5. What is your overall impression of the game now after this week? (1-5) *Why?*
   (Rating scale: Very bad - bad- neither bad nor good - good - very good)
   a. *Visually?*
   b. *Game idea?*

6. What did you think about the story? (1-5) *Why?*
   (Rating scale: Very bad - bad- neither bad nor good - good - very good)
   a. *Did the story contribute to your playing experience? Did it increase your emergence in the game in any way?*
   b. *Did the story affect your motivation to play the game?*
Appendix D

In this study we have divided all the participants into two groups. One group got to play the game where the story was less developed, and the other got to play the game where the story was more developed in the form of screen images. You got to play the game with the [pre-existing/developed] story.

We want to show you the developed story and see what you think about it. Is that alright with you?

Questions about the developed story

1. What did you think about the story (the text)?
2. Does the illustrations fit with the story (the text)?
3. Does the story images fit with the game?

The purpose of the study was then to examine whether a developed story like this one could increase one’s motivation to continue playing.

Do you have any questions about the study?

Thank you for your participation.