Flow based assessment of the onboarding phase in F2P mobile games

Cathja Windbæk Lind
Thesis 2016
Information Studies
Aalborg University Cph

AALBORG UNIVERSITY
DENMARK

Preface

Author:
Cathja Windbæk Lind

University:
Aalborg University Copenhagen

Faculty:
The Faculty of Humanities

Field of Study:
Master of Science in Information Studies

Semester:
Master's Thesis - 10th semester

Title of thesis:
Flow based assessment of the onboarding phase in F2P mobile games

Characters with spaces: 191.998

Normal pages: 134

Supervisor:
Anders Drachen

Date of hand-in:
31 of May 2016 at 12:00

Signature: 

Summary

The mobile game industry has grown rapidly in the past decade and has become the second largest in terms of global revenue with $25 billion, only topped by PC games with $32 billion. Encompassing roughly 30-40% of the global market for games, and has seen a global expansion in players from a few hundred to more than 2 billion players. This emphasizes that mobile games have become a large player in the game industry. However, even though this is an industry with a lot of possibilities in terms of new and exciting research, little within this area has currently been published in academia; though much exist in the area of games user research (GUR). Therefore, it was found that there is a need for investigating the field of mobile games user research (mGUR) and help explore the possibilities for implementing and rethinking traditional methods from HCI and GUR to be used in the field of mGUR. Thereby, giving research in this field the possibility for investigating a fairly unexplored field. Mobile games are often released under the Free-to-play model, making playtime essential in order for a game to make revenue, as it is obtained though in-game purchases and adds. However, mobile games have a general problem in terms of player retention rates being low, as players often leave the game in very early stages of gameplay. This means that the design of the onboarding phase, the first few minutes of gameplay, is particularly important to player retention in mobile games. Therefore, this research aimed at investigating the onboarding phases of three different F2P mobile games: Candy Crush Jelly Saga, WinterForts and PogoChick, with a mixed methods approach and a within-subjects experiment, targeting the three different F2P mobile game titles across three different game genres. Investigating the relationship between the design of the three onboarding phases, the experience of the player and the desire to keep playing. Furthermore, as a specific focus, the theory of flow was adopted, which is important when dealing with an experience and fun, as it is the state where one gets so involved into an activity that nothing else matters and the feeling of time alters, it is the ultimate experience. To investigate flow and the three onboarding phases, survey and interview based measures were used in 78 play sessions on 26 test participants and analyzed using both statistical measures and open coding. By these investigations it was found that flow already did occur in the onboarding phases of the three games and that Candy Crush Jelly Saga was the game with most flow occurrences. It was also found to be important for the test participants desire to keep playing and wanting to play again. Therefore, a set of nine recommendations were created based on the findings regarding the onboarding phases of the three games, with the aim of helping the developers in future design of new onboarding phases or the re-design of existing ones.

Acknowledgements

I would like to thank Jonathan Magnusson from King.com Ltd and Julian Maroda from Norsfell Games Inc. for their cooperation in making this thesis possible by giving valuable insights into the minds of the developers of the games and their perception of the onboarding phases. Furthermore, I would like to thank my loving family for both being patient and for helping me where and when ever I needed it. I would also like to thank my incredible experienced and fantastic supervisor Anders Drachen for his help, guidance and also at times patience when explaining bits and pieces of the confusing world of statistics to me. I would also like to thank Professor Mirza Babaei Pajaman and Lennart Nacke for their guidance towards test sessions and projects like this. I would also like to thank Allan Hammershøj and his team at Mediathand and the laboratory team at AAU, who have both helped with and supplied equipment for the test sessions.

It is thanks to all of these amazing people's guidance and help that this thesis was a possibility, for that I am grateful.

Lastly, I would like to dedicate all of my hard work on this thesis to my amazing little sister, the strongest and bravest person I know, because she has been and will always be my inspiration.

Table of Contents

1 Introduction

Mobile games have seen a rapid growth in the past decade and encompass roughly 30-40% of the global game marked today (Newzoo, 2016). In the end report of 2015 mobile games showed a global revenue of approximately $25 billion, PC games had a revenue of approximately $32 billion and console games approximately $4 billion (Sillicur, 2016). Additionally, it was found by Statista (2016) that within Apple's app Store the game category was the most popular and had most active apps with 22.99%. This emphasizes that mobile games are growing within the industry with many possibilities, because it is the second largest contributor to the total revenue of the game industry and the most popular and active category on Apple's app Store.

Furthermore, because the game industry in general has become as large as it has and is still growing, the need for developing and keep develop designated play testing methods to games has also become present in order to investigate, optimize and understand players experience and their interactions with the game (Drachen A. , et al., 2009). Likewise, in terms of mobile games this is equally important, as this very competitive area is now the second largest within the game industry and with challenges very diverse from traditional PC and console games. (Smeddinck, Krause, & Lubitz, 2013). Mobile games have a variety of distinct and diverse challenges, like the diversity of players, player scenarios, player patterns and difference in mobile operating systems (Smeddinck, Krause, & Lubitz, 2013). Therefore, it is a very different research area than more traditional game research, as the perception of how, when, why and how long a play session should be, are changing and with mobile game user research or mGUR still being a new field of study and one that needs to keep changing according to new technological development in the industry (Smeddinck, Krause, & Lubitz, 2013). It is a great opportunity to contribute in trying to understand the area, as it is equally important for distinct methods and approaches to be developed in this field of study (Smeddinck, Krause, & Lubitz, 2013).

Additionally, the mobile analytics company Appsee conducted a research in 2015 on 100 mobile games concerning the retention rate of mobile game players one-day, one-week and one-month past play (Even, 2015). What they found was that 28.6% returned to play after one-day, 26.3% after one-week and 22.1% after one-month (Even, 2015). Meaning that the user-retention rate in mobile games is relatively low. The cause for this was found by Appsee to have four main reason; Traffic source, Poor onboarding experience, User expectations not met and Fierce competition (Even, 2015). Also, due to mobile games being released under the F2P model and generate revenue through in-game purchases and adds, playtime is essential for a game to have revenue, but with low retention rates it makes it difficult (Even, 2015). This emphasizes the importance of the onboarding phase, as apps only get one chance to impress players and to give them the desire of returning. Thereby having a poor onboarding phase gives users a bad first impression. In the first impression, how the app works needs to be clear and not confusing and technical problems should not be present (Even, 2015). If the onboarding phase does not work the user will be unlikely to return to the game (Even, 2015).

The fact that the industry is rapidly growing and there is a need for developing mGUR and its methods, and the importance of the onboarding phase in the retaining of players in mobile games, the inspiration of this masters' thesis emerged. The focus was thereby chosen to be within this area, since it was a great opportunity for investigating the fairly unexplored and newer field of mobile games and mGUR.

1.1 Case description

This masters' thesis investigated the possibility for players to experience a flow state in the onboarding phase of three different mobile games from two different collaborators; King (King.com Ltd., 2016) and Norsfell (Norsfell Games Inc., 2016). The three games, which was investigated was; Pogo Chick (Norsfell Games Inc., 2016) WinterForts (Norsfell Games Inc., 2016) and Candy Crush Jelly Saga (King.com Ltd., 2016).

To examine the potential flow states of players in the onboarding phase of these three games, it was investigated if it was even possible for players to experience a flow state in the short period of time, which the onboarding phase of these mobile games were. Furthermore, if different in-game elements contributed to the possibility of experiencing flow and who was more likely to experience it, based on demographic data and the player motivation profile obtained through the profiling tool by Quanticfoundry (2016). The aim of this research was then to clarify if one or more of the three games provided a greater possibility for its players to experience a flow state in the onboarding phase, with the aim of creating a set of recommendations, that can be taken into account and helping the developers when designing or re-designing onboarding phases of mobile games. In this relation nine recommendations were in the end created.

The three games chosen were based both on the possibility for collaborating with the two companies but also based of them being very diverse and having different kinds of onboarding phases. From WinterForts, which has a nominated onboarding phase that takes the player through the game and game elements. To Pogo Chick, which has a 'learn by doing' approach to its onboarding phase. Finally, Candy Crush Jelly Saga, which was the game in-between with a freer onboarding phase than WinterForts but not as free as PogoChick. The possibility to have chosen other games from the two developing companies was present, but these three were seen as the best fit for the investigation of the possibility of experiencing flow in different onboarding phases of different mobile games and in order to find the best approach in regards to onboarding phases.

1.2 Problem statement

The problem this thesis was trying to solve was whether it was possible for players to experience a flow state in the three F2P mobile games and if the onboarding phase

of one or more of these games provided a greater possibility for this and why. On the basis of investigating this, the problem statement of this research is as follows:

Do different onboarding phases of different mobile games and the motivation of players affect the possibility of experiencing a flow state with players?

1.3 Research questions

In order to answer the problem statement, a set of research questions (RQ) was created to guide the process of coming to a conclusion. Firstly, it was important to recognize the area this research resides in by investigating what has been done previously and why the different key elements were important to this research. Secondly, it was central to highlight the important elements that needed to be analyzed, in order to come to a conclusion. Lastly, it was important to stress if the correlation between the data used in this research did enable the possibility of observing a flow state in the onboarding phase of the three F2P mobile games.

RQ1: What has previously been done within the area of game user research and mobile game user research?

RQ2: Why is flow important to the user experience in both games in general and in mobile games?

RQ3: Why is motivation in games important, how does it collaborate with flow and what has been done previously in the area?

RQ4: Do players pre-defined motivational profile or demographics affect the possibility of experiencing flow?

RQ5: Do one or more of the three games provide greater possibility for experiencing a flow state?

RQ6: Do different in-game elements contribute to the possibility for experiencing a flow state?

RQ7: Can the correlation between the data give insights into determining the possibility of experiencing flow in the onboarding phase of F2P mobile games?

1.4 Assumptions

In relation to the RQ different assumptions also arose during the preliminary investigation of this and the formation of the problem statement and RQ:

A1: One of the games has the onboarding phase that provides the greatest percentage of players who experienced a flow state.

A2: Different in-game elements do have an impact on the possibility to observe flow with participants.

A3: It is a possibility to observe flow in the onboarding phase of F2P mobile games.

A4: Different motivational profiles do have a greater possibility of experiencing flow than others.

A5: Demographical data has an impact on the possibility to experience flow.

1.5 Definitions

The definitions beneath have been created in order to help the reader understand the different abbreviations and phrases frequently used throughout this thesis:

Onboarding phase: The onboarding phase refers to the first few minutes of gameplay with a new user. That was found to be the first seven minutes of gameplay in the three games, based on statements from the developers and their intended experience graphs (Norsfell Games Inc., 2016; Maroda, J., personal communication, 24 Marts, 2016: King.com Ltd., Magnusson, J., personal communication, 11 April, 2016: Appendix H). The onboarding phase is in the categories sometimes also referred to as the tutorial.

Test session: The definition of test session refers to the test as a whole with the test participants (TP).

Play session: The definition of play session refers to the three individual play sessions which each test session contained.

In-game elements: In-game elements refers to elements like design features or other game functionalities or elements that all contribute in making the game what it is.

FSS: Refers to The Flow State Scale questionnaire by Jackson & Marsh, (1996).

Motivation/motivational questionnaire: Refers to The Game Motivation Profile questionnaire by Quanticfoundry (2016).

Motivation/motivational profile: Refers to the results received from The Game Motivation Profile questionnaire by Quanticfoundry (2016).

Flow/flow experience/the flow state: A flow state, is defined by the state where one gets so involved or immersed into an activity that nothing else around seems to matter (Csikszentmihalyi, 1990).

Flow abbreviations: The 9 dimensions of flow measured in the FSS, has been shortened down to 9 abbreviations, which are as follows: Challenge – skill balance (Chal), Clear goals (Goal) Unambiguous Feedback (Fbdk), Sense of Control (Cont), Concentration on Task at Hand (Conc), Transformation of Time (Trans), Loss of Self-Consciousness (Loss), Autotelic Experience (Enjoy) and Action-Awareness Merging (Act).

Motivation abbreviations: Like the 9 dimensions of flow the 6 factors from The Game Motivation Profile questionnaire by Quanticfoundry (2016) has also been made into abbreviations, which are as follows: Action (Act), Mastery (Mast), Achievement (Ach), Social (Soc), Immersion (Imm) and Creativity (Crea).

F2P abbreviation: Refers to Free-to-play mobile games.

TP abbreviation: Refers to test participant or test participants.

2 Literature Review

Before finding relevant literature, an initial investigation on the topic of this thesis was done, to find out what domains surrounded it and thereby what needed to be considered in order to get an understanding of the research area. What was found by this initial literature research was that the topic is situated in four main areas, which are Game User Research (GUR), User Experience (UX) and Flow in games, Usability in games and Player Motivation in games.

Based on these four main areas found, it was decided what approach to take when doing the literature search. Here it was decided to use the thematically based literature review (The Writing Center, 2016). The reason for this was that the topic of this thesis was naturally multidisciplinary. Therefore, a chronological based literature review (The Writing Center, 2016) would not be appropriate to this topic and would be confusing as the amount of literature is so vast.

The first of the sections that deal with the areas, which this thesis resides in, is named Game User Research. This section will concern the area of GUR; what methods are used in this field, where it ordinates from and how it has been adopted and adapted. Furthermore, it investigates research done on mobile devices and on GUR in a mobile context also called mGUR.

The second section is named User Experience and Flow in games and concerns what UX is, how it is used traditionally and how it has been applied to the area of games and mobile devices. Furthermore, this section also investigates why flow is important to UX in games and what methodologies are used to measure this.

The third section named Usability in games concerns what usability is, what it does in a traditional manner and why it is an important part of players experience, the playability and thereby game and mobile game research.

The fourth section named Player Motivation in games concern Self-determination theory (SDT), how this has been applied to games and mobile devices, and why this is important.

Lastly, a summary section is included to sum up the findings of this literature review and how it has helped in the understanding of the areas surrounding the thesis topic and how previous research could contribute to it.

2.1 Search strategy

In this section, how and in what databases literature was obtained and what search strings were used when searching in these databases is explained.

To start finding literature on this research topic, the search began in AUB's list of databases to find the most relevant ones for this area (AUB, 2016). By using the category filters, it helped to narrow down the list of databases and come closer to the ones relevant to investigate further. Five filters and eight categories were used and by

filtering multiple times to try to reduce the amount of databases. Four were found to be the most relevant ones, which was as follows:

- ProQuest (Proquest, 2015)
- Springer (Springer, 2015)
- ACM (ACM, 2016)
- IEEE (IEEE, 2016)

Some of the databases were found to have more relevant literature than others, for example was ACM (ACM, 2016) found to be the one with most relevant literature. Additionally, the amount of literature found in these databases was so large that it exceeded the amount of literature that it was possible to cover during this thesis.

To search on these different databases different search strings were created and used both as a whole but also in pieces or with small changes or additions applied to their structure to try to either reduce or increase relevant results.

An example of a used search string is the search string below, which was used to find literature on Games user research (GUR). By using the whole string on e.g. ACM 304,345 results were found, therefore different pieces of the string were used and changes applied to it and to the search settings, to try to reduce the number of results. This helped and gave only 10 results (Appendix A).

1. "Game user research" OR GUR
2. AND methods* OR tools OR approach* OR practice*
3. AND User* OR player*
4. AND testing OR research* OR study*
5. AND Mobile
6. AND device* OR platform OR game*
7. AND "Onboarding phase" OR "intro phase" OR "learning phase" OR "introduction phase"

This search string, its results, the other search strings and their results can be seen in more detail in appendix A.

Besides literature found by these literature searches, our supervisor also provided a large amount of usable literature within the topic and the field of game research, as this is his expert area. He is a well-recognized expert in the area of game research and game analytics etc. and is one of the most published scientists worldwide within this field (LinkedIn, 2016).

Furthermore, Google Scholar (Google, 2015) was used as a practical side tool to find specific literature from references in articles found by the database searches and from the supervisor. Google Scholar provides an overwhelming amount of both relevant and not-relevant results, which can be problematic. Nonetheless this disadvantage also has its advantage, because it has a very broad search spectrum, it can be a useful tool for finding specific articles or papers. However, because of this large amount of overwhelming results, which can be of questionable quality, it is not

suitable to use as the primary literature search tool. Therefore, the peer previewed literature found by database searches is preferred, as it can give more specific results.

2.2 Game User Research

The area of Game User Research or GUR for short, is a large field and much has been done to find the best methods for testing and explaining playability and player experience in different games, with the aim of increasing the UX, the usability and fun in games, in order to design or re-design according to the player's needs.

When dealing with the case of this thesis, it is important to investigate the area of GUR and what has been done previously in order to understand the area and how games have been tested before and what is important when player testing games.

To give a short explanation of what GUR is; it is the investigation of the game designer's intended player experience and what the player actually experiences (Collins, Nacke, Mirza-Babaei, Gregory, & Fitzpatrick, 2013). Furthermore, Nacke (2015) describes GUR as an area of research that has been adapted from the areas of Human-Computer Interaction or HCI, human factors, social psychology and scientific user testing. This is why the methods within GUR, for most parts, are roughly the same as seen in these fields, especially within HCI. In some cases, the methods have been modified to be more adequate within the field of GUR (Zammitto, Kobayashi, Mirza-Babaei, Nacke, & Livingston, 2014). Additionally, these methods are seen as best practice and are the standard within the industry (Collins, Nacke, Mirza-Babaei, Gregory, & Fitzpatrick, 2013).

When dealing with GUR in an industry context, the aim is to generate data that allows for analyzing and understanding the player experience and playability of games. This is done in order to communicate findings to the game designers and developers, to make the game more fun for players (Nacke L. E., 2015; Drachen A. , et al., 2009).

Some of the more traditional methods, which have been adapted from HCI and used within GUR, are;

- Behavioral Observation, which according to Nacke (2015) is one of the core methods used in GUR, because it is easy to learn and use, and it supports the gathering of large amounts of data quickly.
- Think-aloud is commonly used in combinition with behavioral observation, because it provides an explanation to what is being observed. Think-aloud, as it is used in GUR, has been adapted from interaction design (Nacke, 2015).
- Heuristic evaluation has also been adapted from HCI and Usability. Nielsen & Molich (1990) were some of the first to stress this area in their work and it was based on their previous work on usability research. Heuristic evaluation is a less expensive method for evaluating usability. Because the traditional heuristics are not usable for games, different heuristics that applies to games has been created inspired by the classic ones (Nielsen & Molich, 1990).

- Questionnaires are also a commonly used method within GUR. When using questionnaires in GUR, it is often used either during gameplay, when gameplay events happen or after the play-session has ended to collect insights into the player experierence. Furthermore, the Likert scale is often applyed to questionnaires (Nacke, 2015; Likert, 1932). Nacke (2015) explains that post gameplay interviews, has a greater chance of biasing the data, than questionnaires, because players are asked to recall events that have happened during gameplay, and remembering can be difficult. Furthermore, when using questionnaies in GUR, there are different standard questionnares created to fit the area of research, which enables comparison of results between studies. Such standard questionnaires are for example the Game Engagement Questionnaire (Brockmyer, Fox, Curtiss, McBroom, Burkhart, & Pidruzny, 2009)
- Even though interviews have a greater chance of biasing the data, as explained above, they are still a very used method in GUR, also adapted from HCI. In order to try to minimize the bias with players not recalling actions or play events, researchers can use gameplay video to help jumpstart the TP memory (Nacke, 2015).
- Focus groups are a traditional user testing and UX evaluation method, widely applied to HCI and used in GUR on some occasions. However, as Nacke (2015) points out, focus groups are not the most valuable method when dealing with GUR, because it is less interesting in GUR to know what people think they do or think they have done and more interesting to look at what people actually do.
- Within GUR, game metrics and analysis is one of the only novel methods, solely created for the purpose of GUR. It is a newer method and as Nacke (2015) states, the work done by Drachen, Canossa, & El-Nasr (2013) thoroughly describes the method, its context and use. Additionally, game metrics are often used to vizualize the large amound of data collected during gameplay sessions, focussing on the behavior of players and not experience (Collins, Nacke, Mirza-Babaei, Gregory, & Fitzpatrick, 2013).

Most GUR studies use a mix of the above mentioned methods to collect both objective and subjective measures in order to evaluate playability and player experience. As stated by Zammitto, Kobayashi, Mirza-Babaei, Nacke, & Livingston (2014), it is important to incoorporate a mix of methods when researching the UX in games, because it is such a complex area. Thereby, mixing different methods provides researchers with a more complete picture to conclude upon.

Likewise, Drachen A. , et al. (2009) discuss the methodological advancements in playability and player experience research and argue on the advantages and disadvantages of the mix of different methods and concluded that a mix of different methodologies gives the basis for the best approach. The reason being that it enlightens a fuller picture of player experience, which single methodologies do not have the possibility to (Drachen A. , et al., 2009).

In the investigation of mobile devices and user research done on particularly apps and games, different studies were found. Väätäjä (2010) found that when developing

mobile systems, it is important to uncover users' needs and goals as they play a part in their experience and intrinsic motivation. Abney, White, Bermudez, Brecko, & Glick, (2014) from Disney Interactive, found that when introducing an unnatural element into the play session on mobile devices, even though it is only a camera attached on top of a phone, it still makes a change in player behavior. Stressing how easily data can be affected and biased by the methods used for data collection on mobile devices. This emphasizes the importance of considering that even small changes in the natural setting of TP, impacts their behavior.

Likewise, when dealing with user research in a mobile game context, it is also a complex area with distinct challenges that include diversity in devices and usage scenarios, players might play games in a diversity of places where total immersion and focus can be difficult to achieve. These distinct challenges need to be considered when designing mobile games (Smeddinck, Krause, & Lubitz, 2013). Because of the complexity in mobile games user research or mGUR there is a need for developing distinct methods and procedures to develop the market, which there is limited amounts of at the moment (Smeddinck, Krause, & Lubitz, 2013). A study by Duh, Chen, & Tan (2008) additionally discovered that developing mobile games is complex and instead of implementing too advanced features into games, game developers must reflect on the mental models of users. Meaning that it is more important that the game is developed to be easy to control on the device used to play on, than implementing fancy features for the mobile device, just because it is a possibility.

Below is a model illustrating the area of mGUR and how it originates and is adapted from GUR, which is adapted from HCI:

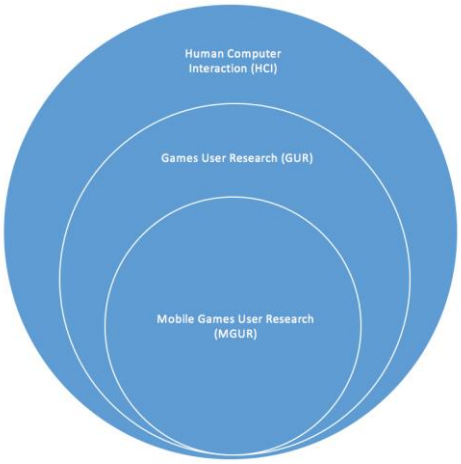


FIGURE 1: MODEL OF RESEARCH AREAS

2.3 User Experience and Flow in games

UX is also something that within GUR has been widely investigated and is important when investigating flow, because flow is related to the experience, which the player is experiencing through gameplay. Nielsen & Norman (2014) describes that traditional UX has two main requirements that need to be met by a product in order for it to have a good UX. The first requirement is that a product needs to meet the exact needs of its users. The second is that the product needs to be simple to use and have elegance, as it makes the product both a joy to use and own. When dealing with UX it is not only about what the users say they want, it is also about what they actually need, which may not be the same and something they do not know they need, but is essential for them to have the ultimate experience (Norman & Nielsen, 2014).
Nielsen & Norman (2014) also explains how UX is not the same as having a good user interface even though it is important, it does not give the full UX. Emphasizing that having a good usability is not equal to a good UX. Although it is important to have a good usability and thereby a system that is easy to learn, pleasant to use and is useful, it does not give the user the full UX (Norman & Nielsen, 2014; Nielsen J. , 2012).

Within games, the requirement of meeting the users' needs and having simplicity and elegance is also important but it is more complex than that. Additionally, fun and arousal have to be taking into account. One important addition to UX in games is the concept of flow which was found by Csikszentmihalyi in 1990 by his work on dancers and chess players (Csikszentmihalyi, 1990). Flow has since been widely used in the area of games (Sweetser & Wyeth, 2005) and concerns the concept of having the ultimate or most optimal experience, because they are so engaged or immersed into an activity that nothing else matters (Csikszentmihalyi, 1990). Csikszentmihalyi (1990) found that within flow nine dimensions exist that have an impact on experiencing a flow state. These dimension are; challenge-skill balance, action-awareness merging, clear goals, unambiguous feedback, concentration on task at hand, sense of control, loss of self-consciousness, transformation of time and autotelic experience (Csikszentmihalyi, 1990).

In order to measure engagement and flow, different questionnaires have been created and used in games. One example of these questionnaires is the Flow State Questionnaire or FSS (Jackson & Marsh, 1996), which is a 36-item Likert scale based questionnaire (Likert, 1932) meaning that the users are asked to rate their experience on a 5 point scale. Furthermore, the questionnaire is based on the nine dimensions of flow by Csikszentmihalyi (1990). This questionnaire was originally created by Jackson & Marsh (1996) in a study on flow in a sport and physical activity context. It was later used in games by Kivikangas (2006) and further re-created and adapted by Klarkowski, Johnson, Wyeth, Smith, & Phillips (2015). Another example of a questionnaire used to measure engagement in video games, is the Game Engagement Questionnaire or GEQ by Brockmyer, Fox, Curtiss, McBroom, Burkhart, & Pidruzny (2009). This questionnaire is a 19-item questionnaire, with yes or no answers. What the researchers investigated when they created this questionnaire, was presence, flow, absorption and dissociation in video games (Brockmyer, Fox, Curtiss, McBroom, Burkhart, & Pidruzny, 2009).

Besides questionnaires, other methods have also been used to evaluate UX in games. One example of another method, is the method presented by Drachen, Nacke, & Göbel (2010). Here a commonly used concept within mobile game testing is described; the concept of player context experience, which concerns the contexts that the player is playing a certain game in has an impact on how the game is percieved by the player. Within the investigation of this cultural debugging, qualitative interview, ethnography, questionnaires and multiplayer game metrics, is used (Drachen, Nacke, & Göbel, 2010).

Flow is also a relevant area within mobile applications and games, because it concerns the ultimate UX and as with desktop or console games, there is also a need for mobile games to give a compelling experience in order for users to want to play the mobile game (Zhou, 2012). The study by Zhou (2012) indicated that the possibility for reaching a flow state in mobile games is present and that three main factors affects it; Ease of use, Connection, and Content quality. Content quality was the one with the greatest effect on flow (Zhou, 2012). Likewise, flow experience can also be an important factor to mobile applications in general, such as mobile learning spaces, which are stressed by Park, Parsons, & Ryu (2010) in their study.

2.4 Usability in games

Though usability is not a sole player in having a good UX, it is still an important aspect to take into account, also when dealing with games. Nielsen J. (2012) describes usability as a quality attribute, which adresses how easy or difficult a user interface or product is to use. This is also the reason why usability is so important to products of interface, because if something is difficult to use, users will not use it (Nielsen J. , 2012). Within usability five quality components are defined as being important to having a good usability. These five components are; Learnability, Efficiency, Memorability, Errors and Satisfaction (Nielsen J. , 2012). Furthermore, Nielsen (1995) made a set of usability heuristics, which aims at providing a set of guidelines that applies to creating or optimizing websites (Nielsen J. , 1995).

Usability in games focusses as traditional usability on the use of the game, meaning the controls, the game challenges, problems, and how a user is interacting with the game, but player enjoyment is also important when developing an experience (Sweetser & Wyeth, 2005). To try to assemble these two elements of game development, Sweetser & Wyeth (2005) have made a model called the GameFlow model. This model consists of eight elements that have been adapted from the nine dimensions of flow by Csikszentmihalyi (1990).

However, designing a system for mobile devices is different from designing any other system or traditional game. The usability has other factors that are important to take into account, the UX and needs are very different and the use and context are also very different from traditional systems or games. A study by Ickin, Wac, Fiedler, Janowski, Hong, & Dey, (2012) investigated what factors were important to the quality of UX on mobile devices. They found that the factors important to this were much more complex than traditional usability and usefulness factors. Examples of the

factors they found is; Interface Design, Battery life, Performance, Features, User routines and Lifestyle. A related study of a newer date by Angulo & Ferre (2014) found that when dealing with different platforms, in this case IOS and Android, coding everything from the bottom up without a cross-platform framework, gives developers more control over potential interaction issues and thereby the possibility for a better UX. This means that there is a possibility of apps or games being different on different platforms, because they are different enough that coding specifically for each platform is better than having one for all.

Additionally, another reason why usability in a mobile context is so much more complex than in traditional systems, such as websites, desktop applications or in games, is due to its diverse and unique challenges. Because of this there is a need for developing and adapting guidelines to fit the mobile environment (Zhang & Adipat, 2005). Zhang & Adipat (2005) proposed a framework for conducting usability studies on mobile devices and provided a set of detailed guidelines for this.

Korhonen & Koivisto (2006) also described in their paper *Playability Heuristics for Mobile Games* that traditional heuristics cannot be applied within games, and mobile games in specific. Therefore, they introduced a new set of heuristics, which were adapted to apply to games, called playability heuristics. These playability heuristics were presented in a model that consists of three modules, which are; Mobility, Gameplay and Game usability. Furthermore, they are designed as traditional heuristics, to be a set of guidelines and a form of expert evaluation that applies to any mobile game (Korhonen & Koivisto, 2006).

2.5 Player motivation in games

Research within self-determination theory and human motivation is a field widely applied with success to different research areas both in sports, education and leisure (Johnson, Nacke, & Wyeth, 2015). It focusses on what human motivation is, how it can affect and have the possibility to enhance engagement and enjoyment (Rigby, Ryan, & Przybylski, 2006; Przybylski, Ryan, & Scott, 2010) Within this research area two kinds of motivation types have been presented, which are *intrinsic* and *extrinsic* motivation (Ryan & Deci, 2000). *Intrinsic* motivation is the motivation that naturally occurs and is not based on rewards of any kind but on the activity itself (Ryan & Deci, 2000). On the contrary *extrinsic* motivation is the motivation based on rewards and the outcome of an activity and not the activity itself (Ryan & Deci, 2000).

According to research done by Przybylski, Ryan, & Scott (2010) and Rigby, Ryan, & Przybylski (2006) focusing on self-determination theory and its applicability in a game context. Games have the possibility to increase *intrinsic* motivation and well-being in players by providing experiences that satisfy the three basic psychological needs; Competence, Autonomy, and Relatedness. Additionally, Mastery of controls and Players experience of immersion is also important factors in increasing *intrinsic* motivation (Przybylski, Ryan, & Scott, 2010). By increasing the *intrinsic* motivation in gameplay, it positively affects game enjoyment (Rigby, Ryan, & Przybylski, 2006; Przybylski, Ryan, & Scott, 2010). Furthermore, Weinstein, Przybylski, Ryan, &

Rigby (2009) discovered in their study on video gameplay that low levels of need satisfaction led to an obsessive passion for that game, which led to higher amounts of play and tension after play. Furthermore, it also fostered low enjoyment, because it gave the feeling of having to play instead of wanting to. On the other hand, they discovered that higher levels of need satisfaction led to more harmonious play, with higher enjoyment and with higher energy levels following gameplay (Weinstein, Przybylski, Ryan, & Rigby, 2009). Though higher levels of need satisfaction did not lead to the prediction of added hours of gameplay, it led to a slight increase in well-being and the feeling of wanting to play and not having to (Weinstein, Przybylski, Ryan, & Rigby, 2009).

Quantic Foundry is a company, which has developed a survey and profiling tool, that can measure what kind of motivation a person has in regards to games and thereby has the possibility to map what kind of game activities and game types have the greatest possibility of motivating that specific person (Quanticfoundry, 2016).

Though much different research has been conducted in the area of games in general, nothing was found that specifically concerned the area of mobile games and player motivation. However, it was seen as a possible correlation with the area of flow, as the nine dimensions of flow also has the possibility of cooperating and fulfilling the three basic psychological human needs.

2.6 Summary

In the literature review regarding the areas surrounding this thesis topic of flow in mobile games, using different metrological approaches for correlation. Limited amounts of data were found within academia and databases. Furthermore, nothing was found regarding player motivation and mobile games in specific, though research exists in regards to video games.

The reason why limited amounts of literature were found in regards to the research areas of this thesis, could possibly be because the keywords used in this literature review were not the same as used in research regarding this, or that the searches were not broad enough or maybe too broad. It can also be because the body of knowledge in the field could be situated within the industry and would therefore not be accessible to the public due to corporate secrecy. Companies that could hold large amounts of knowledge could be companies such as King (King, 2015), Disney (Disney, 2016), Microsoft (Microsoft, 2016), Sony (Sony, 2016) etc. Furthermore, it was found after communicating with different area experts, such as Mirza-Babai Pejman, Lennart Nacke and the supervisor of this thesis Anders Drachen, that they agreed to the fact that the literature regarding Flow, UX, Usability and Motivation in a mobile game context is limited and that little has been done previously in academia (Drachen, A., personal communication, 12 February, 2016).

Because nothing, to our knowledge, has been done in the area of flow and F2P mobile games, this study can contribute with new knowledge in the area of user testing on mobile games. Give new insights into a relatively new and fairly unexplored area in terms of academic research and possibly contribute with shaping

this new and rapidly growing field, which has a great need for the development of distinct methods and approaches that can be iterated further in the future.

Additionally, it was clear that the relevant literature surrounding this thesis, could contribute with inspiration in how this research could be conducted, what approaches to take, what methods to use and how it could contribute with something new to the field.

Based on the investigation on relevant literature, it was found that a mix of methods would be the best approach to gain insights into flow in F2P mobile games, what effect it has and how GUR methods can be used in this context for user testing on mobile devices and games. Furthermore, it helped in answering **RQ1**, concerning what has been done previously, **RQ2** about why flow is important to UX in games in general and in mobile games, and **RQ3** which concerns why and how motivation collaborates with flow.

3 Theory

In this chapter, the theory of player motivation and flow used in relation to the investigation in this masters' thesis, will be presented and explained.

3.1 Player motivation

When dealing with potential flow experiences in games, player motivation is important and interesting to take into account, because motivation links directly to the experience of the user. If the users are not getting a form of satisfaction and experience to feed their motivation, they will not keep playing. Therefore, the game needs to provide the user with a fulfilling experience to motivate gameplay, which could be impacted by the individual player's motivation profile (Przybylski, Ryan, & Scott, 2010).

In order to collect data and insights into the pre-defined motivation profile of the TP, the questionnaire called The Game Motivation Profile questionnaire was used. This questionnaire was developed by the game analytics company Quantic Foundry, which is newly founded by Nick Yee and Nicolas Ducheneaut. Both of whom have academic backgrounds and have been conducting research within the game industry and academia for over a decade (Quanticfoundry, 2016). They started working together in 2005 on Palo Alto Research Center and later joined Ubisoft in 2012, where they founded the Gamer Behavior Research Group (Quanticfoundry, 2016). The Game Motivation Profile questionnaire is the newest tool within player motivation and is based around the further development of the Online Gaming Motivations Scale developed by Nick Yee, Nicolas Ducheneaut and Les Nelson in 2012 at Palo Alto Research Center (Quanticfoundry, 2016; Yee, Ducheneaut, & Nelson, 2012).

In this research it was relevant to consider measuring the motivation of players and if different kinds of pre-defined motivations affected how easily the TP was motivated and experienced flow in the three games. By using The Game Motivation Profile questionnaire, which is an alternative to using the Player Experience of Need Satisfaction or PENS questionnare (Przybylski, Ryan, & Scott, 2010) and Bartels Player Types (Bartle, 1996; Quanticfoundry, 2015), it helped give an understanding of what motivates players, which is such an important part of gameplay and player engagement; that players are motivated.

This approach, gave the opportunity to correlate the player profiles and their motivations, with the data from the FSS questionnaires, which were answered after each playsession and from the interview during the stimulated recall. These data, contributed to analyzing whether or not and to what extent the pre-defined motivations of the TP affected their possibility for experiencing flow in the three different F2P mobile games. With the aim of contributing to the set of recommendations regarding onboarding phases of mobile games and how flow and motivation potentially interact with each other, which can be used for future game

development or re-development. It also contributed in answering the problem statement.

The Game Motivation Profile questionnaire considers player motivation, which is grounded back in the work done on human motivation and self-determination theory (SDT) by Ryan & Deci (2000). That concerns the motivation of humans in which they have identified two types of motivation; *Intrinsic* and *Extrinsic* (Ryan & Deci, 2000). The Game Motivation Profile questionnaire and its methodology will in more detail be described in section 4.2.1: Questionnaires.

The first motivation type deals with behaviors performed in the search of enjoyment, where motivation is not a conscious choice, but rather something that naturally occurs in this search and comes from within oneself. This type of motivation is within SDT identified as *intrinsic motivation* (Ryan & Deci, 2000). The work on SDT done by Ryan & Deci (2000) suggests that the most important physiological human needs, which has to be satisfied in order to enhance *intrinsic motivation*, and thereby self-regulation and well-being are; a) Competence, b) Autonomy and c) Relatedness. In relation to games, this is important, as if these needs are nourished; they enhance the players experience of fun and enjoyment of a game, and increases their immersion into the game (Przybylski, Ryan, & Scott, 2010). These three needs have the possibility to independently predict or investigate whether or not a game has a high level of enjoyment and whether or not players will play a game in the future (Rigby, Ryan, & Przybylski, 2006). Because they are independent of each other, all of them can be used in a research or the relevant ones can be chosen.

On the contrary, there is the *extrinsic motivation*. Where the end goal is what motivates, it is not likely the work needed to reach the goal, but the goal itself (Ryan & Deci, 2000). In contrast to *intrinsic motivation*, where motivation is not a conscious choice, the motivation here is, and it is chosen to reach a desired goal (Ryan & Deci, 2000). As Przybylski, Ryan, & Scott (2010) states, people experience an activity widely different, when asked to do it based on the encouraging of the different motivations. Those experiencing *extrinsic motivation* based on goals, rewards, evaluations and even pressure, are not enjoying activities as much compared to those who experience *intrinsic motivation.* Those who are enjoying doing the activities more, are more creative and have a greater cognitive flexibility (Przybylski, Ryan, & Scott, 2010).

Rigby, Ryan & Przybylski (2006) explain *intrinsic motivation* as *"the core type of motivation underlying play and sport"* (p. 349). Based on this and the fact that *intrinsic motivated* people experience more emotions that are positive and have more fun than *extrinsic motivated* people have. *Intrinsic motivation* is the most desirable motivation to achieve in a game context but this is difficult to achieve and people will almost never be fully *intrinsically motivated* (Rigby, Ryan, & Przybylski, 2006). Thereby the aim for games is to enhance the *intrinsic motivation* of players, and thereby game research should investigate whether or not specific games reach this (Przybylski, Ryan, & Scott, 2010). When games independently satisfy one or more of the three physiological needs; a) Competence, b) Autonomy and c) Relatedness with players, they have the possibility to enhance the *intrinsic motivation* and well-being. Thereby this gives a greater enjoyment and future engagement in the game according

to the research done by Przybylski, Ryan, & Scott (2010). In their research, they created a need satisfactory model for video game engagement, measuring the levels of well-being and *intrinsic motivation* in players.

Competence need

When dealing with the Competence need in the field of games, it concerns that a game needs to be created in such a way, that the difficulty gradually increases, enabling the player to increase their competences towards the game (Przybylski, Ryan, & Scott, 2010).

Autonomy need

The need of Autonomy is the need for self-exploration of a game and choosing which paths to take to reach the end. Thereby game developers needs to design a game to enable for freedom to fulfill this need. To have many possible paths to reach different goals and quests and allow players to explore the game world, in order to satisfy their curiosity. Allowing the player to feel that they are finding their own patch's in the game and to some extent shaping the narrative (Przybylski, Ryan, & Scott, 2010).

Relatedness need

The last of the three needs, is the need of Relatedness, which concerns the need for social interactions. In a game relation, it is also very relevant, as social interactions in games are very popular today, where players connect to the internet to get into the virtual world of a game with other gamers. When in this virtual world with other gamers, it enables them to interact with each other, complete goals and quests together, and create bonds to each other for longer in-game relationships (Przybylski, Ryan, & Scott, 2010).

Mastery of controls

Another important factor to consider in relation to games is mastery of controls, because as stressed by Przybylski, C., & Ryan (2010), it is important in order for a game to satisfy the psychological needs necessary to increase the *intrisic motivation*. It cannot on its own satisfy these psychological needs and thereby increase the *intrisic motivation*. But in contrary, the needs cannot be satisfied without the player understanding and mastering the controls of the game, which enables them to play it (Przybylski, Ryan, & Scott, 2010). Therby the mastery of controls is also an important aspect to considur when investigating games and the *intrisic motivation*.

Self-determination continuum

In relation to SDT, a model or as it is called a self-determination continuum have been made to illustrate the taxonomy of the different motivational types, all of which are experientially, theoretically and functionally distinct (Ryan & Deci, 2000). The model, which is arranged from left to right, shows the different types of motivation, from being non motivated or *amotivated* to being *extrinsic motivated* and at the far right, being *intrinsic motivated* and how these types of motivation are placed in terms of behavior, the self and their internalization (Ryan & Deci, 2000). This model helps by both visualizing the different motivations and their relations to each other, but it

also visualizes the motivations that exists on the continuum and that one can experience different degrees of the different motivations (Kowal & Fortier, 1999).

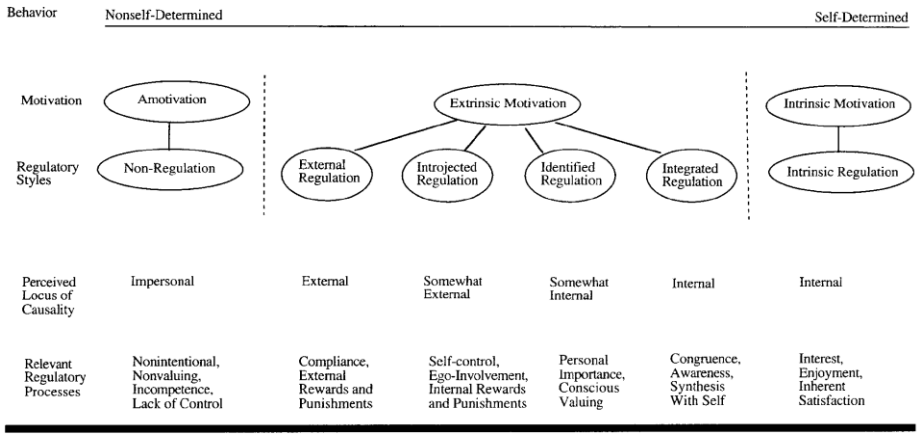


FIGURE 2: THE SDT CONTINUUM (RYAN & DECI, 2000, P. 72).

Within SDT a lot of research has, along the years, been done to establish five subtheories to compliment the macro theory, which SDT is (Ryan & Deci, 2000; Vansteenkiste, Niemiec, & Soenens, 2010). These subtheories are a) cognitive evaluation theory, b) cognitive evaluation theory, c) Causality orientations theory, d) Basic psychological needs theory and e) Goal content theory.

Cognitive evaluation theory

The first subtheory, Cognitive evaluation theory (CET) deals with trying to identify factors that act in the variability of *intrinsic motivation* and how these can act to increase this motivation rather than decrease it (Vansteenkiste, Niemiec, & Soenens, 2010).

Organismic integration theory

The second, Organismic integration theory (OIT) is a subtheory that aims to detail the internalization of the different *extrinsic motivations* and thereby the factors within human values, believes, and behaviors that encourages or discourages it (Ryan & Deci, 2000).

Causality orientations theory

The third subtheory Causality orientations theory (COT) is in contrast to the two previous subtheories, because it focusses on how people are changing behavior in orientation with the environment and setting they are situated in. This is what is called causality orientations and within COT three types are addressed, which are the *autonomy orientation*, the *control orientation* and the *impersonal orientation* (Vansteenkiste, Niemiec, & Soenens, 2010).

Basic psychological needs theory

The forth subtheory is named Basic psychological needs theory (BPNT). What this subtheory addresses is that the three basic physiological needs are essential for well-

being and health. It stresses, that if any of these are not fulfilled, it will have an impact on health and well-being (Vansteenkiste, Niemiec, & Soenens, 2010).

Goal content theory

The fifth subtheory of SDT is Goal content theory *(GOT)* (Vansteenkiste, Niemiec, & Soenens, 2010). This subtheory deals with the distinctions that exist between *intrinsic* and *extrinsic* goals and how these different goals have an impact on both the wellness, health and motivation of people (Vansteenkiste, Niemiec, & Soenens, 2010).

3.2 Flow theory

Flow is the subjective phenomenon people are experiencing when they achieve the most ideal experiences of engagement and become so involved into an activity that time goes by without them noticing it (Csikszentmihalyi, 2014). The reason why they are experiencing flow is that they are so engaged in an activity, that nothing else matters (Csikszentmihalyi, 2014). This is why it is so important for games to achieve flow, as it means that the players are having the optimal experience and hence engagement.

The research of flow emerged from previous research done on SDT and *intrinsic* and *extrinsic motivation*, where people are so intrinsically motivated by the activity itself and the fun within, that the potential extrinsic rewards do not matter (Csikszentmihalyi, 2014). Therefor SDT and flow are a good choice to support each other, as flow is a further development of SDT. Additionally, Kowal & Fortier (1999) describes that studies have indicated that there is a relation between people being motivated and experiencing high levels of flow. Thereby this contributes to answering **RQ3** in emphasizing how motivation and SDT relates to flow theory

Mihaly Csikszentmihalyi is the one credited for his work on flow theory. He spent many years researching the area and idea, in order to discover the dimensions needed to reach flow and what happens when people reach it (Schell, 2008; Csikszentmihalyi, 2014; Csikszentmihalyi, 1990).

What he found during his many years of research was that within flow, there are nine different dimensions, which all have an effect on flow but are not all needed in order for flow to occur (Jackson & Marsh, 1996; Csikszentmihalyi, 2014). These dimensions are a) Clear goals, b) Unambiguous feedback, c) Continuously challenging, d) Awareness margin, e) Transformation of time, f) Loss of self-consciousness, g) Total concentration, h) Sense of control and i) Autotelic experience.

Clear goals

The first important dimension is that of clear goals. It is the simple idea of people clearly understanding tasks that they are given, it does not matter whether the tasks are difficult or easy, what is important is that they are clearly presented (Schell, 2008; Csikszentmihalyi, 2014; Jackson & Marsh, 1996). In games, three different types of tasks exist; explicit, implicit and player-driven tasks (Murphy, 2016). Explicit tasks

are in-game tasks that are determined and defined by the game developers, things that need to be completed in order to continue playing (Murphy, 2016). Implicit tasks are tasks that are designed for the players to not directly complete, but to reach by playing the game. It is not tasks that need to be completed in order to keep playing but the opportunity to complete them exist and the desire to complete them is expected by the developers (Murphy, 2016). The last type of task is player-driven tasks, they are different than the two previous, because it is tasks that players chose for themselves, it could be creating elements in the game. None of these tasks are defined or expected by the developers (Murphy, 2016).

Unambiguous Feedback

The next important dimension is unambiguous feedback, because it is important for people to get immediate feedback from an activity in order for them to know that progress is occurring (Schell, 2008; Csikszentmihalyi, 2014; Jackson & Marsh, 1996). Besides giving immediate feedback to people, it is also important to give noticeable and precise feedback that in a game context help players learn and understand what is happening in the game (Murphy, 2016).

Challenge and skill balance

That a game should be continuously challenging, and have a balance between skill level and challenges is another dimension important in achieving flow (Schell, 2008; Csikszentmihalyi, 2014; Jackson & Marsh, 1996). What this mean is that the difficulty in the game should be neither too hard nor too easy, it should be balanced. Thereby it should be designed, so that it is possible for players to achieve goals and challenges, without being agitated or bored (Schell, 2008; Csikszentmihalyi, 2014; Jackson & Marsh, 1996).

Action and awareness margin

The next dimension of flow is awareness margin, where people experience being so deeply concentrated in an activity that the activity happens automatically and people do not perceive themselves as being independent of the action (Jackson & Marsh, 1996).

Transformation of time

In relation to the dimension above is the next, as it concerns the transformation of time, where time either passes by seeming extremely fast or slow or on the contrary disappears altogether and becomes irrelevant (Jackson & Marsh, 1996).

Loss of self-consciousness

Furthermore, the next one is also in close relation to the two above, as it concerns the loss of self-consciousness, meaning that people doing an activity becomes so focused on the activity, that they become one with it and perform it intrinsically (Jackson & Marsh, 1996).

Concentration on task at hand

The next dimension of flow is the need for total concentration and minimal distraction when wanting to achieve flow (Jackson & Marsh, 1996; Csikszentmihalyi, 2014). What this means is when people is doing an activity, concentration is essential in order for them to reach a flow state. For them to be that concentrated and remain being so there is a need for a minimum of distraction (Csikszentmihalyi, 2014; Jackson & Marsh, 1996). This applies to both internal and external distractions. External distractions are almost impossible for game developers to control when players are playing games at home, but it can be controlled in a test setting (Murphy, 2016). Internal distractions in the game can also be a factor, meaning that the game itself can distract players; it could be by opening ads or having tips and tricks pop up and interrupting gameplay, sometimes occurring at critical points (Murphy, 2016). This means that in-game elements can have the potential of being the biggest distractions.

Sense of control

The sense of control is also one of the nine dimensions of flow, as it relates to the feeling of anything being achievable and people not actively searching for control but more the feeling of it being a possibility (Jackson & Marsh, 1996).

Autotelic experience

The last dimension of flow is the autotelic experience, which is described to be the end goal of flow; it is about people having an enjoyable experience, meaning that the experience has given them intrinsic rewards (Jackson & Marsh, 1996).

The data collection and analysis of flow

Within flow theory, many different methods have been used to both collect data and analyze them. Interview was the method first used when flow emerged in Csikszentmihalyis work in 1975 (Csikszentmihalyi, 2014). The way interviews were used was by asking people or participants open-ended questions about their experience with an activity and analyze on these answers in relation to flow (Csikszentmihalyi, 2014). From this, other methods have emerged; one is the experience sampling method, where participants are given alarms, set to go off at different times. When the alarm goes off, the participants need to fill out a questionnaire asking them questions about the current moment, customized to what is being investigated. This gives the chance to get an insight into the everyday flow states of TP (Csikszentmihalyi, 2014). Another emerged method is the Flow State Scale questionnaire or FSS, which is a questionnaire developed by Jackson and Marsh (1996). It is based on the nine dimensions of flow originally created by Csikszentmihalyi and it firstly contained 54 items or questions, 6 per dimension, but was reduced to 36 items and 4 per dimension (Jackson & Marsh, 1996).

To collect data on whether or not the TP in this research were experiencing a flow state, the FSS questionnaire, after each play session, was used together with statements from the interview during the stimulated recall. Ones this data were collected, it was possible to correlate and analyze them in relation to flow, the pre-defined motivation of the TP and their demographic data. The aim of this was to come

to a common conclusion towards flow in the three games and give potential recommendations. Because flow theory has originally emerged from SDT (Csikszentmihalyi, 2014), the investigation into whether a player's pre-defined motivational profile has an impact on the possibility for experiencing flow was an interesting correlation. Also investigating if flow even occurs in the onboarding phase of these three mobile games in such a short period of time, which seven minutes of gameplay is, was interesting.

4 Method

In this chapter, the research design and the methods used for collecting data will be presented and explained. Additionally, the TP, the test setup and the procedure will also be presented and explained. Lastly, a summary is included to summarize the chapter, any limitations on the data collection that might exist and what they and the methods mean to this thesis in general.

4.1 Research Design

In order to guide the research of this thesis, a research design was chosen. In order to investigate what research design was appropriate to use, the major ones used in scientific research were considered (Bordens & Abbott, 2011, pp. 102-114). By this consideration, it was found that the design of this research was experimentally anchored with a repeated measures design, where one variable directly or indirectly influences the other (Bordens & Abbott, 2011, pp. 102-114).

Additionally, the nature of this research has an explanatory focus that aims at preliminary exploring the area, since enough information in this area is yet to exist within academia, which could not make it possible to develop true causal explanations (Bordens & Abbott, 2011, pp. 102-114). In such case many iterations should exist and the area should be thoroughly investigated (Bordens & Abbott, 2011, pp. 102-114).

Though not much research resides in the area within academia and one could argue that the correlational research design could be more applicable in research residing in a newer area. It was not truly applicable in this case, because correlational designs only aim at observing how changes in one variable can accompany changes in others called covary (Bordens & Abbott, 2011, pp. 102-114). Therefore, it does not incorporate the amounts of control on what is tested and thereby the possibility to manipulate the independent variables to observe changes in the dependent, as was needed for this research (Bordens & Abbott, 2011, pp. 102-114). Based on that it was not appropriate to fully use a correlational research design in this case, as there was a need for great amounts of control over the test session and the variables to observe if the changes or manipulation done to the independent variable changed what was observed; the dependent variables (Bordens & Abbott, 2011). Furthermore it would not have allowed the more strict control over the extraneous variables needed to minimize their possibility for diminishing the internal and potentially the external validity (Bordens & Abbott, 2011, pp. 102-119).

However, though this research design is experimentally designed, the analysis was done correlational as the aim was to find correlations in the data rather than causal conclusions. The reason for this was that this area of interest is yet to be thoroughly investigated and is a newer area of research. Therefore, it has a preliminary nature in its field, which did not make it appropriate to find and conclude on causal relationships in the variables in general within the field as a whole, but instead only conclude on correlational relationships within this smaller sample of the field

(Bordens & Abbott, 2011, pp. 102-114). This gave the research a mixed approach with the research design being experimental and the analysis and data processing being correlational (Bordens & Abbott, 2011).

Because this research was experimentally designed different variables resided in it, both in regards to what was going to be manipulated; The independent variable, the observed impacts from this manipulation; The dependent and the ones needing to be diminish; The extraneous (Bordens & Abbott, 2011, pp. 108-113).

The independent variable in this research was: The mobile game. This independent variable had three levels as it were three different mobile games that was being investigated and if the change of game made a change in the observed; The potential flow experience of the TP. Thereby the mobile game is the one that was manipulated to observe a difference in the dependent variables, which related to the results and conclusions. By changing the mobile game, it was possible to observe if different onboarding phases of different mobile games had an effect on the possibility for the TP to experience flow.

The two dependent variables of this research was flow and the experience or UX of the TP in general, as they were what was measured. Within these dependent variables, different data collection methods were used to be able to measure them. The data collection methods used were the experience graph, the FSS, and interviews during the stimulated recall.

Lastly, there were also some extraneous variables, which needed to be taken into account to try to minimize their possibility of threatening the internal and potentially external validity (Bordens & Abbott, 2011, pp. 108-119).

The first extraneous variable was the setting of the test session itself. In more specific it was the room where the test was conducted, the setup with seating and placements of the TP, the equipment, the interviewer and the facilitator. Because any changes in these could have affected the experiment by changing the behavior between the TP and thereby had the possibility to bias the data and internal validity. Therefore, it was attempted to control this by having the same room and setup inside that room throughout all tests.

The second extraneous variable was the test session and procedure itself. Meaning the way, the TP were passed through the test and thereby their experiences of the test. To try to control this, the same person was the interviewer and anchor throughout all tests, to try to make every test session as equivalent and similar as possible, so that it was the TP who changed and not the procedure and test itself.

The third extraneous variable was that some of the TP was acquainted with, or acquaintances of friends to one or more of the researchers. Thereby they could, for example be afraid of hurting the feelings of the researchers by telling that they did not like the game or could be afraid of doing a bad performance, which could affect their experience. To try to control this the TP was told in the introduction of the test that it was the game that was being tested and not them and that any problems with playing or frustrations towards the game would help equally as much as none.

The fourth extraneous variable was the potential for the TP to become fatigued during the test, due to the many questions they had to answer multiple times in the questionnaires. To try to minimize this, the FSS was reduced from 36 to 18 questions.

The fifth extraneous variable was about the research setting being a laboratory setting. As it is always difficult in research involving humans, to avoid the possibility of the unnatural and unrealistic setting of the test in general to have the possibility of becoming uncomfortable for the TP. Due to them both being observed, wearing sensors, asked to sit still and having cameras filming them, which could affect their experience of the three games. This was minimized by trying to create a light and pleasant atmosphere, being very friendly and offering them something to eat and drink and to try to get to know them a little before the test session began. Also emphasizing that it was the games that were being tested and not the skills of the TP in any way. To try to make them feel as comfortable and welcome as possible.

The sixth extraneous variable was that every TP had to play all three different mobile games after each other, which could have the possibility to make participants tired along the way. Thereby having the possibility of making the experience of the games less good in the last play session than in the first. To try to minimize this, the games were randomized, so that all games became both first, second and last (Appendix B).

Additionally, different extraneous variables did also exist, which were difficult to control. These concerned external factors such as the mental state of the TP, for example a TP could have personal problems affecting their experiences during the test.

Independent Variables	**Dependent Variables**	**Extraneous Variables**
The Mobile Game	Flow	The Test Session Setting
	User Experience	The Test Session
		Acquaintance
		Fatigue
		Laboratory Setting
		Repeated Measures

TABLE 1: THE DIFFERENT VARIRABLES IN THIS RESEACH

4.1.1 Validity and Reliability

In this research, the internal validity was taken into account and was tried controlled by for example, as mentioned above, controlling the extraneous variables and being aware of the threats to it. The reason for trying to control the internal validity was because it was related to the ability for the research design to test the hypothesis and thereby the ability to show if changes or manipulations in the independent variable was the reason for a variation in the dependent (Bordens &

Abbott, 2011, pp. 114-119). The external validity was more difficult to control because the research was laboratory based with the aim of identifying if flow can happen in the three specific mobile games with the 26 TP rather than if it typically happens in all mobile games (Bordens & Abbott, 2011, pp. 114-119). However, this research and research design still needed to enable for replication to other mobile games and thereby other contexts than originally intended. Giving the research reliability and taking the external validity into account (Bordens & Abbott, 2011, pp. 114-119). Though, this research was not aimed to directly be translated into a real-world setting also called ecological validity, but rather give a direction for further research into the subject and give the possibility for translating it and using its design in future research instead. In terms of reliability when measuring on a psychological variable, which flow is, there will always be a difficulty in translating it on a later note, even if it was the same TP and setting which was used. The reason for this is that psychological variables tend to naturally change over time according to what the TP is experiencing and feeling in the specific moment of time, when being tested. Though, because it was found that the 26 TP reacted in a similar matter to the experiment, it can be assumed that there is a possibility of getting similar results if the research was to be replicated (Bordens & Abbott, 2011, p. 131). However, in order to more extensively investigate the reliability, it could be assessed by replicating the research and determine the correlations between the original and the new research by using Pearson's or Spearman's correlation coefficient to investigate any potential differences (Bordens & Abbott, 2011, p. 131). This was thought not possible due to the time constraints of this research but could be a possibility on a later note as future research.

Additionally, because this research resides in the empirical paradigm, much research and iterations into the area need to be conducted in order to draw true causal conclusions (Bordens & Abbott, 2011, pp. 114-119).

Below is a model visualizing this research and the steps gone through in conducting it. The first step in the model and in this research was the preliminary research, where the literature search was conducted, related work found and problem statement and RQ created. The next and second step in the model and in this research was conducting the pilot test on 3 TP and actual mobile game user tests on 26 TP. Thereafter the third step was analyzing the large amounts of data using different qualitative and quantitative measurements. The fourth step was then creating the recommendations to onboarding phases of mobile games by concluding and drawing upon the results of the analysis. This was the final result of this research and thereby the outcome. The fifth and last step was to reflect on what could be done in the future to further iterate on this research:

FIGURE 3: RESEARCH DESIGN

4.2 Test methods

In this section, the methodologies used in the test sessions will be presented and explained.

4.2.1 Questionnaires

For the test setup, it was decided to use three different questionnaires, which the TP had to answer; one before the test sessions began and two after each play session. The questionnaire that the TP had to answer before the test session began was The Gamer Motivation Profile questionnaire (Quanticfoundry, 2016), which collected data about what pre-defined motivations the TP had, which player type they were and other demographic data. The first of the questionnaires that the TP were asked to answer after each play session was the Flow State Scale Questionnaire (FSS) (Jackson & Marsh, 1996). This questionnaire was aimed at trying to determine if the TP experienced a flow state during each of the play sessions (Csikszentmihalyi, 1990). The last questionnaire that the TP were asked to answer after each play session was the Post-game experience questionnaire (PGQ) (Poels, de Kort, & IJsselsteijn, 2008). This questionnaire tried to measure the experience the TP had during the play session and thereby the experience with the games.

These three questionnaires were acquired from previous research and from a game analytics consultancy company (Jackson & Marsh, 1996; Poels, de Kort, & IJsselsteijn, 2008; Quanticfoundry, 2016). Though the questions and the design of the questionnaire was not specifically created in this research, it was still being used with a critical view, meaning that they were evaluated before being used via a list of recommendations of how an effective questionnaire should be created (Pickard, 2013, p. 209).

The use of questionnaires as a data collection method is very used and popular. The reason for this is that using questionnaires is very cost efficient. Together with its low cost, it also has the ability to collect large amounts of data and determine how to analyze this data before the data is collected (Pickard, 2013, p. 207).

Though questionnaires are an effective and cost-efficient data source, it still has its limitations and challenges. One of these is the nonexistent possibility of directly communicating with respondents to get further explanations or deeper insights into their answers or understanding of the questions (Pickard, 2013, p. 207). Another possible challenge or limitation is that it can be difficult to obtain responses and thereby give low response rate if it is distributed for example online (Pickard, 2013).

However, because the interviewer and the facilitator were present in the test session when the TP were answering the questionnaires, it gave the TP the possibility to ask questions or express any perplexities (Pickard, 2013, p. 208). This partially solves the limitation and challenge of participants not having the possibility to express themselves. It does not in total ensure deeper insights or that the TP are answering truthfully or have fully understood the questions. Because it requires the TP to ask questions and communicate with the researchers, which was not a guarantee that they would do that, but it gave the possibility for asking any clarifying follow-up questions from both sides.

The limitation and challenge with low response rate was not a direct problem in this research because the questionnaires were administrated during the test sessions and the researchers were personally present while the TP answered them. However, the researchers being personally present also gave another possible limitation and challenge, because it can make the TP feel obligated to answer. Also because they had to answer the same questionnaire multiple times in addition to this feeling of obligation, it could lead to the feeling of being fatigued (Bordens & Abbott, 2011, p. 307) and just wanting to get the questionnaire over with. Thereby not thinking the answers through and answering them in consistency with how they were actually feeling. To try to minimize this, the FSS was reduced from 36 items to 18 and the two questionnaires were separated in the test session to try to make a variation in activities, so that all questions should not be answered at once.

The Game Motivation Profile questionnaire

The Game Motivation profile questionnaire created by Quantic Foundry (Quanticfoundry, 2016) uncovers and investigates the motivation of players and player types. Thereby what drives gamers and how to design more engaging experiences for them, by applying social science to data science. For investigating these areas of interest within the game industry, they use different methodologies where The Game Motivation Profile is one of these. It contains 12 motivation factors categorized into 6 basic motivation categories (Quanticfoundry, 2016). These 6 basic motivation categories and their motivation factors are visualized in the table below:

Action "Boom!"	Social "Let's Play Together"	Mastery "Let Me Think"	Achievement "I Want More"	Immersion "Once Upon a Time"	Creativity "What If?"
Destruction Guns. Explosives. Chaos. Mayhem.	Competition Duels. Matches. High on Ranking.	Challenge Practice. High Difficulty. Challenges.	Completion Get All Collectibles. Complete All Missions.	Fantasy Being someone else, somewhere else.	Design Expression. Customization.
Excitement Fast-Paced. Action. Surprises. Thrills.	Community Being on Team. Chatting. Interacting.	Strategy Thinking Ahead. Making Decisions.	Power Powerful Character. Powerful Equipment.	Story Elaborate plots. Interesting characters.	Discovery Explore. Tinker. Experiment.

FIGURE 4: VISUALIZATION OF THE 6 MOTIVATIONS AND 12 MOTIVATION FACTORS FROM THE GAMER MOTIVATION PROFILE QUESTIONNAIRE (QUANTICFOUNDRY, 2016)

The Game Motivation Profile questionnaire furthermore consists of 5 demographic questions which are answered firstly, 3 open-ended questions about respondents' favorite games and 48 questions concerning player preferences, likes, dislikes etc. all answered by 5 scale Likert charts (Quanticfoundry, 2016; Likert, 1932). Each of the 12 motivation factors are measured by 4 questions and tries to measure the extent to which a player is motivated by the 6 motivations and thereby which motivation profile they have (Quanticfoundry, 2016).

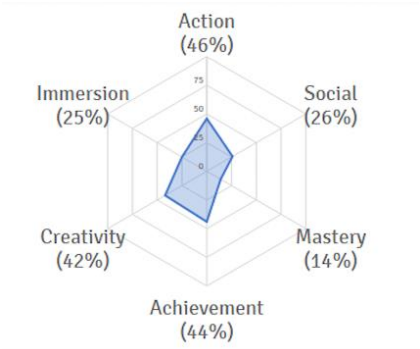


FIGURE 5: EXAMPEL OF A PLAYER PROFILE GENERATED BY THE GAME MOTIVATION PROFILE QUESTIONNAIRE

Worldwide 220.000 have completed the questionnaire and on this basis Quantic Foundry has made a cluster analysis and proven the connection between earlier reports on motivational factors and their model (Quanticfoundry, 2016). The algorithm they use for calculating the motivation and player profile are not visual to the public, therefore it is not possible to show it here.

Flow state scale questionnaire

The Flow State Scale questionnaire was created by Jackson & Marsh in 1996 and aims at measuring if respondents reach a state of flow (Jackson & Marsh, 1996). The flow state, is the state where one is so involved or immersed in an activity that nothing else seems to matter (Csikszentmihalyi, 1990).

The FSS is based on the concept and original 9 dimensions of flow found by Csikszentmihalyi in 1990. These 9 dimensions were created as a means to try to determine and measure the complex phenomenon that flow is (Jackson & Marsh, 1996, p. 19; Csikszentmihalyi, 1990).
Each of the 9 dimensions are originally measured by 4 questions, meaning that the questionnaire consists of 36 questions in total that together represent all dimensions of flow (Jackson & Marsh, 1996; Csikszentmihalyi, 1990):

- **Challenge-Skill Balance:** Q1, Q10, Q19, Q28
- **Action-Awareness Merging:** Q2, Q11, Q20, Q29
- **Clear Goals:** Q3, Q12, Q21, Q30
- **Unambiguous Feedback:** Q4, Q13, Q22, Q31

- **Concentration on Task at Hand:** Q5, Q14, Q23, Q32
- **Sense of Control:** Q6, Q15, Q24, Q33
- **Loss of Self-Consciousness:** Q7, Q16, Q25, Q34
- **Transformation of Time:** Q8, Q17, Q26, Q35
- **Autotelic Experience:** Q9, Q18, Q27, Q36

The FSS is answered by using a 5 scale Likert chart (Likert, 1932) with the intensity of statements varying from (Jackson & Marsh, 1996):

- **Strongly disagree** (1)
- **Disagree** (2)
- **Neither agree nor disagree** (3)
- **Agree** (4)
- **Strongly agree** (5)

Furthermore, it was originally developed to use in a sport and physical activity context (Csikszentmihalyi, 1990), but has since been found useful in other contexts as well, like in the evaluation of games (Kivikangas, 2006; Nacke & Lindley, 2008). Furthermore, it was developed to give a method for collecting and giving the possibility for quantitatively investigate data on the concept of flow. Giving the possibility to compare it to other physiological states (Jackson & Marsh, 1996), like motivation and motivation factors applicable in the context of this thesis and collected by The Game Motivation Profile questionnaire. When collecting data on flow from the FSS and analyzing it by using quantitative measurements, there is a need for combining these with qualitative measurements. Because the FSS data and quantitative measurements cannot stand alone, as they do not give deeper explanations into why and how the TP experienced flow, why they did not, for how long they experienced it, if any specific events contributed to it etc. It only provides the answer regarding if flow occurs or not (Jackson & Marsh, 1996, p. 19). Together this mix of methods had the possibility to give a deeper insight into flow and if it is possible for the TP to experience it in the short period of time, which the onboarding phases of these three mobile games are.

Instead of using the 36-items of the original FSS it was reduced to 18-items, giving 2-items for each dimension of flow instead of 4. This was done by taking the first part of the original questionnaire, as it is originally divided into two parts with two questions regarding the nine flow dimension in each. The reason for this was that the TP needed to answer the questionnaire three times along with the PGQ. By reducing the questionnaire it was attempted to avoid losing the attention of the TP and them getting fatigue, which could lower the quality of responses (Bordens & Abbott, 2011, p. 307; Bogen, 1996). However, either reducing the questionnaire or keeping it long, had the possibility of reducing the validity and thereby the reliability of the collected data. Because reducing the questions measuring the different dimensions of flow to half, caused a reduction in the volume of validation, which could be executed on the accumulated answers. On the contrary keeping the questionnaire long could cause fatigue with the TP, which could also negatively affect the validity and reliability of the answers. Additionally, it was also stressed by Mirza-Babaei (2013) that TP struggle to remember their gameplay experience even after small play sessions.

Therefore, by reducing the FSS it was additionally attempted to minimize the chance of them not remembering their gameplay experience throughout the questionnaire.

4.2.2 Interview

There are many different forms of interviews ranging from the very structured almost questionnaire like, to the unstructured purposeful conversation between the interviewer and interviewee (Pickard, 2013, p. 195). Interviews have the purpose of getting data specific to the individual that is being interviewed. Thereby giving the possibility for the interviewer and interviewee to interact with each other to get a deeper insight and clarify meanings by asking follow-up questions specific to the received answers. Interviews are thereby useful for getting insights into more complex questions, which is not possible to get in a questionnaire (Pickard, 2013, p. 196).

In the process of creating an interview, Kvale (1996) have specified seven stages to iteratively reflect on to help remember the elements needed to consider before conducting an interview. The seven stages are as follows (Pickard, 2013, pp. 196-197):

- **Thematizing:** Clarifying the purpose of the interview and the why and what (Pickard, 2013, p. 197).
- **Designing:** Constructing the interview and what questions needs to be asked (Pickard, 2013, p. 197).
- **Interviewing:** Deciding on how the interview is going to be conducted, how structured or unstructured is it going to be and how is it going to be recorded (Pickard, 2013, pp. 197-201).
- **Transcribing:** Determining how and when the interview is going to be transcribed (Pickard, 2013, pp. 201-202).
- **Analyzing:** Defining how the collected data is going to be analyzed and when the analysis should begin (Pickard, 2013, p. 202).
- **Verifying:** Finding out how the data is going to be verified, usually by considering if the interview covered what it should and answered any RQ needed to be answered by the interview. Moreover, there could be a need for presenting one's interpretation to the interviewee afterward to clarify if it matches their own interpretation (Pickard, 2013, pp. 202-203).
- **Reporting:** Determining how the findings are going to be reported and presented (Pickard, 2013, p. 203).

These seven stages was also considered in the initial consideration on how and why to use the interview technique, what questions to ask, how to ask them and what kind of approach was best in order to get the answers needed. Additionally, how the data should later be processed and analyzed in order to compare them with the other data and how they would contribute to them.

What was decided was to do a semi-structured interview at the start and end of the test session, both to ask different health related questions, questions regarding the use and preferences of mobile games and any potential follow up questions from both

sides. Furthermore, the semi-structured interview technique was used, to have a set of guidelines on what questions needed to be asked during the stimulated recall in order to get the TP to talk about their experience.

4.2.3 Stimulated Recall

Stimulated recall or post-task walkthrough, as Dix, Finlay, Abowd, & Beale (2004) refers to it, is a technique where TP are presented with accurate stimuli or accounts of themselves performing a given task. It aims at stimulating the memory of TP to get their honest thoughts, feelings and interpretation concerning their original experience and explain actions to understand a phenomenon (Dix, Finlay, Abowd, & Beale, 2004; Vesterinen, Toom, & Patrikainen, 2010). It enables the researcher to be in a dialogue with the TP about their experience and to ask questions about it (Dix, Finlay, Abowd, & Beale, 2004; Vesterinen, Toom, & Patrikainen, 2010). It is an advanced addition or alternative to the traditional interview and think-aloud, because it requires the researcher to keep asking questions about the experience to get the TP to think and interpret their own actions and clarify them (Vesterinen, Toom, & Patrikainen, 2010). It can vary from being very structured with concrete questions specifically created, to being fully unstructured (Vesterinen, Toom, & Patrikainen, 2010). The stimulated recall session is often similar to that of a discussion, where an experience is discussed (Vesterinen, Toom, & Patrikainen, 2010).

The stimuli used to stimulate memory and conversation can be of a different nature, it can both be recorded by audio or video, but it can also be by written notes (Dix, Finlay, Abowd, & Beale, 2004).

The advantages of this research method is that it enables the TP to be fully concentrated in the activity they are asked to do while they are doing it and are not disturbed. Meaning that the research enables the gathering of insights while still obtaining and allowing for the most natural performances in a task (Dix, Finlay, Abowd, & Beale, 2004; Vesterinen, Toom, & Patrikainen, 2010). Furthermore, it is also an advantage that there is a greater possibility for the researcher to have a longer conversation with the TP about tasks, without it interrupting them, when for example asking follow-up questions about actions, like when TP explain what they are doing but not why (Dix, Finlay, Abowd, & Beale, 2004).

As with any research method, this one also has its disadvantages. One disadvantage with using video recorded stimuli can be that it can feel uncomfortable for the TP to be filmed while performing tasks, making them act differently than they normally would (Vesterinen, Toom, & Patrikainen, 2010). Another disadvantage could be a loss of freshness in memory; this is though avoided by performing the stimulated recall directly after a task is completed (Dix, Finlay, Abowd, & Beale, 2004). Moreover, another possible disadvantaged, which can in fact also be an advantage, is that it enables the gathering of large amounts of data. It can be a disadvantage, because it can be very difficult and time-consuming to process and analyze all this data, but it is also an advantage, because it promotes large amount of important user insights into a phenomenon (Dix, Finlay, Abowd, & Beale, 2004; Vesterinen, Toom, & Patrikainen, 2010).

As mentioned above an alternative to stimulated recall could be to use think-aloud, which is a very simple technique to use. It is a form of observation where TP are asked to tell the researcher as much possible about what is happening in the activity they are asked to do, while doing it. Thereby tell what they are doing and what they think about it, while being observed (Dix, Finlay, Abowd, & Beale, 2004). The advantage of think-aloud is that it is a very simple technique to use and it enables an easy gathering of large amounts of useful user insights with little expertise needed in order to perform it (Dix, Finlay, Abowd, & Beale, 2004). However, it can be difficult to analyze the data to its full extent and it can be a very subjective and selective measure. It can also be very disturbing and unnatural for the TP due to them having to force themselves to talk about an activity while doing it, which they would not normally do (Dix, Finlay, Abowd, & Beale, 2004).

The reason for not choosing this approach, was that it can be argued that think-aloud can bias the TP actions and thereby the data, because when TP have to talk about everything they do while being observed, it can change the way they perform and solve tasks and problems (Dix, Finlay, Abowd, & Beale, 2004). Since it is flow in mobile games that are being investigated, it is crucial to enable the TP possibility for being fully concentrated in the game activity, it would be insufficient to use the think-aloud approach. Because asking them to think-aloud would have the possibility of ruining the probabilities of the TP to experience flow. Therefore, it was chosen to use the stimulated recall approach, where each play session was replayed back to the TP after it had ended, to avoid the disadvantage of the original experience not being fresh enough in the TP memory.

This gave valuable insights into the TP experience of the games, their interpretation and thoughts of their own experiences and actions in the games and thoughts on the design and in-game elements, without ruining the possibilities for them to experience flow.

4.2.1 Player Experience Graphs

A player experience graph or self-assessment diagram is a self-reported graph drawn by the player, which shows the player experience without being prompted or interrupted by the interviewer (Mirza-Babaei, 2013). The advantage of this approach is that it enables the researchers to get an insight into how much or how little and what the TP or players actually remember from a play session (Mirza-Babaei, 2013). Thereby it reveals whether or not events designed to be very important in the gameplay actually have set the desired mark on the players (Mirza-Babaei, 2013).

In this case, the player experience graphs were not directly used but the experience graphs from the game developers and designers were used to get insights into what in-game events and elements they perceived as important in the onboarding phase. Along with statements from the TP in the stimulated recall it gave an idea about if these elements and events made an impact, became remembered and worked as intended or not.

4.3 Test participants and recruitment

In this section, the TP, the recruitment of them and the ethical considerations of this research will be presented and explained.

4.3.1 Test participant recruitment

The target group for TP needed in order to test the onboarding phase of the three games in this masters' thesis was found to be very broad, as the three games are very different and address a very broad spectrum of people. Therefore, it was decided that a specific or narrowed target group would not be used, but instead emphasize that what was most important, was that any potential TP had not played any of the three games beforehand. The reason why this was important was because it was the onboarding phase of the mobile games with new players that was being tested. It would not give authentic insights into the experience of the onboarding phase with new users, and its ability for introducing the mobile game, get players to understand it and wanting to play it further than the onboarding phase, if it had been players who had played the games before.

To recruit TP, an e-mail was firstly created that stated the need for TP for this masters' thesis, information about the test session, the purpose of the research and contact information if anyone was interested in participating. This e-mail was sent out to all students at AAU Cph through Moodle (AAU Moodle, 2016). Additionally, the same information was posted in different Facebook groups and wrote out personally to acquaintances asking them if they or somebody they knew would like to participate. This was done in order to spread the word about the need for TP.
When being contacted by interested TP, a time and date was arranged for each TP, which was written into a calendar to keep track on times left for tests and already planned test sessions.

To avoid the bias of having too similar people participating in the test, the word was attempted to be as widely spread out as possible. Moreover, the bias of being potentially acquainted with some of the TP was also tried avoided by specifically clarifying and emphasizing in the pre- interview that it was the game being testing and not them and that the researchers did not make any of the games. Thereby them criticizing any of the games would not in any way hurt the feelings of the researchers, but that it would instead help in the investigation because it was their most honest opinion that was important and needed. The effect of the demographics was then tested in the statistical analysis, to investigate if there was any bias of these demographics. It was found that neither age nor gender had an effect on the possibility of experiencing flow; thereby it can be assumed that they did not give any biases. However, gamer types were found to have a significant impact on the possibility to experience flow in the three mobile games. Therefore, if this research was to be replicated to further investigate the reliability, it could be interesting to try to do it on each player type to investigate the differences. These findings will furthermore be explained in section 5.1.3 Correlation Coefficient.

4.3.1 Test participants

The TP acquired from the recruitment and which was tested on were seven males representing 26.92% of the total TP and 19 females representing 73.8%:

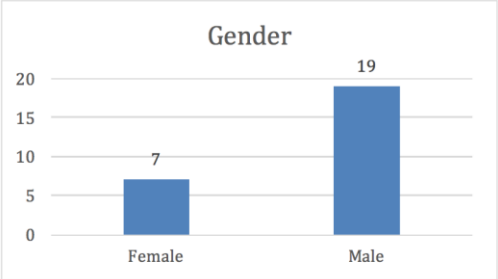


FIGURE 6: GENDER DIVISION AMONGST THE TP

The average age amongst the TP was 25 years of age and ranged from a minimum of 20 to 37 years. The figure below shows a chart visualizing how the age was divided between the TP who participated in the test:

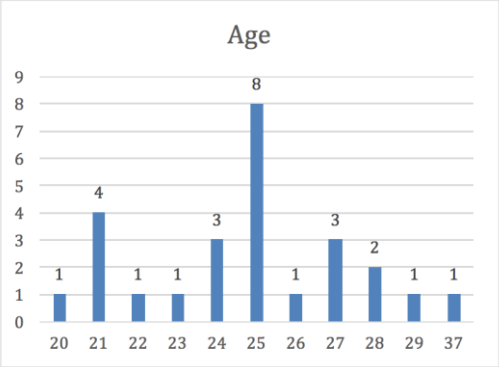


FIGURE 7: AGE DIVISION AMONGST THE TP

The largest group of gamer types accounted for 80.8% and 21 out of 26 of the TP who claimed themselves as being Casual gamers (Quanticfoundry, 2016) (Quanticfoundry, 2016). Three claimed themselves to be Core/Mid-core gamers which accounted for 11.5%. Two and thereby 7.7% claimed to be Hardcore gamers (Quanticfoundry, 2016):

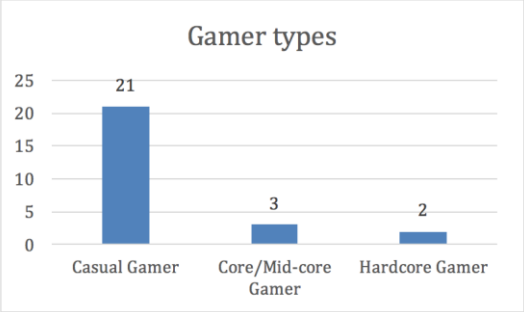


FIGURE 8: GAMERTYPE DIVISION AMOUNGST THE TP

Most of the TP answered that they prefer to play on smartphone/tablet with 22 answers or 57.9%. The reason for having 38 answers is because this question allowed for multiple choices, as it was acknowledged that one can have multiple preferences. Moreover, nine or 23.7% answered that they prefer to play on PC/Mac and seven or 18.4% on Console:

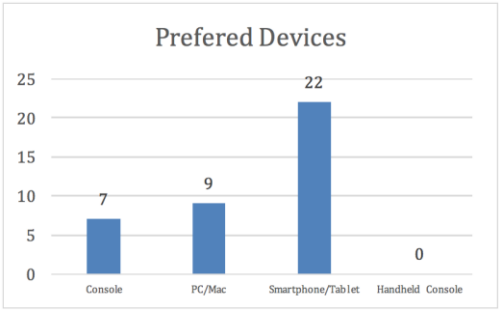


FIGURE 9: PREFERED DEVICES AMOUNGST THE TP

Lastly, 17 or 65.5% of the TP answered that they play 0 to 1 days a week. Three or 11.5% answered that they play 2 to 3 days a week, three or 11.5% 4 to 5 and three or 11.5% 6 to 7 days a week:

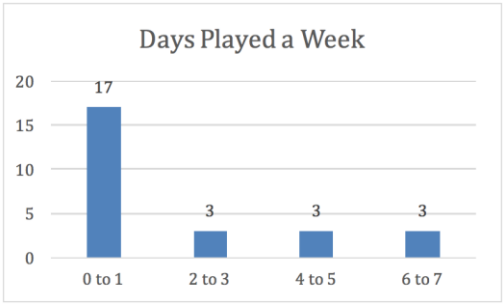


FIGURE 10: PLAYED DAYS A WEEK DIVISION AMOUNGST THE TP

4.3.2 Ethics

When conducting any research involving human TP, it is important to consider the ethics of the research, how this could affect the TP and what precautions to take to minimize any possibility of offending them (Pickard, 2013, p. 87).

The field of research ethics is constantly changing, from what is acceptable to what is not, therefore it is important as researchers to keep up with what is happening in this field (Pickard, 2013, p. 87).

The origin of research ethics is derived from the aftermaths of World War II, where Nazi doctors were brought to trial because of their many unethical human experiments. Grounded in the trials of these doctors, the Nuremberg Code was founded, which is groundwork for ethical standards today (Bordens & Abbott, 2011, p. 201). From this, many other important steps and evolution have since been done in

research ethics. One of them was the creation of the Declaration of Helsinki, which was mainly created to address ethics in medical research but also embodies many principles that are applicable to social sciences (Bordens & Abbott, 2011, p. 201).

Another important step in research ethics was the creation of the Belmont Report in 1979, which further defined what to consider regarding research ethics when using human TP (Bordens & Abbott, 2011, p. 202). The Belmont Report presents three different principals to consider for all studies across fields, which uses human TP. These are listed below (Bordens & Abbott, 2011, p. 202):

1. **Respect for persons**: This principle concerns that TP should enter into any test participation of their own will and desire and should not be forced in any way. To do this, this principle contains two components; the first is that TP need to be treated as autonomous human beings who are able to make their own decisions and choices. The second component concerns that when people have reduced autonomy they deserve to be protected (Bordens & Abbott, 2011, p. 203).
2. **Beneficence**: This principle concerns that research should not only respect the TP, it should also protect their well-being. Like the first principle, this also contains two components. These two components are; that a research should do no harm to TP and maximize the benefits of the research without doing any harm (Bordens & Abbott, 2011, p. 203).
3. **Justice**: The last principle concerns that the burden of the research should be divided equally between researchers and the TP and both should share any benefits or costs (Bordens & Abbott, 2011, p. 203).

For this research, the principle of **Respect for persons** is taken into account in the form of an informed consent developed for the test sessions (Appendix E). This informed consent provided the TP with information about the purpose of the research, what and how data was collected and that they would have total privacy and be anonymous (Pickard, 2013, p. 90). By giving this informed consent to the TP with information, it gave them the free choice of whether they agreed and sign if they did. This way they were not forced to participate but participated of their own free will.

The second principle of **Beneficence** was met by cherishing the well-being of the TP and protect them from harm, by telling them that if they for any reason needed the test to stop or to have a break during it or if anything seemed unpleasant they should just speak up and tell the interviewer. Furthermore, the TP were asked if they had any prior heart-related issues. Because the GSR sensors send small amounts of voltage through the skin to measure the GSR and TP with heart-related issues could be affected by this.

Lastly, the third principle of **Justice** was met by carefully considering who was recruited and having every TP volunteer to participate and by stating in the informed consent and in the introduction, that they could at all times refuse to answer questions if they felt uncomfortable and that they could also leave the test at any time. The reason why this was important, was that researchers should never select any individuals or groups based on them being easily persuaded to participate because

they are vulnerable or burdened (The National Commission for the Protection of Human Subjects, 1979).

4.4 Test setup

In this section, the test session, test roles and the materials used in the test will be presented and explained.

4.4.1 Test roles

Interviewer:

The interviewer was responsible for controlling and running the test session and was the one to diminish any flaws and ensure that the test session was running efficiently. That included explaining the test session to the TP, giving them the informed consent and making sure it got signed. Additionally, the interviewer interviewed the TP, gave them the three different questionnaires and the engagement graph at the right time and asked and answered follow-up questions and led the stimulated recall.

Facilitator:

The facilitator's responsibilities were to ensure that the technical equipment was running as it should. This included starting and stopping the cameras, making sure that the audio recorder, the GSR recorder, and HRV were running and that The Game Motivation Profile questionnaire was opened and ready to be answered and that the answers were properly saved by screenshots. Additionally, the facilitator's responsibility was also to support the interviewer by getting the stimulated recall ready to be viewed and given to the interviewer.

Observer:

The responsibilities of the observer were to observe any event during the test session and to be on standby in case of any unexpected events were to happen and prevent interruptions from external sources, like people looking into the test room. Furthermore, the observer was responsible for converting videos of previous test sessions during current ones and upload them to the Google Drive (Google, 2016), in order for the SD card to be ready for the next session.

4.4.1 Materials

Below is a table, showing the materials used for the test and their specifications:

Tablet:	Notebook A:	Notebook B:	Camera A:	Camera B:	Audio Recorder:	Galvanic Skin Responses:	Heart Rate Variability:
iPad mini 3, 7.9" (Apple, 2016)	Lenovo T430 (Lenovo, 2016)	Asus ZenBook UX305F (Asus, 2015)	Sony Handycam DCR-SX33E (Sony, 2016)	Panasonic Camcorder HC-V700 HD (Panasonic, 2016)	iPhone 5S (Apple, 2013)	BITalino (Plugged kit) (Bitalino, 2016)	Merlin-digital Heart Rate Monitor PRO (Merlin-Digital, 2016)
1536x2048 Pixel	1920x1080 Pixel	1920x1080 Pixel				OpenSignals(r) evolution (Bitaline-Software, 2015)	EliteHRV (Android) (EliteHRV, 2016)
ISO 9.2	Windows 10	Windows 10				Skintact Electrode F-401C (Skintact, 2014)	HTC One(m8) (HTC, 2014)
Apple A7	Intel Core i7, 2.9 GHz	CPU: Core M, 1.2 GHz					
Dual-core 1.3 GHz Cyclone (ARM v8-based)	8 GB DDR3	4GB DDR 3					
PowerVR G6430	256 GB Intel SSD	SATA 3 256 SSD					

TABLE 2: SHOWING ALL THE MARTERIALS USED IN THE TEST

4.4.1 Test setup

The test was run individually, meaning that there was only held one test session at a time. The test and test setup were placed in a special user testing room at AAU Cph, which had a one-way mirror to the room beside it that was used by the observer to observe the test.

In the room the two cameras were placed so that there was one filming the TP from the back during the play sessions, making it possible to see what was happening on the iPad and in the game, which was used for the stimulated recall. The other camera was placed in front of the TP and filmed the whole test session.

The TP were placed at a table facing a white wall to minimize any possible distraction. The GSR device (Bitalino, 2016) was placed on the table and the sensors on the TP hand. The HRV device (Merlin-Digital, 2016) was placed on the TP shirt and the sensor on their ear.

Furthermore, the audio recorder was placed in-between the interviewer and the TP in order to record both voices. The iPad was placed in a holder taped to the table in front of the TP.

The interviewer was placed on the TP left side so that the TP were always able to see the interviewer. The reason for this was to enable the possibility for the TP and the interviewer to ask questions. Also, to ensure that it was not uncomfortable for the

TP, as they could have felt uncomfortable by being watched from behind by someone they could not see, also found in the pilot test.

The facilitator was placed in the corner of the room behind the TP as there was no direct interaction between the facilitator and the TP, there was no need for them to be able to see the facilitator.

The observer was placed on the other side of the one-way mirror. This means that during the test sessions the interviewer and the facilitator were the only ones present in the room with the TP. The purpose of this was to minimize any potential disturbances and the feeling of being watched by a lot of people, which could have led to the loss of the attention and concentration of the TP and them being more uncomfortable.

Below is a visualization of the test setup, the placement of equipment and the researchers:

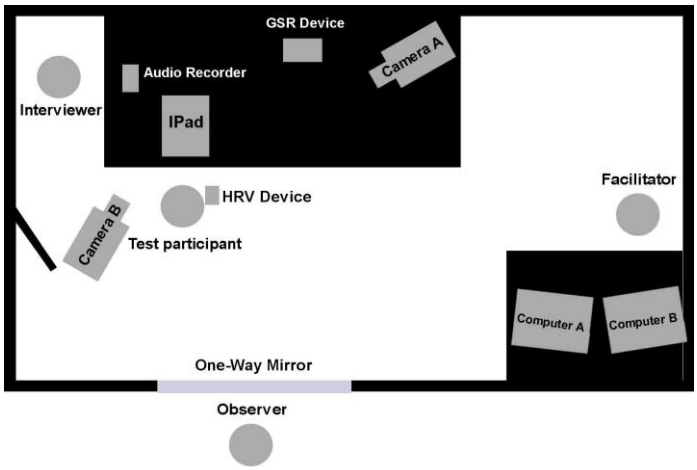


FIGURE 11: MODEL VISUALIZING THE TEST SETUP

4.5 Procedure

In this section, the test session and its parts will be presented and explained. The model below illustrates the test session and the steps the TP went through. Firstly, the TP were introduced to the test, given and asked to sign the informed consent. Afterward, they were given The Gamer Motivation Profile questionnaire and lastly before the three play sessions begin, they were asked pre- interview questions. This is illustrated by the four boxes connected to each other and leading up to the play session wheel. The play session wheel contains all the stages the TP goes through three times in the playing of the three games, before exiting with a set of post-interview questions:

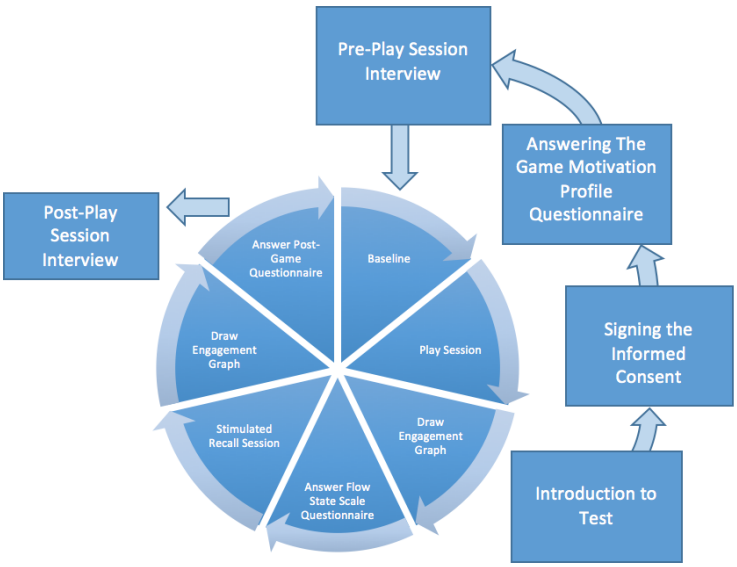


FIGURE 12: VISUALIZATION OF TEST PROCEDURE

4.5.1 Pre- game interview

Before the play session and actual testing of the three games began, the TP received a detailed explanation of what was going to happen during the test session and what the purpose of the research was. In this explanation it was made clear to the TP, that the researchers did not create any of the games and that they should therefore not be afraid of criticizing them, and that their honest opinion was what was important and needed. After this explanation, they were given the informed consent (Appendix E) informing the TP about their rights and again the purpose of the tests, how the data would be collected and handled and that they were guaranteed total confidentiality.

They were then given time to read and decide if they agreed and wanted to sign it before proceeding to the first questionnaire; The Motivation Profile questionnaire (Quanticfoundry, 2016).

When they had signed the informed consent and were handed the first questionnaire, the video and audio recording was started. After the TP had completed the first questionnaire and their answers had been saved by screenshots, the brief pre-interview began, where they were asked different demographical questions and questions concerning their use of mobile games. After this, the GSR and HRV electrodes were attached to the TP fingers and ear and the sensors were tested before moving on to recording a three-minute baseline and beginning the actual play session.

4.5.2 Play session

The play session began with the interviewer placing the iPad in the holder in front of the TP with the game opened and ready. In order for the TP to only focus on playing the game and not finding and starting it.

All games were played for seven minutes each with a three minutes' baseline. The reason for this was that after talking to the CEO of Norsfell and receiving what they perceive as the steps a player goes through in the onboarding phase and how long they perceive these steps to take (Norsfell Games Inc., 2016; Maroda, J., personal communication, 24 Marts, 2016; Appendix H). It was found that they define the onboarding phase of WinterForts as the intro tutorial plus 3-5 minutes of gameplay and 3-5 minutes of gameplay and approximately 10 death events for PogoChick. Additionally, by talking to the team lead candy BPU analytics at King Stockholm (King.com Ltd., Magnusson, J., personal communication, 11 April, 2016; Appendix H). It was found that they perceive their onboarding phase as the first 15 levels. Then by playing the onboarding phases of the three games according to these statements, while taking time, it was found that seven minutes was what the onboarding phases of the three games in average took. PogoChick (Norsfell Games Inc., 2016) was the one of the three games that had a more loose approach to its onboarding phase and did not have a specific and descriptive onboarding phase but more of a 'learn by doing' one. WinterForts (Norsfell Games Inc., 2016) had a very specific and descriptive onboarding phase, where TP had to follow a strict tutorial and perform the tasks told by the game. Candy Crush Jelly Saga (King.com Ltd., 2016) was the game in-between; it had a more descriptive onboarding phase with help functionalities and information, but was neither as strict as WinterForts nor as loose as PogoChick.

After the TP were finished playing the onboarding phase of each game, they firstly had to draw a graph visualizing the experience they have just had while the interviewer asked any potential question to the TP about the graph.

Secondly, the TP had to fill out the FSS.

After they had filled out the questionnaire, the stimulated recall session began, where the TP were shown a video of their gameplay while they were asked to talk about what they experienced in the game, their thoughts of the game and their actions.

After the stimulated recall session, the TP were asked to draw another graph showing their perceived experience after they had seen themselves play, to help them recall different in-game events more clearly.

Lastly, the TP were asked to fill out the PGQ. After this, the play session started over with the next game. Because it was three separate games that were being tested, the TP had to complete three play sessions.

After the whole test session was finished and the TP had played all three games, they were asked two final questions regarding which game they liked the most, the least and why. Here the TP also had the chance to ask questions about what they had just experienced if they had any.

4.5.3 Pilot test

In order to identify any potential problems with the test setup and session, and to minimize or remove them, a pilot test on three TP was conducted. This pilot test followed a similar procedure and test script as explained above, but was done before

beginning the actual data collection. During the pilot test, it was possible to test if the test setup, procedure, and test script worked and if the equipment functioned as intended and in general rehearse the test setup in practice and find out if anything needed to be changed.

By this, different problems with the GSR and HRV devices was found and one with the cameras concerning how long battery life they had. These problems were removed by charging the HRV and GSR between each test session and by always having the charger connected to the cameras. It was also found that there was too much noise and distractions in the initial room up in the HUM lab at AAU Cph. This was corrected by booking an actual user testing lap with a one-way mirror down in Globegangen at AAU Cph instead. Additionally, it was found that some of the questions asked by the interviewer during the stimulated recall session were difficult for TP to understand, therefore some of the questions were rephrased and the test script and procedure was additionally rewritten according to the new room and findings.

It was also discovered that the TP found it more distracting if the interviewer and the facilitator whispered to each than talking in a voice that they could hear if they for any reason had to exchange words.

Lastly, it was found to be uncomfortable and distracting for the TP if they were not able to see the interviewer during the test, both so they were able to freely ask questions, but also because it was unpleasant to have the interviewer watch them from behind without being able to see the interviewer.

4.6 Summary

These methods mentioned above contributed to give comprehensive insights into the experience of the TP and whether or not they experienced flow during the play sessions. It was found to be an adequate mix of methods and fostered large amounts of data both concerning physiological measurements and their use in a mobile game testing context, the UX in general and the occurrence of flow. However, as it fostered large amounts of data, which was found highly relevant and important, there was also some data that was less important to the investigation of this thesis.

Therefore, the data was prioritized and the most relevant was processed in order to find the answers needed to answer the problem statement and RQ. The data less relevant and which did not directly contribute to answering the problem statement and RQ were therefore deselected due to both the restrictions on thesis size, the four to five months of available time, resources, the lack of funding possibilities and thereby what was realistic to be able to cover within these frames was used. Although additional interesting angles could be derived from the additional data.

It could be argued that wearing sensors to record GSR and HRV could have an effect on the possibility for flow to occur as some TP could have felt uncomfortable wearing them. However, by asking the TP after each play sessions how they felt about the test session and if they felt unpleasant with any of the test elements including the

sensors. It was found that in a majority of instances the TP stated that the sensors did not affect their experiences at all and that they did not notice them that much, some said they did not notice them at all. This led to the assumption that the sensors in the majority of cases did not affect the TP possibility for experiencing a flow state (Appendix M).

Furthermore, it can be argued that the PGQ and experience graphs should not have been collected as they were not used in the final analysis. However, they were collected as a mean for going further into depth with a more UX specified view as an addition to flow, if time and resources would allow for it and there was room for extra investigation besides the initial answering of the problem statement and RQ. This was found to be impossible due to the amount of interesting angles possible to investigate regarding flow by using the FSS and stimulated recall itself. Nonetheless, the further data and possible angles could be processed and investigated further in a possible future research.

Thereby the data that was perceived as the most relevant to the problem statement and RQ of this thesis was:

- Pre- interview
- Stimulated recall
- The FSS
- The Game Motivation Profile questionnaire
- Post- interview
- Design and developer experience graphs

The data that was perceived as the least relevant and to not directly answer the problem statement and RQ was:

- GSR measurements
- HRV measurements
- Player experience graph
- The PGQ

5 Analysis

In this chapter, the analyses will be presented, which were done in order to get an understanding of the games, the possibilities for flow and to create a set of recommendations. The quantitative analysis is firstly presented, which contains the investigation of the FSS. Where Cronbach's Alpha (Field, 2005) is used to investigate if the questions meant for measuring the same flow dimension was still doing that. The one-way repeated measures ANOVA (Field, 2013) is then used to investigate any potential variance between flow in the three games. Lastly, Spearman's rho (Field, 2013) is used to investigate potential covariance between flow and the demographic data, both generally on all 78 answers and in each game specifically, and on flow in each game and the data from The Game Motivation Profile questionnaire (Quanticfoundry, 2016). Then the qualitative analysis is presented, which uses open coding (Lazar, Feng, & Hochheis, 2009; Pickard, 2013) to code categories regarding flow, the experience, design and in-game elements based on the TP statements from the stimulated recall. Finally, the recommendations to onboarding phases will be presented.

Below is a model visualizing the steps gone through in the process of statistically analyzing the data from the FSS, analyzing the data from the stimulated recall and lastly creating the recommendations:

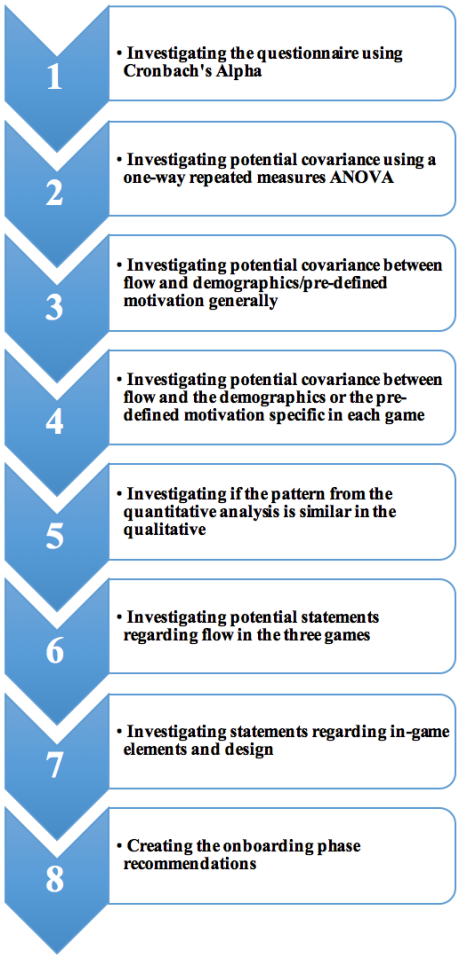


FIGURE 13: SHOWING THE ANALYSIS PROCESS

5.1 Quantitative analysis

In this section, the different statistical analyzes will be presented and analyzed, on the basis of the data from the FSS, which have all been calculated using the statistical program SPSS by IBM (IBM, 2016).

5.1.1 Investigating the FSS with Cronbach's Alpha

In order to measure the reliability in terms of the correlation between, and grouping of the items in the FSS data, a Cronbach's Alpha analysis was used to determine if it was still consistently reflecting the construct it was meant for measuring (Field, 2013).

Additionally, to ensure the reliability in the FSS data entry, different samples were reentered by an external source, after all the data from the FSS had been entered into the data spreadsheet. This was done to make sure that the data entered into the data spreadsheet was reliable and to ensure that it did not have any faults of incorrect entries.

In order for a questionnaire to have reliability and consistently reflect the construct, which it is measuring, it should produce consistent results across a set of items meant for measuring the same. In traditional manner, it means that a dataset could be split up and then compared. If they are close to equal, then the data has high reliability, this method is called spilt half reliability (Field, 2005). However, because data can be split in many different ways this method is problematic, therefore Cronbach's Alpha is used instead (Field, 2005). Cronbach's Alpha calculates to what extent the questionnaire responses correlates with one another and thereby the amount of consistent variance in the questionnaire, instead of splitting the data up as many times possible (Shelby, 2011).

In Cronbach's Alpha, a score value within the range of .7 and .8 is perceived to be acceptable. Values lower than this indicates that the scale is unreliable. However, these guidelines should, according to Field (2005), be used with caution because the value will change according to the items being measured on the scale. Some researchers have argued that even values as low as .5 can be accepted in some cases of early research on psychological concepts (Field, 2013).

Two versions of Cronbach's Alpha exist, the standardized; used when items are summed to construct a single score, and the normal; used when items are standardized beforehand (Field, 2005).

As a start, it was investigated if any of the questions in the FSS contained any reverse phasing problems in order to enlighten the reliability of the Cronbach's Alpha calculations. This was found not to be a problem, therefore it could be determined that it did not affect the calculations and thereby not something that diminished the reliability of them.

In Cronbach's Alpha, which was calculated amongst all 78 answers across the three games, it was found that the items had a mixed reliability. Challenge – skill

balance (Chal), Clear goals (Goal), Unambiguous Feedback (Fbdk), Sense of Control (Cont), Concentration on Task at Hand (Conc), Transformation of Time (Trans), Loss of Self-Consciousness (Loss) and Autotelic Experience (Enjoy) all had measures above .5 with an average of .699. Thereby, these are all above the cut-off of .5, as some researchers have argued to be acceptable in early stages of research when measuring on psychological concepts. Both due to the diversity and individuality in the understanding of the measured constructs, but also because of the smaller sample size (Field, 2013). It thereby testifies on the reliability being acceptable for these measures. The measure of Action-Awareness Merging (Act) had however a very low score under the cut-off of .5. Thereby its reliability as a conjoined construct was not sufficient and should not be measured together.

Measuring Cronbach's Alpha also enabled the comparison with the original, to see the differences between it and this reduced version (Jackson & Marsh, 1996). In the comparison, it was seen that reducing the original questionnaire affected the outcome values. However, considering the reduction from 4-items per question to 2-items, the reduction in values is not critical and is still overall acceptable values for a preliminary research with a smaller sample size.

	Cronbach's Alpha	**Cronbach's Alpha based on standardized items**
Chal	.643	.643
Act	.490	.490
Goal	.916	.917
Fdbk	.652	.665
Conc	.591	.592
Cont	.770	.773
Loss	.587	.589
Trans	.747	.751
Enjoy	.902	.902

TABLE 3: CRONBACH'S ALPHA CALCULATIONS

Although it was found in the Cronbach's Alpha, that the reliability in the FSS in the majority of cases was acceptable, it was chosen to work with flow from the questionnaire as a whole construct. Instead of processing the data according to the 9 dimensions of flow, when investigating if flow occurred in the onboarding phases of the three mobile games and if one or more of them gave a greater possibility for the TP to achieve a flow experience. Going further into the dimensions was saved for investigating the design aspects of the games and thereby the qualitative data analysis.

5.1.2 Analysis of variance

ANOVA is an analysis of variance and for comparing several means. Within ANOVA different approaches exist, which are all used differently according to the research and what is measured (Field, 2013). Three examples of approaches that exist within ANOVA is the Independent ANOVA, the One-way repeated measures

ANOVA and the Multivariate ANOVA or MANOVA (Field, 2013). What they all have in common, is that they measure three or more conditions to find the variance between them, instead of using a t-test, as a t-test only measures two conditions (Field, 2013). The difference between the one-way repeated measures ANOVA and the independent ANOVA is that the independent ANOVA is used when measuring on different TP or groups each of which are getting different treatments and no single TP is subjected to more than one condition. The variance is then measured between the TP or groups. Therefore, it has a between-subjects design (Field, 2013). On the contrary, the one-way repeated measure ANOVA uses repeated measures to investigate the same TP or group and every TP is subjected to all treatments and thereby conditions. Therefore, it has a within-subjects design (Field, 2013). Both the one-way repeated measures ANOVA and the independent ANOVA can measure on several independent variables, but only one dependent variable. In case of having multiple dependent variables, the MANOVA needs to be used. The MANOVA can both be one-way and two-way, depending on whether it needs to measure on one independent variable (one-way) or several independent variables (two-way) (Field, 2013).

In this case a one-way repeated measures ANOVA was used in order to analyze the variance between the manipulated independent variable (the three mobile games) and if the manipulation of the independent variable gave a variance in the conditions of the experiment and subsequently if it had a significant effect on the dependent variables (flow). This helped in answering **RQ5**. The reason for using a one-way repeated measures ANOVA was that there was only one dependent variable that needed to be tested and one independent variable with three levels, which were all tested on the same TP. Therefore, an independent ANOVA or MAVOVA would not be the best ones applicable in this case (Field, 2013).

In the one-way repeated measures ANOVA, it was found through Mauchly's test of sphericity that the assumption of sphericity with the critical value of $p<.05$ was not violated, as $\chi^2(2)=.766$, $p=.682$. Therefore, the null hypothesis of equality in variance cannot be rejected and the degrees of freedom did not need to be modified to prevent an increase in the risk of a type 1 error. Thereby the *F*-ratio calculations were valid and could be used for further statistical evaluations (Field, 2013) (Appendix I).

When further looking into the calculations done in the one-way repeated measures ANOVA, it can be seen in the descriptive statistics, that there was a variance in the mean (M) values across the three levels of the independent variable (Appendix I & K). Candy Crush Jelly Saga had an M=3.83, PogoChick M=3.01 and WinterForts M=3.10. This indicates the assumption of there being a variance in which game enabled the highest occurrences of flow experiences with the TP. Additionally, there was also a diversity in the standard deviations (SD) between the three games. Candy Crush Jelly Saga had an SD=.432, PogoChick SD=.575, and WinterForts SD=.669. It can thereby be assumed that the TP in the three games had a variation in their answers and thereby their agreement towards the individual games, with the TP having highest agreement towards Candy Crush Jelly Saga because it had the lowest SD.

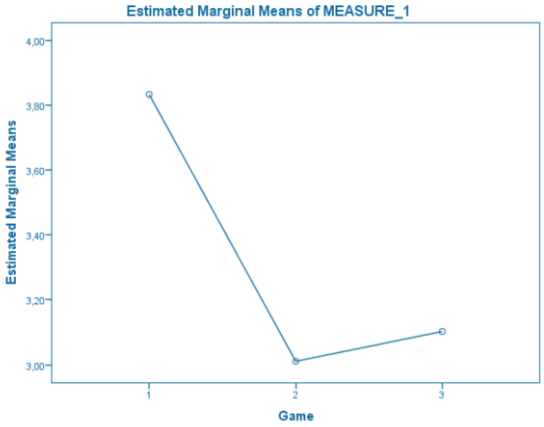


FIGURE 14: PLOT VISUALIZING THE M VALUES IN THE THREE GAMES: CANDY CRUSH JELLY SAGA BEING 1, POGOCHICK 2, WINTERFORTS 3

In the main one-way repeated measures ANOVA, it was found that F=16.73 with p<.000, meaning that there was a significant variance between the three conditions of the experiment. Consequently, the experimental manipulation of the independent variable had some effect on flow besides extraneous factors (Appendix I), based on the p-value being under the criterion value of .05 and the F-ratio above the value of 1 (Field, 2013).

Furthermore, it was found in the test of within-subjects contrasts that Candy Crush Jelly Saga had significant higher experiences of flow with the TP compared with PogoChick p<.000. However, when comparing PogoChick with WinterForts there was not a significantly higher degrees of flow experiences p=.589 (Appendix I).

In order to investigate the pairwise comparison between conditions, Turkey's post hoc test, which goes under LSD in SPSS, was performed (Field, 2013). The reason for using Turkey's post hoc test was due to the assumption of sphericity not being violated (Field, 2013). Had the assumption of sphericity been violated, the Bonferroni post hoc test would have been most applicable (Field, 2013). Similar to the test of within-subjects contrasts, it was found in the post hoc test that there were significantly more flow experiences in Candy Crush Jelly Saga compared to PogoChick p<.000 and Candy Crush Jelly Saga compared to WinterForts p<.000. Additionally, it was also found here that there was no significant difference between PogoChick and WinterForts p=.589.

Because Candy Crush Jelly Saga show a significance when compared with the two other games and that it is the only game with M ranging positively in possible answers in the FSS Likert scale (Likert, 1932; Jackson & Marsh, 1996) with M=3.83. Based on the questions ranging from 1 to 5, where 1-2 are negative (Strongly disagree: 1, Disagree: 2), 3 is neutral (Neither agree nor disagree: 3) and 4-5 are positive (Agree: 4, Strongly agree: 5.) and that the two other games have M values in the neutral range with PogoChick M=3.01 and WinterForts M=3.10. It can be assumed that Candy Crush Jelly Saga gave a significantly greater possibility for the TP to achieve a flow experience, which relates to the answering of **RQ5,** and **A1** that has been proved to be true.

5.1.3 Correlation Coefficient

The Correlation Coefficient is used when investigating potential relationships between two variables and how they are related to each other, called the covariance (Field, 2013). In order to investigate any covariance, SD is used, which is how much the data deviates from its M (Field, 2013). Two variables can be positively, negatively and not related at all. If two variables are positively related, the deviation from the M in one variable would also give a similar deviation in the other. If they are negatively related, the deviation in one variable would foster the opposite deviation from the M in the other. If they are not related at all, the deviation of one variable would not affect the other in any way (Field, 2013). In order to calculate covariance across different measure types, a standardized covariance is used, which is the correlation coefficient (Field, 2013).

The Pearson's correlation coefficient or Pearson's *r* can be used for calculations on parametric data and thereby requires data that are interval or ratio (Field, 2009). It uses a standard set of measures that range from -1 to +1, where +1 indicates a perfect positive correlation and -1 a perfect negative (Field, 2013). The data needs to be interpreted in relation to what is measured but an approximate value of $\pm$.1 shows a small effect, $\pm$.3 a medium and $\pm$.5 a large (Field, 2013).

If the data is non-parametric and not interval or ratio and thereby ordinal, a method like Spearman's correlation coefficient or Spearman's rho needs to be used, because it ranks the data. It uses Pearson's equation from his correlation coefficient and similar to Pearson's *r*, Spearman's rho uses the same standards with the measures ranging from -1 to +1 (Field, 2013).

Because the data from the FSS is ordinal, as it is ordered according to the rank of whether the TP agreed, did not or neither, it is not nominal (Strongly disagree: 1, Disagree: 2, Neither agree nor disagree: 3, Agree: 4, Strongly agree: 5). That is why Spearman's rho needs to be used to investigate the correlations between the FSS data.

Spearman's rho was used for measuring general correlations in the data to investigate if any patterns existed. Thereby investigating potential covariance and if the variables were positively dependent, negatively dependent or independent of each other.

The following was found in Spearman's rho, when measuring on all 78 answers from all TP between all three games. There was a non-significant positive correlation with small effect between the age of the TP and their score in the FSS and thereby in their experience of flow r_s =.065 p=.573 (Appendix J). Additionally, there was also found to be a non-significant positive correlation with small effect between the gender of the TP and their score in the FSS r_s =.121 p=.290. However, it was found that there was a significant positive correlation with small effect between what gamer type the TP had and their score in the FSS r_s=.227 p=.046 (Appendix J).

It was found that there was a non-significant positive correlation with small effect between age and flow score based on answers towards Candy Crush Jelly Saga r_s=.145 p=.480. A similar result was found between gender and flow r_s=.122 p=.554 and gamer types and flow r_s=.084 p=.683. In WinterForts, there was also found a non-

significant positive correlation with medium effect between age and flow score r_s=-.378 p=.057. A similar result was found between gender and flow r_s=.156 p=.446 and also between gamer types and flow r_s=.286 p=.157 both with a small effect. In PogoChick, there was also found a non-significant positive correlation with small effect between flow score and age r_s=-.050 p=.809. A similar result was found between gender and flow with medium effect r_s=359. p=.072 and with gamer types r_s=.381 p=.055 also with medium effect (Appendix J). Thereby there was not found any significant correlations between flow in each of the games and the demographical data, which relates to the answering of **RQ4**.

Correlating the motivation factors with the scores from the FSS towards each of the games also did not show any significant correlations (Appendix J).

	Act	Mast	Ach	Soc	Imm	Crea
N	26	26	26	26	26	26
Candy Crush Jelly Saga (Spearman's r_s)	-.022	.179	.101	.038	.156	-.115
Sig. (2-tailed)	.915	.381	.623	.852	.445	.577
WinterForts (Spearman's r_s)	.107	.259	.119	.246	.025	-.094
Sig. (2-tailed)	.604	.202	.561	.225	.904	.649
PogoChick (Spearman's r_s)	.228	.208	.086	.182	.297	.199
Sig. (2-tailed)	.262	.309	.675	.372	.141	.330

TABLE 4: SHOWING CORRELATION COEFFICIENT BETWEEN MOTIVATION AND THE FSS ANSWERS

Because there was found no significant relationship between age, gender, gamer types or motivational profile and the answers from the FSS in each game. It can be assumed that it did not make a difference what pre-defined motivational profile, gender, gamer type or age the TP, in this case, had in regards to their flow experience, related to the answering of **RQ4**.

However, when comparing the overall answers without distinguishing between games. Gamer types were found to be the only one having a significant correlation, which lead to the assumption that gamer types have some effect on the possibility for TP to experience flow in the games when looking generally at the data. When looking further into their M and SD it can be seen that all gamer types also follow the pattern of Candy Crush Jelly Saga being the game with the highest M value and lowest SD and thereby most flow. WinterForts is in the middle and PogoChick last with casual and core gamers but hardcore gamers have a slightly higher M in PogoChick than WinterForts.

	Casual Gamers	Core Gamers	Hardcore Gamers
Candy Crush Jelly Saga	M=3.8201 SD=.4312	M=4.0556 SD=.14699	M=3.6389 SD=.35355
WinterForts	M=2.9974 SD=.63306	M=3.7037 SD=.50103	M=3.3056 SD=.1.13923
PogoChick	M=2.9223 SD=.56368	M=3.2778 SD=.69389	M=3.5278 SD=.19642
All Games	M=3.2469 SD=.68470	M=3.6790 SD=.54982	M=3.4907 SD=.56154

TABLE 5: SHOWING M AND SD FOR GAMER TYPES

Furthermore, only a slight difference was found in M and SD between the answers from both female and male TP when distinguishing between games and when not.

	Female	Male
Candy Crush Jelly Saga	M=3.8626 SD=.44651	M=3.7540 SD=.41556
WinterForts	M=3.0292 SD=.68503	M=3.3016 SD=.63087
PogoChick	M=2.9211 SD=.52225	M=3.2540 SD=.68182
All Games	M=3.27 SD=.69477	M=3.43 SD=.60331

TABLE 6: SHOWING M ADN SD FOR FEMALE AND MALE

All demographical M and SD measures are comparable with Candy Crush Jelly Saga being the game with most flow and least disagreement towards it, as it has the highest M and lowest SD values.

Together these findings in Spearman's rho helped in the answering of **RQ4** and helped prove **A4** and **A5** not to be true.

5.2 Qualitative analysis

In this section, the data from the stimulated recall will be presented and analyzed using open coding in order to find categories in the data regarding flow, design and in-game elements. Furthermore, the data from the statistical analysis will be compared with the findings in the open coding.

5.2.1 Open Coding

In order to qualitatively analyze, investigate and code the data from the stimulated recall, open coding was used. In the open coding process, the coders deconstruct all the data, which can come from a variety of sources such as interview transcripts, audio- and video recordings, observation notes etc. (Pickard, 2013, s. 270-271). In this case, the audio recordings from the stimulated recall were used. By this

deconstruction of the data, possible themes and categories in the data can be identified that relates to the investigated issue and are based on the statements from the TP (Pickard, 2013, s. 270-271). After the categories have been identified, they can be converted into a group of categories, giving any number of overall categories with several subcategories (Pickard, 2013, s. 270-271).

In the process of processing the data, an additional person was recruited to help listen to the audio recorded data from the stimulated recall and instructed in writing notes on statements relating to the concept of flow, design and in-game elements (Appendix L) (Pickard, 2013, s. 270-271; Lazar, Feng, & Hochheis, 2009). Thereby both an outside objective and inside subjective coder, coded all the data (Lazar, Feng, & Hochheis, 2009, s. 288-298). After the process of writing individual notes on statements to every audio recording from the individual play sessions. Each play session and related notes on statements were discussed in depth to come to an agreement on what were the highlights of the stimulated recalls. And convert the notes into a set of first categories containing who of the TP had statements fitting within what category both concerning flow, design and in-game elements (Appendix M) (Pickard, 2013, s. 270-271). After the first categories were created from the notes, they were narrowed down with a more specific view on answering **RQ5**, **RQ6**, and **RQ7** to create the overall second set of categories containing all the first categories, turning them into subcategories (Pickard, 2013, s. 270-271). Additionally, if any category was repeated or very similar they were merged with another category or if any category was found not to be relevant, it was considered to be taken out. By doing this, a final set of categories was created that contained all the first categories, which are now subcategories. This was done due to multiple pieces of evidence being stronger than only one in terms of validity of the interpretation (Lazar, Feng, & Hochheis, 2009, s. 288-298) (Appendix M). The final categories were also color coded in terms of what was negatively, positively or neutrally anchored.

The reason for doing this was to qualitatively find the patterns and give a dimension of insights into the experiences of the TP and thereby explanations to the quantitative analysis. Also, to investigate if the two analyses contributed a similar pattern and result. This thereby helped in the answering of **RQ6**, concerning if one of the games provided a greater possibility for experiencing flow. It also gave the possibility for looking into what design elements were found to be good or bad with the aim of creating a set of recommendations in terms of the onboarding phase of mobile games. Related to the answering of **RQ6** and together with the quantitative analysis the answering of **RQ7**, which concerns if the correlation between the methodologies and analyses foster the possibility of determining if flow occurs in these onboarding phases of the three F2P mobile games.

In order to test the reliability of the data processing method and the categories that emerged from it, one additional outside person was recruited to try to code a sample of the data and from this coding calculate the inter-coder reliability. The inter-coder reliability is calculated to illustrate to what degree two or more independent coders code the same data equally, and thereby how high agreement they have. This was done using percentages, where a percent agreement above 70% is acceptable (Lazar, Feng, & Hochheis, 2009, s. 296-297; Bordens & Abbott, 2011, pp. 229-230). The

inter-coder reliability in the categories were calculated to be satisfying high ranging from 85% to 95% with an average of 91% (Appendix N).

5.2.2 Comparing the two analyses

It was found in the statistical analysis that Candy Crush Jelly Saga was the game where most TP experienced some degrees of flow, based on the FSS data, when investigating the significance between the games (Appendix J, I & K). It was also the only game with a satisfying high M=3.83 based on only 4 and 5 on the FSS Likert scale (Jackson & Marsh, 1996; Likert, 1932) (Appendix I) is positively anchored. The other games were both neutrally anchored with M=3.10 in WinterForts and M=3.01 in PogoChick (Appendix I).

When comparing the overall categories and subcategories, which emerged from the statements of the TP in the stimulated recall. It was similarly found that Candy Crush Jelly Saga was the game with the best results and the greatest amount of positively anchored categories and subcategories compared with its number of negative. The other two games had greater amounts of negative categories and subcategories compared with Candy Crush Jelly Saga (Appendix M).

Furthermore, almost all TP liked Candy Crush Jelly Saga (22 TP), four would play it again and two would have continued playing. Making it the game with the highest amount of TP saying that they like the game. Additionally, 19 TP stated that they thought the game was fun and simple, two were eager to play, 15 TP stated that they thought it was cozy, nice and enjoyable and 12 TP stated that they got involved in the game. Only three TP stated that they did not like Candy Crush Jelly Saga, one would have stopped playing and five would not play again.

Positive experience with game:		**Number of participants:**
Liked it:	**P10, P11, P13, P14, P16, P17, P18, P20, P15, P21, P22, P7, P8, P23, P25, P26, P3, P4, P5, P19, P28, P27**	**22**
Would have continued playing if they could:	**P11, P13**	**2**
Would play again:	**P11, P10, P18, P20**	**4**
Happy about recognazability:	**P13, P18, P20, P7, P8**	**5**
Fun and simple:	**P10, P11, P13, P14, P15, P17, P18, P20, P21, P22, P7, P8, P23, P24, P25, P26, P5, P28, P27**	**19**
Eager to play:	**P11, P28**	**2**
Cozy and nice/Enjoyable:	**P11, P15, P17, P18, P22, P7, P8, P23, P24, P25, P26, P3, P19, P28, P27**	**15**
Fine experience was engaged:	**P5, P19, P28, P27**	**4**
Got involved in the game:	**P14, P17, P18, P20, P21, P22, P7, P8, P23, P25, P26, P3**	**12**
More fun than WinterForts:	**P22, P7, P25, P4, P19**	**5**
Bad experiences and frustrations towards the game:		**Number of participants:**
Disliked it:	**P9, P12, P6**	**3**
Would have stopped playing if they could:	**P12**	**1**
Frustrating and boring:	**P12, P9**	**2**
Did not understand the game:	**P12**	**1**
Childish:	**P22, P6, P28**	**3**

No fun:	**P12, P6**	**2**
Would not play again:	**P12, P9, P13, P24, P6**	**5**

TABLE 7: POSITIVE AND NEGATIVE EXPERIENCES WITH CANDY CRUSH JELLY SAGA

PogoChick had the highest amount of TP stating that they disliked the game, as 17 TP did not like it, 12 would have stopped playing before the end of the test session and 15 would not play again. The TP also stated that they found the game frustrating (11 TP), that they did not understand the game (9 TP), that it was boring and that they were not engaged (14 TP). PogoChick also had the least stating that they liked the game, as only six stated that, three would though have played longer but none stated that they would play again.

Did not like the game - too long time in play session:		**Number of participants:**
Disliked it:	**P10, P11, P13, P12, P15, P14, P16, P17, P18, P20, P23, P26, P3, P4, P5, P19, P27**	**17**
Too long play time in play session, would have stopped before:	**P12, P13(5-6deaths), P15, P23 (3 deaths), P16, P18 (5 deaths), P22, P26 (5/6/7 deaths), P3, P4 (2 deaths). P6, P19 (2-3min), P27**	**13**
Would not play again:	**P10, P11, P9, P12, P13, P15, P16, P18, P20, P22, P23, P26, P3, P5, P19**	**15**
Frustrating game:	**P11, P13, P14, P15, P18, P20, P22, P26, P3, P19, P27**	**11**
Did not understand the game:	**P10, P12, P13, P18, P3, P4, P5, P19, P27**	**9**
Bad experience/boring/Not engaged:	**P10, P11, P13, P15, P17, P18, P20, P23, P26, P3, P19, P27, P5, P16**	**14**
A game for younger people:	**P6**	**1**
Stressing game:	**P6**	**1**
Childish:	**P17, P20**	**2**
Needs great concentration/cannot be played in the train/not a game to go back and forth to:	**P14, P7, P28**	**3**
Liked the game and understood it:		**Number of participants:**
Liked it:	**P21, P7, P24, P25, P8, P28**	**6**
The difficulty was appropriate for new players:	**P24**	**1**
Cozy and simple but irritating:	**P20, P21, P22, P6**	**4**
Would have played longer then play session:	**P24, P25, P28**	**3**
Very engaged:	**P21, P7, P24, P25, P28**	**5**
Liked the graphics:	**P15, P20, P3**	**3**
Liked the simplicity and simplicity and that you just die and start over/Uncomplicated:	**P24, P25, P28**	**3**
Understand that you can win a new chick:	**P14, P17, P21, P25, P5**	**5**
If you played with friends it could be fun to try to be best:	**P14**	**1**
Cute universe/silly:	**P14, P24, P25, P28**	**4**

TABLE 8: POSITIVE AND NEGATIVE EXPERIENCES WITH POGOCHICK

WinterForts was the game in the middle with seven stating that they liked it, two might want to download it at home and three found it relaxing. However, 12 stated that they did not like the game, 11 thought it was boring, three would not play again and five would have closed the game. Moreover, a lot of TP stated that they did not understand the game (17 TP), that it was confusing (12 TP) and that they did not know what was happening in the game (13 TP).

Boring game - do not like it at all/would not play again:		**Number of participants:**
Dislike:	**P9, P11, P12, P15, P16, P20, P22, P8, P25, P26, P3, P28**	**12**

Boring game:	**P9, P11, P12, P15, P16, P20, P22, P8, P25, P27, P28**	**11**
Negative before starting, do not like that kind of game:	**P20, P28**	**2**
Did not understand the game:	**P9, P11, P12, P13, P15, P16, P20, P22, P8, P25, P26, P3, P4, P7, P19, P27, P28**	**17**
Would not play again:	**P3, P4, P7**	**3**
Do not know what is happening:	**P12, P15, P16, P20, P22, P8, P25, P26, P4, P7, P19, P27, P28**	**13**
Would have closed the game before end session:	**P16, P22, P25, P28, P7**	**5**
Confusing experience:	**P10, P13, P16, P20, P22, P8, P26, P3, P4, P19, P27, P28**	**12**
Other games in the genre is more advanced:	**P17, P25**	**2**
Do not allow for engagements:	**P8, P27, P28**	**3**
Too advanced game:	**P20, P22, P8, P4, P28**	**5**
Liked PogoChick or Candy Crush more/less engaging then other games, PogoChick=better immersion:	**P24, P3, P23, P28**	**4**
Not something new in the genre – not exciting:	**P25**	**1**
Liked the game - good experience:		**Number of participants:**
Like:	**P13, P14, P17, P18, P21, P24, P6**	**7**
Would have continued a little longer then the play session, to figure the game out:	**P13**	**1**
Understood the game – it made sense:	**P14, P17, P18, P21, P24, P5, P6, P23**	**8**
Would read forums for tips and tricks:	**P14**	**1**
Might want to download it at home:	**P14, P17**	**2**
Relaxing and cozy game:	**P18, P21, P6**	**3**
Better then PogoChick you can get immersed into this game:	**P23**	**1**

TABLE 9: POSITIVE AND NEGATIVE EXPERIENCES WITH WINTERFORTS

That Candy Crush Jelly Saga was the game with most TP stating that they liked it (22 TP) and least stating that they disliked it (3 TP) and that it was the game with most positive categories compared to its negative, was comparable to the findings in the quantitative analysis. Where Candy Crush Jelly Saga had the highest M=3.83. Also the findings in WinterForts and PogoChick were comparable to the findings in the statistical analysis with WinterForts having seven likes, 12 dislikes and M=3.10, PogoChick having six likes, 17 dislikes and M=3.01.

Thereby the findings in the two analyses show a similar pattern. This further emphasizes that one of the games (Candy Crush Jelly Saga) did have the onboarding phase with the best possibility for flow experiences to occur, which further answers **RQ5**.

5.2.3 Statements regarding flow

In terms of flow all three games contained categories and subcategories regarding positive and negative flow, therefore it can be assumed that all games had participants who experienced flow. However, Candy Crush Jelly Saga was the game with most subcategories, containing most TP, concerning flow and thereby had the onboarding phase with most TP experiencing some degrees of flow (Appendix M). Some of the subcategories regarding positive flow in Candy Crush Jelly Saga were that the game contained clear goals which were always in sight, that they did not need to think much and that it got them relaxed. This is consistent with what the game aims to do

(King.com Ltd., Magnusson, J., personal communication, 11 April, 2016; Appendix H). This contributed in the creation of the 4th and 9th recommendation. They also felt that they mastered the game that it was intuitive and that time accelerated during play, which contributed to the 8th recommendation. They also stated that things just happened automatically and that the game could be addictive due to its clear goals, also contributing to the 4th recommendation.

A large amount of TP also stated that they liked the positive outburst, as they gave good feedback in the game. It made them feel as if they always knew when they were doing well and that the game had a good progression, contributing to the 5th recommendation. This was also found to be one of the things that the developers aimed the game to have (King.com Ltd., Magnusson, J., personal communication, 11 April, 2016; Appendix H).

Statements positively related to flow - enables:		**Number of participants:**
Clear goals in the game/Do not need much thinking/goal always in sight:	**P9, P10, P11, P13, P14, P16, P17, P20, P22, P6, P21, P7, P8, P23, P24, P25, P26, P3, P5, P28, P27, P23**	**22**
Relaxing game/Got you relaxed from everyday stress/Flee into the world of phone(Less thought then WinterForts/Minutes of thinking nothing/noncommittal):	**P10, P11, P9, P13, P14, P15, P17, P18, P20, P21, P22, P7, P8, P23, P28, P27**	**16**
Too high challenges at first but better later:	**P11**	**1**
Mastered the game:	**P13, P14, P15, P16, P17, P18, P20, P21, P22, P7, P8, P23, P25, P26, P6, P3, P28, P27**	**18**
Could get addicted to this kind of game because of clear goals:	**P14, P4**	**2**
No strings attached:	**P13, P15, P14, P16, P18, P20, P21, P22, P7, P8, P23, P28, P27**	**13**
Good balance between skill and challenge:	**P4**	**1**
Time accelerates when you play:	**P22, P8, P23**	**3**
Good progression:	**P14, P17, P20, P22, P8, P23**	**6**
Not in doubt about you are doing well:	**P14, P16, P20, P7, P8, P24, P25, P26**	**8**
Easy to navigate/intuitive/easy to play:	**P14, P16, P17, P21, P22, P7, P27, P4**	**8**
Good experience/feels like a success:	**P14, P17, P18, P20, P21, P22, P7, P23, P25, P26, P19**	**11**
Things happen automatically:	**P27, P28**	**2**
Likes outbursts - good and reinforcing feedback:		**Number of participants:**
Positive(Outbursts) reinforcements but not deeply satisfying/Good feedback:	**P9, P12, P13, P14, P16, P22, P8, P23**	**8**
Really likes outbursts/good feedback:	**P16, P8, P24, P25, P26, P3, P19**	**7**
Positive outburst makes the game whole/unconscious satisfying/Makes you want to play again:	**P16, P8, P23, P25, P26, P3, P19**	**7**

TABLE 10: POSITIVE FLOW CATEGORIES AND SUBCATEGORIES TOWARDS CANDY CRUSH JELLY SAGA

Some subcategories in terms of statements negatively related to flow in Candy Crush Jelly Saga were also found. These concerned the fact that the TP felt that their skills exceeded the challenges of the game, that they lost control when everything exploded and that the game at some point told them too much what to do. This contributed to the 8th recommendation.

Statements negatively related to flow - disables:		**Number of participants:**
Do not understand what you are not doing well:	**P24, P4**	**2**
Skill exceed challenges:	**P9, P20, P21, P23, P6**	**5**
Ahead of the game allows for:	**P9, P11, P6**	**3**
No control when too much happens/explosion irritating (Got one out of the zone, should think, takes too long time):	**P10, P15, P20, P22, P7, P8, P25, P26, P5, P27**	**10**

Irritating that at one point you had to do what the game told you to:	**P15, P20, P7, P17, P24, P6**	**6**
Rules too strict, needed more control:	**P16, P17**	**2**

TABLE 11: NEGATIVE FLOW CATEGORIES AND SUBCATEGORIES TOWARDS CANDY CRUSH JELLY SAGA

In PogoChick, statements positively related to flow concerned that the eyes and sounds of the chick gave positive and quick feedback, that the game had clear goals, was simple to master, was good for passing time and gave good challenges due to its fluent goals. This contributed to the 4th, 5th, 6th and 8th recommendation

Positive flow elements in the game:		**Number of participants:**
The chick eyes gave good feedback:	**P12, P17, P22, P7, P8**	**5**
Skills became better during gameplay:	**P12, P7, P24**	**3**
Clear goals:	**P9, P21, P7, P24, P25, P28**	**6**
Simple to master:	**P9, P16, P21, P7, P24, P25, P6, P28**	**8**
Quick feedback:	**P9, P17, P21, P22, P7, P23, P24**	**7**
Felt challenged because of the fluent goal:	**P21, P7, P24, P25**	**4**
Clearly knew what to do:	**P22, P7, P24, P25, P28**	**5**
Kills time/relaxing/get away from thoughts:	**P21, P7**	**2**
Good sound effects/gave good responses/feedback:	**P13, P14, P15, P16, P17, P22, P7, P23, P24, P4, P8**	**11**

TABLE 12: POSITIVE FLOW CATEGORIES AND SUBCATEGORIES TOWARDS POGOCHICK

In PogoChick, statements negatively related to flow were also found. Concerning the game having too high challenges, did not have a purpose and was only fun at the beginning but became boring when the TP could not master it, which contributed to the 8th and 4th recommendation.

Negative flow elements in game:		**Number of participants:**
Too high challenge to skills/not a good balance:	**P19, P27**	**2**
Lack of response/feedback on you dong good or bad:	**P19**	**1**
Lack of purpose/do not see the point in the game:	**P10, P13, P15, P16, P17, P20, P3, P4, P5**	**9**
Fun at start but becomes boring when it is not mastered:	**P22, P26, P5, P6**	**4**

TABLE 13: NEGATIVE FLOW CATEGORIES AND SUBCATEGORIES TOWARDS POGOCHICK

In WinterForts, the subcategories regarding positive statements towards flow, concerned that the info and goals were clear and the history understood, which contributed to the 4th recommendation. The sound and the music were relaxing, gave good and clear feedback and could be a means of immersion and that the game was exciting and challenging. This contributed to the 6th, 8th and 9th recommendation.

Positive flow elements:		**Number of participants:**
Clear info and understood the history of the game:	**P14, P17, P18, P21, P24, P25, P6**	**7**
Sounds are good to give clear feedback:	**P9, P10, P14, P17, P23, P24, P27**	**7**
Kills time:	**P21**	**1**
Good progression:	**P14, P21**	**2**
Clear goals:	**P17, P18, P21**	**3**
Simple to master because to the intro:	**P23, P24**	**2**

Sounds could be a means of immersion:	**P23**	**1**
Exciting and challenging:	**P21, P6, P19**	**3**
Positive towards sounds - fitting to the theme/relaxing - means of immersion:		**Number of participants:**
Fitting mid-evil music and sounds (Immersion):	**P9, P10, P11, P13, P14, P18, P21, P26, P3, P4, P7, P6, P19, P27**	**14**
Relaxing sounds:	**P23, P24, P26**	**3**
Music relaxing:	**P17, P23, P24, P26**	**4**

TABLE 14: POSITIVE FLOW CATEGORIES AND SUBCATEGORIES TOWARDS WINTERFORTS

In terms of negative subcategories related to flow in WinterForts, it was found that some of the TP were unsure of the end goal, that it was not challenging enough and that it was clear what to do during the onboarding but after it ended, a large number did not understand what to do (7 TP) and got confused (13 TP). This contributed to the 4th, 8th and 3th recommendation.

Negative flow elements:		**Number of participants:**
Unsure of the end goal of game:	**P16, P8, P28**	**3**
Needed more challenge:	**P11, P8, P25, P26**	**4**
Feels dump/No challenges (Game makes you feel dump):	**P9, P11, P8, P26**	**4**
Lack of clear goal:	**P24, P28**	**2**
Clear what to do first but confused after the onboarding:		**Number of participants:**
Clear info as a start (But did not know what to do after):	**P9, P10, P11, P12, P24, P25, P3**	**7**
Confusion after end tutorial:	**P9, P10, P11, P12, P13, P20, P22, P8, P24, P26, P4, P27, P28**	**13**
Should have been help functions after the tutorial/Maybe after 30sec where nothing happens:	**P10, P12, P28**	**3**

TABLE 15: NEGATIVE FLOW CATEGORIES AND SUBCATEGORIES TOWARDS WINTERFORTS

5.2.4 Comparing the onboarding phases

It was furthermore found, based on statements from the TP, that the not too strict and not too loose design of the onboarding phase in Candy Crush Jelly Saga worked best and gave the best understanding of how the game functioned and what to do in it. Compared with the very strict onboarding phase in WinterForts and very loose in PogoChick, this contributed in creating the 1st recommendation. The TP had statements regarding that they liked Candy Crush Jelly Saga being fast, which made their experience peak. They also had statements more specific to the onboarding phase design, which specified that they liked that the game was easy and quick to learn (14 subcategories). Statements also indicating that the TP thought that the game had good help functionalities (6 TP) and start info (3 TP). Consequently, if something was not understood and nothing was done in the game for a little while, the game helped, for example by moving candy the way it could be matched or by coming up with new info (Appendix M). This contributed to the creation of the 3th recommendation.

FIGURE 15: SHOWING SOME OF CANDY CRUSH MANY HELP FUNCTIONS AND INFO

The TP also stated that they liked that the game allowed for exploration (3 TP) that it is fun with different elements that acted differently (6 TP) and that the fish gave mental rewards (4 TP) (Appendix M).

FIGURE 16: THE FISH GIVING POINTS IN CANDY CRUSH JELLY SAGA

They also stated that the outbursts made the game whole (7 TP) by giving good feedback (7 TP) that was positively reinforcing (8 TP) and gave them the feeling of wanting to play again (7 TP), and when the game became faster their excitement rose (2 TP) (Appendix M). This also contributed in the creation of the 5th recommendation.

FIGURE 17: OUTBURSTS THAT GIVES POSITIVE FEEDBACK IN CANDY CRUSH JELLY SAGA

The fact that the TP liked it when the game became faster was consistent with what the game developers aimed to make players to feel. As they have designed the game in order for the excitement of the player to increase as they are introduced to new features, for example game modes or blockers. Also over time as the player gets hooked to the game, its challenges are increased (King.com Ltd., Magnusson, J., personal communication, 11 April, 2016; Appendix H).

Even though most of the TP liked the game (22 TP) and felt they quickly learned it and its features (14 TP) the game also gave some confusion. Some had statements concerning the outbursts were too much in the long run and that they did not like them. Some also found that the info was boring and too long (4 TP) and thought that the game helped too fast (2 TP), which both related to the creation of the 2^{end} and 3th recommendation. Others felt that there was not information enough (3 TP), and that they did not understand the striped candy (4 TP), the fish (3 TP) or that they played against the machine (4 TP), which some also thought was weird (3 TP) (Appendix M).

FIGURE 18: PLAYING AGAINST THE JELLY QUEEN IN CANDY CRUSH JELLY SAGA

Many also did not understand that you should spread the jelly and not destroy it (9 TP) (Appendix M).

FIGURE 19: SPREAD THE JELLY INFO IN CANDY CRUSH JELLY SAGA

Some also felt as if it was not them making everything explode (4 TP) (Appendix M).

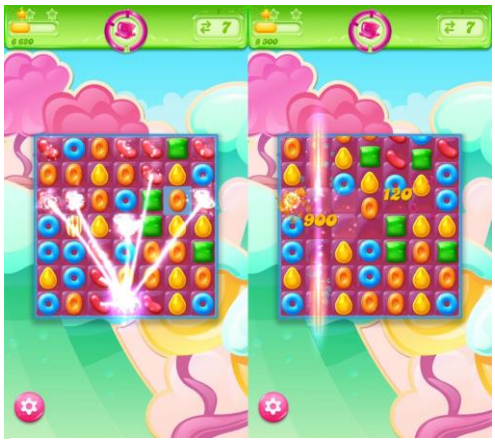


FIGURE 20: EVERYTHING EXPLODES IN CANDY CRUSH JELLY SAGA

A lot of the TP also did not like the sound, they found it irritating (9 TP), disturbing (5 TP) and too much (8 TP) (Appendix M), this contributed to the 6th recommendation.

In WinterForts, it was found that the onboarding phase was too strict and confusing. The TP only clicked where the arrows pointed without understanding why (18 TP) or what happens in the different elements of the game (Appendix M). This contributed to the creation of the 1st recommendation.

FIGURE 21: THE ARROWS SHOWING WHAT TO DO

Several TP did for example not understand what happened in battle (13 TP) or why they were in battle (6 TP). Therefore, they did not understand why they had won (12 TP). Only two TP stated that they had understood why they had won (Appendix M).

FIGURE 22: THE GAME SHOWING THE PLAYERS THEY HAVE WON

This also relates to statements about them not understanding all the info text (9 TP) and quickly read through them (9 TP) because they just wanted to get started (8 TP). Some TP also had statements indicating that there were too much text and clicks (4 TP), giving them the feeling of being forced to just click and wait and not really participate in the game (Appendix M). This contributed to the creation of the 1st, 2end, and 3th recommendation.

FIGURE 23: EXAMPLES OF THE INFOBOXES

Several TP also had statements concerning the fact that the game was confusing, for example they did not understand that at some point they were at another castle (15 TP) and generally did not understand where they were in the game (13 TP). Only nine TP understood that they were at the castle of the opponent (Appendix M).

FIGURE 24: THE PLAYERS CASTLE ON THE LEFT AND THE ENEMY CASTLE ON THE RIGHT

In relation to this, the TP also stated that nothing worked when they tried to click around after the onboarding had ended (9 TP). Many felt confused after being able to do things for themselves (13 TP) and felt that there should have been additional help functions after the onboarding had ended (3 TP). Some even felt that the onboarding made sense and was clear but when it stopped they did not know what to do (7 TP) (Appendix M). This contributed to the 3th recommendation.

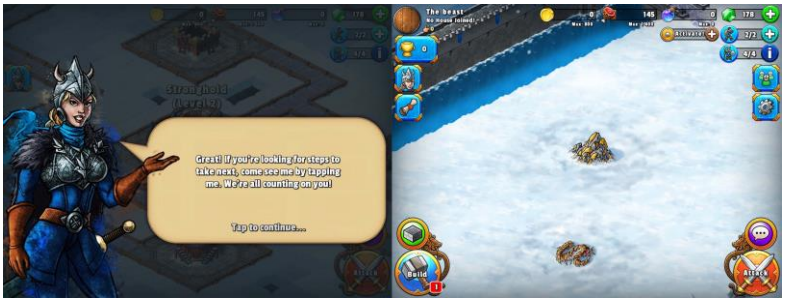


FIGURE 25: THE LAST INFO BOX AND WHERE THE PLAYERS ARE PLACED AFTER END ONBOARDING

Some also stated that the game lacked identification (5 TP) and did not understand what was named in the game (14 TP). Even though, eleven TP felt they understood what was named, almost none of them did actually understand that it was themselves as the jarl in the game that they named (Appendix M).

FIGURE 26: THE BOX WHERE THE PLAYERS HAVE TO NAME THEMSELVES

Some also felt like there was a lack of consistency in game controls because they did not understand them, for example clicking on the flags worked the first time but when trying a second time, it did not work (4 TP) (Appendix M).

FIGURE 27: THE FLAGS SHOWING PLAYERS THE ENTRY POINTS FOR KNIGHTS WHEN IN BATTLE

The TP also thought that the commercial was irritating (7 TP) and some clicked it without understanding that it was a commercial that they were clicking on and not part of the game (4 TP) (Appendix M).

FIGURE 28: COMMERCIAL THAT POPS UP DURING GAMEPLAY

Though there was a majority of negatively anchored categories in regards to the design of the game and onboarding phase, there was also a few positive. Some of the positive categories concerned that the sound was fitting and could be a means of immersion (14 TP) and that it was relaxing (4 TP). This contributed to the 6th recommendation. Some of the TP also stated that they thought the game only became exciting when they could finally do something themselves (4 TP), which contributed to the 7th recommendation and the understanding of some liking a lot of onboarding and others none. A few TP stated that they might have understood the game with longer gameplay (5 TP) (Appendix M).

When comparing the experience of the TP in the onboarding phase with the intended experience graph from the developers, it is clear that there were several inconsistencies (Appendix M). Although the TP mentioned the same events as the developers, several express confusion towards these events. For instance, naming themselves as jarls in the game was very confusing (14 TP), some even stated that they did not feel any identification with the game (5 TP) and that the history and naming did not matter (3 TP). This is directly the opposite of what was intended, as it was intended for players to identify themselves with the game.
The problem in general with the experience of the game was that the in-game elements which were meant to enhance the engagement with players, were not understood (17 TP). Thereby these did not work as intended, for example winning or going to another castle or collecting things to upgrade. However, somewhat consistent with the intended experience, the TP engagement rose after they were able to play for themselves, which also contributed to the 7th recommendation. The problem though was that the TP was confused throughout the onboarding phase of the game, where several TP had already lost interest and found the game boring (13 TP). Therefore, they might already have closed the game before getting to the free play (5 TP) and might not want to play again (3 TP) (Appendix M).

In PogoChick, which was the game that showed least flow, it was found that the onboarding phase was too loose and that it was a problem for the understanding of the game and irritating that there was no general information (5 TP) or intro on how to play (9 TP). Only two TP felt that the 'learn by doing' approach made sense. This led to the TP becoming confused about the goal of the game (5 TP), taking them a long time to understand what to do (7 TP) and trying to find the missing information (4 TP). This resulted in a loss of interest when things were not understood or mastered. Also, because of the lack of information, the TP did not understand the arrows (9 TP), the menu (5 TP), the corn or what to do with them (12 TP). Some TP did not think that there was a point in the corn (5 TP) and others thought the corn might contribute with something more, like a new level, with longer gameplay (5 TP) (Appendix M). This furthermore contributed to the creation of the 1st recommendation.

FIGURE 29: THE ARROWS SHOWING PLAYER WHAT TO DO, THE CORN AND THE MENU

In general, the TP thought that it was irritating that nothing more happened in the game (13 TP) and that it became irritating after several deaths (11 TP) and irritating to

have to start over each time (2 TP). Some also thought that the game should have contained milestones (2 TP) (Appendix M).

Some thought that a new chick would cost money and did not understand it (6 TP). Only five TP understood that they could get a new chick. Some also did not understand the meaning with the new chick (4 TP) (Appendix M).

FIGURE 30: THE MENU AND GETTING A NEW CHICK

Several of the TP thought that the game was very difficult to control (11 TP) and the corn difficult to hit (6 TP). Some also felt that the game did not react accordingly (4 TP). This contributed to the 8th recommendation.

Several also thought that the music (9 TP) and the corn popping sound (3 TP) were irritating, and the music too fast and stressing (5 TP). Only six TP liked the music, two found it relaxing and fun, three thought it made it more fun to die (Appendix M). This together contributed to the 6th recommendation.

Similarly with WinterForts, the TP also did not understand that it was a commercial they were clicking on in PogoChick, they thought it was part of the gameplay at first (4 TP) and thought the commercial was irritating (6 TP) (Appendix M).

FIGURE 31: THE POSSIBILITY FOR EARNING CONS BY WATCHING A COMMERCIAL AND A COMMERCIAL

Once again, as with WinterForts, there were only a few positive categories concerning the design of the game and onboarding phase compared with the amount of negative. One of the positive categories indicated that the game was simple and silly with no gameplay flaws (10 TP). Another category concerned them liking to compete with themselves (4 TP) (Appendix M). This also contributed to the 7th recommendation, and the understanding of people having different onboarding preferences and that the game needs to consider this.

Comparing the experience of the TP to the intended experience from the game developers, showed that there are some elements that are similar, like the visuals being fun and silly (10 TP) and that the sound makes it more fun to die (3 TP). However, a majority of the TP thought that the sound was irritating (9 TP) and too fast and stressing (5 TP). Also a lot of the TP did not understand the corn (12 TP) and that they could get a new chick with them or if they got a new chick what it meant (4 TP). Again, as in WinterForts the problem was that the onboarding was not quite understood, which made it hard to understand the point in the game (9 TP), and that it takes a long time to understand it (7 TP). Thereby the indented in-game elements designed to raise the engagement did not work accordingly (Appendix M).

5.3 Onboarding phase recommendations

Based on the analysis of the onboarding phases of the three games, which game gave the most and the least flow, what in-game elements worked and enhanced the possibility for flow and which did not. A set of nine recommendations was created, which aims at being a set of guidelines to help the designers and developers in the creation of future onboarding phases or the re-design of existing ones. In order to help create onboarding phases that work and enhances the possibility for flow experiences to occur, to get player retained and immersed in the game and wanting to play more and again:

1.	The onboarding phase needs to be informative with the right information but neither too strict nor too loose.
2.	The information should not be too text based but needs to allow for being quickly read and precise.
3.	There needs to be other help functionalities throughout the game and not only in the start info or onboarding, as this is not always read or understood.
4.	The goal and purpose of the game always needs to be clear and in sight.
5.	The feedback throughout the game needs to be clear and precise to make the player feel as if they are doing good and making progress.
6.	The sound and music needs to be fitting and should not be too much or disturbing, as it can be a means of immersion.
7.	The game needs to give the choice between an onboarding and self-

	exploration, as every player is different. Some need onboarding in order to understand how to play, others like to explore and find out for themselves.
8.	The onboarding phase needs to have a clear balance between skill and challenge, to start off easier and then increase in difficulty according to the player's skills, in order for players to feel they master the game.
9.	There needs to be a balance between thinking too much and too little in the onboarding, because the game needs to be relaxing but not become boring. Both too much thinking and too little thinking can make the game become boring.

TABLE 16: THE FINAL ONBOARDING PHASE RECOMMENDATIONS

6 Results

In this chapter, the results following the analysis are summed up in relation to the RQ and the assumptions. These results will further be discussed and evaluated in chapter 7: Discussion.

RQ1, RQ2 and RQ3:

In relation to the answering of **RQ1**, **RQ2**, and **RQ3**, previous work was investigated and there was found to have been little research published in academia in the area of flow in F2P mobile games, player motivation and mobile games in general, though larger amounts of research exist in the area of PC and console games (Chapter 2: Literature Review) (Appendix A).

Because flow in this research was found to be important, nine recommendations were created based on the findings, with the aim of helping developers in the future when designing or re-designing onboarding phases of F2P mobile games.

RQ4:

In relation to the answering of **RQ4**, Spearman's rho was used on the FSS data to investigate potential covariance (Section 5.1.3: Correlation Coefficient) (Appendix J). The FSS was also investigated using Cronbach's Alpha (Section 5.1.1: Investigating the FSS with Cronbach's Alpha).

In this analysis gamer types were found to be the only demographic to have a covariance with the FSS flow data when using all 78 answers.

There was not found any covariance or significant correlations between the FSS flow data from each of the three games in specific and the demographic data or the motivation factors. Therefore, it can be assumed that the TP pre-defined motivational profile or demographics did not affect their possibility to experience flow. This additionally proved **A4** and **A5** not to be true.

The FSS data was investigated in terms of reliability in regards to the set of two questions originally mean for measuring the same dimension of flow. By using Cronbach's Alpha, all pairs of questions except Action-Awareness Merging (Act) were found to have reliability as conjoined constructs, with scores above the accepted cut-off of .5. The measures above .5 had an average of .699.

RQ5:

In relation to the answering of **RQ5**, a one-way repeated measures ANOVA, descriptive statistics and open coding on the stimulated recall were used and the two analyses were compared to investigate if they fostered similar results (Section 5.1.2: Analysis of variance, 5.2.2: Comparing the two analyses and 5.2.3: Statements regarding flow) (Appendix I, K & M).

By this there was found to be a significant variance between the three conditions as $F = 16.73$ was above the criterion value of 1 and $p < .000$ above the criterion value of .05.

Candy Crush Jelly Saga was in the within-subjects contrasts found to show a significant variance and thereby higher experiences of flow compared to PogoChick $p<.000$. Comparing PogoChick to WinterForts was found not to have a significant variance and thereby did not show any higher degrees of flow experiences $p=.589$.

In the post hoc test, there was likewise found a significant variance and more flow experiences in Candy Crush Jelly Saga compared to PogoChick $p<.000$ and Candy Crush Jelly Saga compared to WinterForts $p<.000$. Again, there was not found to be any significant difference when comparing PogoChick to WinterForts $p=.589$.

In the ANOVA the assumption of sphericity was found not to be violated, as $\chi^2(2)=.766$, $p=.682$ and the degrees of freedom did therefore not need to be modified.

In the descriptive statistics, there was found to be a variance in the M values of the three games. Candy Crush Jelly Saga was the only game that showed flow in terms of M value, as it was the only game with a high enough M= 3.83 to be in the positive range of the FSS Likert scale (Jackson & Marsh, 1996; Likert, 1932). WinterForts M=3.10 and PogoChick M=3.01 were both in the neutral range. Candy Crush Jelly Saga also had the lowest SD and thereby the highest agreement towards the game. WinterForts had the highest disagreement with SD=.669. PogoChick was in the middle with SD=.575.

Additionally, it was found that gamer types and gender also followed the pattern of Candy Crush Jelly Saga being the game with the highest M values and lowest SD, thereby having most flow and least disagreement. WinterForts was in the middle and PogoChick last, with casual and core gamers in M values but hardcore had a slightly higher M in PogoChick than in WinterForts.

When comparing the quantitative and qualitative analyses, it was found that the results had similar patterns. Candy Crush Jelly Saga was found to be the game with most TP expressing that they liked it (22 TP) and least who disliked it (3 TP). WinterForts was in the middle in terms of likes (7 TP) and dislikes (12 TP). PogoChick was last with least likes (6 TP) and most dislikes (17 TP).

All games had statements concerning flow and it can therefore be assumed that all games had some TP experiencing flow to some degree. Candy Crush Jelly Saga was however the game with most subcategories, containing most TP expressing flow.

Based on the qualitative analysis, it could similarly to the quantitative analysis be assumed that Candy Crush Jelly Saga had the onboarding phase with most TP experiencing flow.

RQ6:

In relation to answering of **RQ6**, open coding was furthermore used to code statements from the stimulated recall in order to investigate and compare the design and in-game elements of the three games (Section 5.2.4: Comparing the onboarding phases) (Appendix M).

In this analysis, it was found that there were different design and in-game elements that both worked and enhanced the possibility for flow experiences and some that did not work and decreased it. For example, the game being understood, having good

feedback and clear goals or the lack of these and having a too strict, too loose or a perfect in-between onboarding phase.

The inter-coder reliability was used to ensure the reliability of the coding and was found to be satisfying high ranging from 85% to 95% with an average of 91% (Appendix N).

RQ7:

In relation to answering **RQ7**, it was found that the correlation between the data collected in this thesis, did make it possible to give insights into determining the possibility for flow experiences to occur in the onboarding phase of the three F2P mobile games and thereby did provide the results needed in order to answer the problem statement. However, these results can be discussed as there could be different factors that could have affected them and have the possibility for fostering different results if they were changed.

7 Discussion

When further examining the results, presented in the previous chapter (Chapter 6: Results), they can be a basis for consideration and discussion. Firstly, it can be argued, though there was found not to be any covariance with the demographic data (Section 5.1.3: Correlation Coefficient), it may possibly have had an influence on the results anyway. As it can be discussed, if the reason for these results could be that Candy Crush Jelly Saga, according to the developers, target a very diverse user base (King.com Ltd., Magnusson, J., personal communication, 11 April, 2016; Appendix H). This might influence the fact that the TP had a high amount of agreement towards this game and in general liked it more no matter their gender, age or gamer type and that WinterForts on the contrary target the narrower and more specific gamer type of hardcore and core gamers (Norsfell Games Inc., 2016; Maroda, J., personal communication, 24 Marts, 2016; Appendix H). That was not strongly represented in the 26 TP and that WinterForts might have too advanced features for the TP. In January PogoChick was made easier in order to target more casual gamers and not try to target hardcore gamers anymore, as it previously was too silly to interest the hardcore gamers but too difficult for the casual gamers who might download it (Norsfell Games Inc., 2016; Maroda, J., personal communication, 24 Marts, 2016; Appendix H). However, as the largest amount of TP were casual gamers with least likes and flow in PogoChick. It can be argued if these changes, aimed at casual gamers, actually worked or if it might still also be too difficult. As stressed by Duh, Chen, & Tan (2008) mobile games should not have too advanced features. But would it appeal more to casual gamers if it was made easier or just be too easy for everybody? In this investigation it was found to be too difficult to master but also that one of the big problems conversely was that the game simply did not change enough, was not understood due to the lack of information and was therefore not able to retain many of the TP. Consequently, it can be discussed if the lower results with WinterForts and PogoChick and the fact that Candy Crush Jelly Saga was found to have the highest occurrences of flow, was due to it appealing more to the TP and that they simply were not in the right target group for PogoChick and WinterForts. However, it could also be that Candy Crush Jelly Saga do not have too advanced features and simply appeals more to a broader group, which can include all kinds of people and gamer types and consequently the whole group of TP. But there could be a need for a narrower target group to observe larger occurrences of flow in PogoChick and WinterForts, even though PogoChick has been modified in difficulty to target casual players. Yet, again when looking into the M values of the small amount of hardcore and core gamers they were still found not to show more flow in neither WinterForts nor PogoChick than in Candy Crush Jelly Saga (Section 5.1.3: Correlation Coefficient). This can argue to the contrary that these two games did not appeal more to these gamer types. The reason might just be that Candy Crush Jelly Saga is the game with the best-designed onboarding phase, in terms of enabling flow, learning the game, giving the desire to play more and again. And that the problems found in the other two games are just too great and therefore diminishes the possibility for high amounts of flow to occur, thereby needing re-design and correction of the problems in order to foster more flow.

It can also be argued that the comparison of games from the two very different companies with very different amounts of resources for player research of their games is a tough match. Especially because Candy Crush Jelly Saga comes from the big company of King with larger resources and who are already undertaking great amounts of player research into their games (King.com Ltd., Magnusson, J., personal communication, 11 April, 2016; Graft, 2015; Appendix H). And WinterForts and PogoChick comes from the smaller indie company of Norsfell that do not have as large resources as King or the capability of doing larger player testing studies. And are at the moment mostly focusing on telemetry data and have in terms of the two games, stopped updating them and started focusing on other games instead (Norsfell Games Inc., 2016; Maroda, J., personal communication, 24 Marts, 2016; Appendix H). These factors can also apply to the onboarding phase of Candy Crush Jelly Saga simply being more thoroughly tested and re-tested than WinterForts and PogoChick in terms of player research and has been designed accordingly.

That motivation did not have any covariance with flow was an unexpected finding (Section 5.1.3: Correlation Coefficient), as flow theory originally emerged from the theory of STD and that the findings are in contrary to these of Przybylski, Ryan, & Scott (2010) and Rigby, Ryan, & Przybylski (2006) on games (Section 3.2: Flow Theory). However, it can be considered that mobile games might be so much different in how people are engaging in and playing them that they fall totally outside the normal rules of traditional PC and console games. By talking to Jonathan Magnusson team lead candy BPU analytics at King Stockholm, it was found that they are already thinking along these lines, as they are developing their games to enable for several smaller and quick play sessions during bus rides, short breaks etc. Though still foster the possibility for longer play sessions and play over time with the aim of getting further and further in the game (King.com Ltd., Magnusson, J., personal communication, 11 April, 2016; Appendix H). Thereby a game company such as King (King.com Ltd., 2016) is already aware of these challenges and design accorded to them and was found to already consider flow in terms of developing their games, which Norsfell was found not to do (Norsfell Games Inc., 2016; Maroda, J., personal communication, 24 Marts, 2016; Appendix H).

It can also be considered that the laboratory-based experiment and the setting in general might have had an influence on the experience of the TP and changed their behavior as also stressed by Abney, White, Bermudez, Brecko, & Glick (2014) or that their perception of the games was impacted by it (Drachen, Nacke, & Göbel, 2010). As well as giving different extraneous variables to consider (Section 4.1: Research Design) and might have fostered other results had the experiment been conducted in a real world setting. However, the laboratory-based experiment also enabled the possibility to control the extraneous variables and even though a real world setting, on the contrary, would also have been able to give interesting results. It could also have fostered different problems and a lot of uncontrollable extraneous variables, which the outside environment would give. It can however be argued that thought this could be the case, do the players not face these when playing by themselves anyway and might that not be a part of playing? Though this could also be an interesting research in itself, it was not applicable to this research, as there was a need for great amounts of control and had elements such as the stimulated recall that would have been difficult,

if not impossible to manage in a potential bus or train setting. Also, since the methodologies were found to give valuable insights into the flow experiences of the TP, which was needed in order to find the conclusions and answers to the problem statement and RQ. It can be argued that the mix of methodologies used in this research did contribute the desired understanding of the three games and that the experimental setup in a laboratory worked as intended and gave the important control needed for the experiment to work. It can also be argued that the mixed methodologies gave a fuller picture of the experience of the TP, which a single methodology would not have been able to, as also stressed by Drachen A. , et al., (2009) and Zammitto, Kobayashi, Mirza-Babaei, Nacke, & Livingston, (2014). Lastly, as there was found to be a need for developing new methods in the area because little has been done in academia at the moment (Smeddinck, Krause, & Lubitz, 2013). It can be argued that this research has contributed with valuable first itteration knowlegde of flow in F2P mobile games and the use of traditional HCI and GUR methods for mobile games.

8 Conclusion and Future Work

In this chapter, the conclusion will firstly be presented based on the findings found throughout this research. Thereafter, potential future work will be presented with further research possibilities and considerations.

8.1 Conclusion

Though the industry of mobile games in recent years has seen a steady growth and that it is now the second largest in the game industry (EEDAR, 2015; Sillicur, 2016), there was found not to have been much research published in academia in the area of mobile games and mGUR in general **RQ1** and regarding neither flow **RQ2** nor the motivation of mobile game players **RQ3**. It was also found that there is a need for developing novel methods and converting traditional methods from areas such as GUR and HCI to be used to develop the market and area (Smeddinck, Krause, & Lubitz, 2013). In relation to this, the collaboration of these methodologies was found to be a working combination for gaining insights into the onboarding phases of the three F2P mobile games and help in determining if flow occurred **RQ7**. By both obtaining insights from the quantitative analysis of the statistics, alongside the more elaborate explanations from the TP about their experiences with the games by the qualitative analysis.

From the research done in this thesis, it was found that it was already possible to observe flow in the brief seven minutes of gameplay in the onboarding phases of the three F2P mobile games: Candy Crush Jelly Saga, WinterForts, and PogoChick, which emphasizes the importance of flow and proved **A3** to be true.

There was also found to be a significant variance between the three games and Candy Crush Jelly Saga was found to be the game with most flow based on both the qualitative and quantitative analysis, as it was the game with the highest M and the only game with an M value being positive in the FSS (Jackson & Marsh, 1996). It was also the game with most likes, least dislikes and most positive flow subcategories with most TP. WinterForts was in the middle and PogoChick last. Thereby, it can be concluded that one of the three games did provide a greater possibility for the experience of flow, which both answered **RQ5** and proved **A1** to be true.

Flow was found to be an important part of user retention and encouraged players to want to both keep playing and play again, because Candy Crush Jelly Saga, which had most flow, was found to be the game where least wanted to stop before the play session ended and with most wanting to play again **RQ2**. It was also found that it was important for the onboarding phase to be well designed and tested, in order for players to understand the game and experience a flow state. The TP did not allow the games very much time for understanding it, and if it was not understood or mastered fairly quickly, it became irritating and confusing, and they were more likely to not want to play it anymore, as it was the case with both WinterForts and PogoChick. WinterForts was found to have a too strict onboarding phase, that even though it explained

everything, made the TP confused and just doing what the game told them to without understanding why. PogoChick with the more 'learn by doing' approach was found to have a too loose solution for an onboarding phase, as the TP did not understand what to do, did not feel they mastered the game and even tried finding the missing information. This emphasizes that there were different design and in-game elements that both enabled and disabled working onboarding phases and the possibility for experiencing a flow state, which both answered **RQ6** and proved **A2** to be true.

The pre-defined motivational profile defined through The Game Motivation Profile questionnaire (Quanticfoundry, 2016) was found not to have any covariance with flow and thereby it can be assumed that it did not have an effect on the TP possibility for experiencing flow **RQ4**. Because flow originates from previous research done on SDT and the theory of *intrinsic* and *extrinsic* motivation (Csikszentmihalyi, 2014), this was an unexpected finding that proved **A4** not to be true. This might however, contribute to an assumption of mobile games playing under a different set of rules than normally associated with games in a traditional manner, and therefore might foster different motivations for playing.

A similar result was found regarding the demographic data from the TP, as they were also not found to have a covariance with the possibility for experiencing flow. However, when using all 78 questions and not distinguishing between games, gamer types were found to have a significant covariance. This leads to the assumption that gamer types do have an impact on the possibility for experiencing flow. That the different gamer types experience mobile games differently and that there might be a difference in which mobile games the different gamer types may be able to experience flow with, which answered **RQ4** and proved **A5** not to be true.

A result similar to Zhou (2012) can therefore be concluded as flow did already occur in the onboarding phases of the three F2P mobile games. Also it was found that the different onboarding phases of the different games did affect the possibility for the TP to experience flow. Zhou (2012) also states, that mobile games need to give a compelling experience to retain players. Emphasizing that flow has the possibility of being important for game developers to contemplate and already consider when designing or re-designing an onboarding phase of F2P mobile games. Because, it can make the difference in the players desire to keep playing, playing more or giving up and stopping **RQ2**. Therefore, the nine recommendations created, based on this research, could be important in helping the developers create compelling onboarding phases. However, to investigate their effectiveness they need to be tested on several mobile games and potential further iterations of them need to be conducted. To constantly keep them updated, both to the current mobile game scene and to be sure that they function as intended. Also more recommendations should be created or any not functioning correctly should be taken out in the future if the need occurs as the market changes.

8.2 Future Work

When going into the potential future work, there are different interesting aspects to be considered. Based on the investigations done in this research nine recommendations were created. These nine recommendations could in the future be tested, by firstly evaluating one or more mobile games using the nine recommendations in order to find potential problems in regards to flow and a working onboarding phase. Thereafter, test the same mobile game or mobile games on a smaller number of TP to investigate if they find similar potential problems with the onboarding phases. This could enable the testing of the recommendations to find out if they work as intended and if any of them do not or others need to be added. Additionally, it could also be interesting to have these nine recommendations evaluated by game developers in order to gain their thoughts and ideas on them, to understand if such recommendations could be helpful in their work. Also making sure that they work as intended and that they help emphasize the importance of the onboarding phase and how flow incorporate into this. In order to help create better onboarding phases that foster the desire in players for keep playing, wanting to play more and play again.

It could also be a possibility to further investigate the already collected data from a more UX point of view or with the nine dimensions of flow in specific and quantitatively correlate between the data from the FSS and the stimulated recall. In order to see if this could add further additions to the nine recommendations in regards to flow or maybe go into more depth with the collaboration between UX and flow and how they contribute to each other.

Another possibility is to replicate this research but go into more specifics with the impact of gamer types, to investigate how they influence player's possibility for experiencing flow. If WinterForts, developed for more hardcore and core players, or PogoChick, which might also target more core and hardcore players, would get higher occurrences of flow if these were more strongly represented. Also, the demographics could be interesting to investigate further with a more equal division between them, to see if this contributes the same results and if they still do not have a significant impact. Then potentially investigate further why they might not have an effect. Likewise, the motivational data could also be interesting to investigate further, because flow originates from it. It could be interesting to find out why it does not have an effect on the possibility of achieving flow and if it is because mobile games do not play under the rules of traditional games and then discover the reasons. It could also be possible to more extensively investigate the reliability of this research by replicating it and using a Pearson's or Spearman's correlation coefficient to correlate the results from the original research with the new results, to investigate potential differences. If this new research fosters a similar result it emphasizes the reliability of this original research.

Consequently, this industry of mobile games and mGUR is such a growing field (EEDAR, 2015; Sillicur, 2016), with little published research in academia and with not many novel methods yet to have been created (Smeddinck, Krause, & Lubitz, 2013). Therefore, there is in the future, a great need for more research to be

undertaken in this area to obtain a better understanding of it than there is today. The players, who play, need to be understood and investigated in order to gain this understanding, which could lead to more causal conclusions on flow and why motivation does not have an effect on it and if mobile games do not play under the same rules as traditional games. If so, the rules they play under also needs to be investigated and understood in order to keep developing interesting and appealing mobile games that players want to engage in, and in order to be ready for the future challenges within this field.

9 Bibliografi

9.1 Books

Bordens, K. S., & Abbott, B. B. (2011). *Research Design and Methods A Process Approach.* New York, NY 10020: McGraw-Hill.

Csikszentmihalyi, M. (2014). *Flow and the Foundations of Positive Psychology The Collected Works of Mihaly Csikszentmihalyi.* Claremont: Springer.

Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience.* New York: Harper and Row.

Dix, A., Finlay, J., Abowd, G. D., & Beale, R. (2004). *Human–Computer Interaction* (Vol. 3th). Edinburgh Gate, Harlow , Essex, England: Pearson Education Limited.

Drachen, A., Canoss, A., & El-Nasr, M. S. (2013). *Game Analytics: Maximizing the Value of Player Data.* Boston: Springer.

Field, A. (2009). *Discovering statistics using IBM SPSS statistics* (Vol. 3rd). London: Saga.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (Vol. 4th). London: Sage.

Kvale, S. (1996). *InterViews: An Introduction to Qualitative Research Interviewing.* London: Sage Publications.

Lazar, J., Feng, J. H., & Hochheis, H. (2009). *Research Methods In Human-Computer Interaction.* Wiley Publishing.

Nacke, L. E. (2015). *Game user research and physiological evaluation*. In R. Bernhaupt, *Game user experience evaluation.* (pp. 66-86). Toulouse: Springer.

Pickard, A. J. (2013). *Research Methods in Information* (Second Edition). London: Facet Publishing.

Schell, J. (2008). *The Art of Game Design A Book of Lenses.* Burlington: Morgan Kaufmann Publishers an imprint of Elsevier.

Shelby, L. B. (2011). *Beyond Cronbach's Alpha: Considering Confirmatory Factor Analysis and Segmentation.* School of Recreation, Health, and Tourism, George Mason University, Manassas, Virginia, USA. Manassas: Taylor & Francis Group, LLC.

Vansteenkiste, M., Niemiec, C. P., & Soenens, B. (2010). *The Development of the Five Mini-theories of Self-determinition Theory: An Historical Overview, Emerging Trends and Future Directions.* Emerald Group Publishing Limited. p. 106-167

9.2 Papers

Abney, A., White, B., Bermudez, A., Brecko, P., & Glick, J. (2014). *Evaluation of Recording Methods for User Test Sessions on Mobile Devices.* Disney Interactive. Glendale, CA: Disney Interactive.

Angulo, E., & Ferre, X. (2014). *A Case Study on Cross-Platform Development Frameworks for Mobile Applications and UX*. Universidad Politécnica de Madrid. Puerto de la Cruz: INTERACCIÓN 2014.

Bartle, R. (1996). *HEARTS, CLUBS, DIAMONDS, SPADES: PLAYERS WHO SUIT MUDS.* MUSE Ltd. Essex: MUSE Ltd.

Bogen, K. (1996). The effect of questionnaire length on response rate. *Proceedings of the Section on Survey Research Methods* , pp. 1020-1025.

Brockmyer, J. H., Fox, C. M., Curtiss, K. A., McBroom, E., Burkhart, K. M., & Pidruzny, J. N. (2009). *Thedevelopment of the Game Engagement Questionnaire: A measure of engagement in video game-play.* Toledo, OH 43606, USA: University of Toledo, MS 948, 2801 West Bancroft.

Collins, N., Nacke, L. E., Mirza-Babaei, P., Gregory, J., & Fitzpatrick, G. (2013). *How Does It Play Better? Exploring User Testing and Biometric Storyboards in Games User Research.* Paris, France: Changing Perspectives.

Disney. (2016). *home*. Retrieved from disney.dk: http://disney.dk/

Duh, H. B.-L., Chen, V. H., & Tan, C. B. (2008). *Playing Different Games on Different Phones: An Empirical Study on Mobile Gaming.* Singapore, Nanyang: National University of Singapore, Nanyang Technological University, Nanyang Technological University.

Drachen, A., Nacke, L. E., Kuikkaniemi, K., Niesenhaus, J., Korhonen, H. J., van den Hoogen, W. M., et al. (2009). *Playability and Player Experience Research.* West London: DiGRA 2009.

Drachen, A., Nacke, L., & Göbel, S. (2010). Methods for Evaluating Gameplay Experience in a Serious Gaming Context. *Journal of Computer Science in Sport*.

EEDAR. (2015). *DECONSTRUCTING MOBILE & TABLET GAMING 2015*. EEDAR.

Field, A. (2005). *Reliability Analysis - Measures of Reliability*. London: Research Methods II - Abridged version of chaptor 15 of Field (2005).

Ickin, S., Wac, K., Fiedler, M., Janowski, L., Hong, J.-H., & Dey, A. K. (2012). *Factors Influencing Quality of Experience of Commonly Used Mobile Applications.* IEEE Communications Magazine.

Jackson, S. A., & Marsh, H. W. (1996). *Development and Validation of a Scale to Measure Optimal Experience: The Flow State Scale.* Journal of sport & exercise psycholog. Human Kinetics Publishers, Inc.

Johnson, D., Nacke, L. E., & Wyeth, P. (2015). *All about that Base: Differing Player Experiences in Video Game Genres and the Unique Case of MOBA Games.* Crossings, Seoul, Korea: CHI 2015.

Kivikangas, M. J. (2006). *Psychophysiology of flow experience: An explorative study.* Helsinki: Department of Psychology - University of Helsinki.

Klarkowski, M., Johnson, D., Wyeth, P., Smith, S., & Phillips, C. (2015). *Operationalising and Measuring Flow in Video Games.* New York: OzCHI '15.

Korhonen, H., & Koivisto, E. M. (2006). *Playability Heuristics for Mobile Games.* Helsinki, Finland: Copyright 2006 ACM 1-59593-390-5/06/0009.

Kowal, J., & Fortier, M. S. (1999). *Motivational Determinants of Flow: Contributions From Self-Determination Theory.* School of Human Kinetics, University of Ottawa. Ottawa: The Journal of'Social Psvcholom. p. 365-368.

Likert, R. (1932). *A technique for the measurement of attitudes.* New York: Archives of psychology.

Mirza-Babaei, P. (2013). *Biometric Storyboards: A Games User Research Approach for Improving Qualitative Evaluations of Player Experience.* University of Sussex. Sussex: University of Sussex.

Murphy, C. (2016). *Flow Space – A Visual Guide for Flow and Simplicity in Games.* Modsim World Conference 2016.

Nacke, L., & Lindley, C. A. (2008). *Flow and Immersion in First-Person Shooters: Measuring the player's gameplay experience.* Toronto.

Nielsen, J., & Molich, R. (1990). *Heuristic evaluation of user interfaces.* Lyngby & Ballerup: CHI 90 Proceedings.

Park, J., Parsons, D., & Ryu, H. (2010). *To Flow and Not to Freeze: Applying Flow Experience to Mobile Learning.* Institute of Information and Mathematical Sciences, Massey University, Auckland, New Zealand and the Division of Information and Computer Science, Sunmoon University, Asan, Chungchungnam-Do 336-708, South Korea. IEEE.

Poels, K., de Kort, Y., & IJsselsteijn, W. (2008, April). Identification and Measurement of Post Game Experiences. *CHI conference* .

Przybylski, A. K., Ryan, R. M., & Scott, R. C. (2010). *A Motivational Model of Video Game Engagement.* University of Rochester, Immersyve, Inc., Celebration, Florida, University of Rochester. Rochester, Celebration: American Psychological Association.

Rigby, C. S., Ryan, R. M., & Przybylski, A. (2006). *The Motivational Pull of Video Games: A Self-Determination Theory Approach.* Rochester: Springer Science+Business Media.

Ryan, R. M., & Deci, E. L. (2000). *Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being.* University of Rochester. Rochester: American Psychologist.

Smeddinck, J., Krause, M., & Lubitz, K. (2013). *Mobile Game User Research: The World as Your Lab?* Paris: CHI'13.

Sweetser, P., & Wyeth, P. (2005). *GameFlow: A Model for Evaluating Player Enjoyment in Games.* The University of Queensland. St. Lucia: ACM Computers in Entertainment.

Väätäjä, H. (2010). *User Experience Evaluation Criteria for Mobile News Making Technology – Findings from a Case Study.* Tampere University of Technology. Tampere: Tampere University of Technology.

Vesterinen, O., Toom, A., & Patrikainen, S. (2010). *The stimulated recall method and ICTs in research on the reasoning of teachers.* University of Helsinki. Helsinki: International Journal of Research & Method in Education.

Weinstein, N., Przybylski, A. K., Ryan, R. M., & Rigby, S. C. (2009). *Having to versus Wanting to Play: Background and Consequences of Harmonious versus Obsessive Engagement in Video Games.* Rochester: CYBERPSYCHOLOGY & BEHAVIOR.

Yee, N., Ducheneaut, N., & Nelson, L. (2012). *Online Gaming Motivations Scale: Development and Validation.* Austin, Texas: CHI 2012.

Zammitto, V., Kobayashi, M., Mirza-Babaei, P., Nacke, L. E., & Livingston, I. (2014). *Player Experience: Mixed Methods and Reporting Results.* Ontario Institute, UX Consultant, Electronic Arts, Ubisoft Entertainment. Toronto: CHI'14.

Zhang, D., & Adipat, B. (2005). *Challenges, Methodologies, and Issues in the Usability Testing of Mobile Applications.* Department of Information Systems University of Maryland, Baltimore County. Baltimore County: Lawrence Erlbaum Associates, Inc.

Zhou, T. (2012). *Understanding the effect of flow on user adoption of mobile games.* London: Springer.

9.3 Websites

AAU Moodle. (2016, 04 01). *AAU Moodle*. Retrieved 04 14, 2016, from moodle.aau.dk: https://www.moodle.aau.dk

ACM. (2016). *http://dl.acm.org/*. Retrieved from http://dl.acm.org/: http://dl.acm.org/

Apple. (2016). */ipad-mini-3*. Retrieved from www.apple.com: http://www.apple.com/dk/shop/buy-ipad/ipad-mini-3

Apple. (2013). *shop/buy-iphone/iphone5s*. Retrieved from http://www.apple.com/shop/buy-iphone/iphone5s: http://www.apple.com/shop/buy-iphone/iphone5s

Asus. (2015). *productID.314768700*. Retrieved from asus.com/: http://shop.asus.com/store/asusau/en_AU/pd/ThemeID.34023100/productID.314768700

AUB. (2016). *databaser*. Retrieved from aub.aau.dk: http://www.aub.aau.dk/find-materiale/databaser

Bitaline-Software. (2015). *Software*. Retrieved from http://www.bitalino.com/index.php/software: http://www.bitalino.com/index.php/software

Bitalino. (2016). */product/category=6279071&id=26877302*. Retrieved from Bitalino.com: http://store.bitalino.com/index.php/standard-account-store#!/~/product/category=6279071&id=26877302

EliteHRV. (2016). Retrieved from www.elitehrv.com/: http://www.elitehrv.com/

Even, A. (2015, 10 13). *GAMING APP USER RETENTION: ONLY 22% RETURN AFTER ONE MONTH*. Retrieved 11 22, 2016, from blog.appsee.com: http://blog.appsee.com/blog/2015/10/13/gaming-app-user-retention-only-22-return-after-one-month/

Google. (2016, 04 01). *Google Drive*. Retrieved 04 14, 2016, from Drive.google.com: http://drive.google.com

Google, S. (2015). *https://scholar.google.dk/*. Retrieved from https://scholar.google.dk/: https://scholar.google.dk/

GoPro. (2014). */hero3*. Retrieved from https://gopro.com: https://gopro.com/update/hero3

HTC. (2014). *htc-one-m8/*. Retrieved from www.htc.com: http://www.htc.com/dk/smartphones/htc-one-m8/

IBM. (2016, 05 01). *IBM SPSS Software*. Retrieved 20 04, 2016, from www.ibm.com: http://www.ibm.com/analytics/us/en/technology/spss/

IEEE. (2016). *http://ieeexplore.ieee.org/Xplore/home.jsp*. Retrieved from http://ieeexplore.ieee.org/Xplore/home.jsp: http://ieeexplore.ieee.org/Xplore/home.jsp

Lenovo. (2016). */t430/*. Hentet fra lenovo.com: http://shop.lenovo.com/dk/da/laptops/thinkpad/t-series/t430/

Panasonic. (2016). *HC-V700K.html*. Retrieved from panasonic.com: http://shop.panasonic.com/support-only/HC-V700K.html

King. (2015, 04 15). *Home*. Retrieved from king.com: https://king.com/

King.com Ltd. (2016, 03 01). *Candy Crush Jelly Saga - Got the moves*. Retrieved 03 18, 2016, from candycrushjellysaga.com: http://candycrushjellysaga.com

King.com Ltd. (2016, 03 01). *WELCOME TO OUR KINGDOM*. Retrieved 03 18, 2016, from company.king.com: http://company.king.com

LinkedIn. (2016, 03 01). *https://www.linkedin.com/in/drachen*. Retrieved from https://www.linkedin.com/in/drachen: https://www.linkedin.com/in/drachen

Merlin-Digital. (2016). *heart-rate-monitor-pro.html*. Retrieved from merlin-digital.com: http://merlin-digital.com/heart-rate-monitor-pro.html

Microsoft. (2016). *home*. Retrieved from microsoft.com: https://www.microsoft.com/da-dk/

Newzoo. (2016, 05 01). *THE GLOBAL GAMES MARKET REACHES $99.6 BILLION IN 2016, MOBILE GENERATING 37%*. Retrieved 03 01, 2016, from newzoo.com: https://newzoo.com/insights/articles/global-games-market-reaches-99-6-billion-2016-mobile-generating-37/

Nielsen, J. (1995, 01 01). *10 Usability Heuristics for User Interface Design*. Retrieved 03 04, 2016, from www.nngroup.com: https://www.nngroup.com/articles/ten-usability-heuristics/

Nielsen, J. (2012, 01 04). *Usability 101: Introduction to Usability*. Retrieved 03 04, 2016, from www.nngroup.com: https://www.nngroup.com/articles/usability-101-introduction-to-usability/

Norman, D., & Nielsen, J. (2014). *definition-user-experience*. Retrieved from https://www.nngroup.com: https://www.nngroup.com/articles/definition-user-experience/

Norsfell Games Inc. (2016, 03 01). *ONCE UPON A TIME… Story*. Retrieved 03 18, 2016, from norsfell.com: http://norsfell.com/about/

Norsfell Games Inc. (2016, 03 01). *PogoChick; THAT'S ONE SMALL STEP FOR A CHICK, ONE GIANT LEAP FOR BIRDKIND!* Retrieved 03 18, 2016, from norsfell.com: http://norsfell.com/pogochick/

Norsfell Games Inc. (2016, 01 03). *WinterForts: FEATURED AS "BEST NEW GAME" BY APPLE IN OVER 90 COUNTRIES!* Retrieved 03 18, 2016, from norsfell.com: http://norsfell.com/winterforts/

Proquest. (2015). *http://search.proquest.com/*. Retrieved from http://search.proquest.com/: http://search.proquest.com/

Quanticfoundry. (2016, 03 01). *Game Motivation Model*. Retrieved 03 01, 2016, from quanticfoundry.com: http://quanticfoundry.com/2015/06/18/how-we-created-the-gamer-motivation-profile/

Quanticfoundry. (2015, 01 01). *Quanticfoundry*. Retrieved 02 01, 2016, from Quanticfoundry.com: https://apps.quanticfoundry.com/lab/10#

Sillicur. (2016, 27 01). *PC gaming trumps mobile and console in the $61bn digital games market*. Retrieved 03 18, 2016, from www.mweb.co.za: http://www.mweb.co.za/games/view/tabid/4210/Article/24343/PC-gaming-trumps-mobile-and-console-in-the-61bn-digital-games-market.aspx

Skintact. (2014). *EKG_EN_Katalog_2014.pdf*. Retrieved from http://www.skintact.com:

http://www.skintact.com/fileadmin/template/skintact/download/Downloadareas/Katal oge/EKG_EN_Katalog_2014.pdf

Sony. (2016). *home*. Retrieved from sony.com: http://www.sony.com/

Springer. (2015). *http://link.springer.com/*. Retrieved from link.springer.com: http://link.springer.com/

Statista. (2016, 01 01). *Most popular Apple App Store categories in December 2015, by share of available apps*. Retrieved 03 18, 2016, from www.statista.com: http://www.statista.com/statistics/270291/popular-categories-in-the-app-store/

The National Commission for the Protection of Human Subjects. (1979, 04 18). *belmont.html#xjust*. Retrieved from /www.hhs.gov: http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html#xjust

The Writing Center. (2016, February 16). *Literature Reviews*. (UNC-Chapel Hill) Retrieved February 16, 2016, from writingcenter.unc.edu: https://writingcenter.unc.edu/files/2012/09/Literature-Reviews-The-Writing-Center.pdf

10 Appendix

This section will give an overview of all appendixes and a detailed description of how the literature search was conducted. Additional appendix can also be found uploaded digitally both due to the large amounts of appendix and data, and that some are in a digital format such as audio files.

10.1 Appendix A: Literature search

In this appendix, the search strategy can be found, with the used search strings, search words, alternative search words, the data bases used and the entering's into them.

First step
Firstly, it was decided what approach to take when doing the literature search. Here it was decided to use the thematically based literature review (The Writing Center, 2016), because the topic of this thesis is naturally multidisciplinary. Therefor a chronological (The Writing Center, 2016) based literature review would not fit the topic and be confusing as the amount of literature is vast.

Categories
After the decision of doing the literature search thematically, finding out where the literature searches should be done and what categories to search on was determined. This was done by using AUB's (AUB, 2016) list of databases and thereafter its categories and filters to narrow down what databases to search on. The following is the filters that were used with bullets and the categories chosen within each filter:

Art music and design
- Architecture
- Design

Media, communication and information
- Information science
- Communication

Language, culture and history
- Communication

Databases
Within each of these categories the description of the databases were read and quick searches on them were done to find the most relevant ones, before choosing which needed to be used, to ensure their relevance. For the first search and iteration, seven relevant databases were found:

- ProQuest (Proquest, 2015)
- Duke University Press Journals (Duke, 2015)
- Ebrary (Ebrary, 2015)
- Springer (Springer, 2015)

- Wiley Online Library (Wiley, 2015)
- ACM (ACM, 2016)
- IEEE (IEEE, 2016)

After finding the initial seven databases and looking in more detail into their relevance, they were further reduced to four as they were found to be the ones most relevant to this research topic with the most relevant search results. These four is the following:

- ProQuest (Proquest, 2015)
- Springer (Springer, 2015)
- ACM (ACM, 2016)
- IEEE (IEEE, 2016)

Additionally, Google Scholar was used for locating and finding papers from literature found by searching the databases or given by our supervisor. Google Scholar provides an overwhelming amount of literature that are sometimes of questionable quality, which makes it unfit for using as primary search tool compered to using peer previewed literature found by database searches. Nonetheless it can still be a practical tool for finding specific papers or articles referenced in other articles or papers.

Search strings

For searching on the thematically organized research topics in the databases three different search strings were created with guidance from a librarian from AUB. These strings were used as whole, split up and written differently for narrowing down or increasing the results for getting the most relevant ones. Below are the themes, the words and synonyms used, the databases, the search strings within, what was done to them along the search and the amount of results found:

User experience and flow in games:

"User Experience" OR UX
AND Research OR Study OR Evaluation OR project
AND "Onboarding phase" OR "Learning phase" OR "Intro* phase" OR introduction
AND Game* OR "Mobile game*" OR "Casual game*" OR "Free to play" OR F2P OR "tablet game*"

Databases:

- ACM
- ProQuest
- IEEE
- Springer

Words:

User Experience	Research	"Onboarding Phase"	Game*
UX	Study	Learning Phase	"Mobile game*"
Player experience	Project	Intro Phase	"Casual game*"
		Introduction	"Free to play"
		Flow	F2P
			"Tablet Game*"

Search refinements and results found:

Change:	Database	Search	Results
	ProQuest	*("User Experience" OR UX)* *AND (Research OR Study OR Evaluation OR project)* *AND ("Onboarding phase" OR "Learning phase" OR "Intro* phase" OR introduction)* *AND (Game* OR "Mobile game*" OR "Casual game*" OR "Free to play" OR F2P OR "tablet game*")*	12 (anywhere except full text - All)
Removed: **AND ("Onboarding phase" OR "Learning phase" OR "Intro phase" OR introduction)**	ProQuest	*("User Experience" OR UX)* *AND (Research OR Study OR Evaluation OR project)* *AND (Game* OR "Mobile game*" OR "Casual game*" OR "Free to play" OR F2P OR "tablet game*")*	408 (anywhere except full text - All)
	Springer	*("User Experience" OR UX)* *AND (Research OR Study OR Evaluation OR project)* *AND ("Onboarding phase" OR "Learning phase" OR "Intro* phase" OR introduction)* *AND (Game* OR "Mobile game*" OR "Casual game*" OR "Free to play" OR F2P OR "tablet game*")*	40
Removed: **AND ("Onboarding phase" OR "Learning phase" OR "Intro phase" OR introduction**	Springer	*("User Experience" OR UX) AND (Research OR Study OR Evaluation OR project) AND (Game* OR "Mobile game*" OR "Casual game*" OR "Free to play" OR F2P OR "tablet game*")*	11773

Game user research:

"Game user research" OR GUR

AND methods* OR tool* OR approach* OR practice* OR study OR test* OR study*

AND User* OR player* OR gamer*

AND Mobile OR tablet*

AND device* OR platform*

AND "Onboarding phase" OR "intro phase" OR "learning phase" OR "introduction phase"

Databases:

- ACM Digital Library
- ProQuest
- IEEE

Words:

Games user research	Methods	User	Mobile	Device	Onboarding phase
GUR	Study	Player	Tablet	Platform	Intro phase
	Tool	Gamer			Learning phase
	Approach				Introduction phase
	Practice				
	Test				

Search refinements and results found:

Change:	Database	Search	Results
	ProQuest	*("Game user research" OR GUR) AND (methods* OR tool* OR approach* OR practice* OR study OR test* OR study*) AND (User* OR player* OR gamer*) AND (Mobile OR tablet* AND device* OR platform*) AND ("Onboarding phase" OR "intro phase" OR "learning phase" OR "introduction phase")*	21 results 22 e-books; search anywhere.
Removed the last AND; *"Onboarding phase" OR "intro phase" OR "learning phase" OR "introduction phase"*	ProQuest	*("Game user research" OR GUR) AND (methods* OR tool* OR approach* OR practice* OR study OR test* OR study*) AND (User* OR player* OR gamer*) AND (Mobile OR tablet* AND device* OR platform*)*	4,334 results, 963 e-books; Search anywhere.
Search anywhere but full text.	ProQuest	*("Game user research" OR GUR) AND (methods* OR tool* OR approach* OR practice* OR study OR test* OR study*) AND (User* OR player* OR gamer*) AND (Mobile OR tablet* AND device* OR platform*)*	4 results, 0 e-books; Search anywhere but full text.
Removed; AND *User* OR* *player* OR gamer**	ProQuest	*("Game user research" OR GUR) AND (methods* OR tool* OR approach* OR practice* OR study OR test* OR study*) AND (Mobile OR tablet*) AND (device* OR platform*)*	2,762 results, 1,158 e-books; Search anywhere.
Search anywhere but full text.	ProQuest	*("Game user research" OR GUR) AND (methods* OR tool* OR approach* OR practice* OR study OR test* OR study*) AND (Mobile OR tablet*) AND (device* OR platform*)*	1 result, 0 e-books; Search anywhere but full text.
Removed the rows; *AND methods* OR tool* OR approach* OR practice* OR study OR test* OR study** *AND device* OR platform**	ProQuest	*all("Game user research" OR GUR) AND all(Mobile OR tablet*)*	54 results, 380 e-books; Search anywhere but full text.
Search anywhere.	ProQuest	*("Game user research" OR GUR) AND (Mobile OR tablet*)*	4,366 results, 1,332 e-books; Search anywhere.
Removed; *AND Mobile OR tablet** *And added; Mobile games**	ProQuest	*("Game user research" OR GUR) AND (Mobile game*)*	1,214 results, 742 e-books; Search anywhere.
Search anywhere but full text.	ProQuest	*all("Game user research" OR GUR) AND all(Mobile game*)*	3 results, 0 e-books; Search anywhere but full text.
	ACM	*"Game user research" OR GUR* *AND methods* OR tool* OR approach* OR practice* OR study OR test* OR study** *AND User* OR player* OR gamer** *AND Mobile OR tablet** *AND device* OR platform** *AND "Onboarding phase" OR "intro phase" OR "learning phase" OR "introduction phase"*	304,345 results; search any field and matches all.
Removed all stars and added phone.	ACM	*("Game user research" OR GUR methods OR tool OR approach OR practice OR study OR test OR study) AND (Onboarding phase OR intro phase OR learning phase OR introduction phase device OR platform Mobile OR tablet OR phone User OR player OR gamer)*	10 results; Search *"Game user research" OR GUR* and *methods OR tool OR approach OR practice OR study OR test OR study* and *Mobile OR*

			tablet OR phone As title and the rest as any field.
	Springer	*"Game user research" OR GUR AND methods* OR tool* OR approach* OR practice* OR study OR test* OR study* AND User* OR player* OR gamer* AND Mobile OR tablet* AND device* OR platform* AND "Onboarding phase" OR "intro phase" OR "learning phase" OR "introduction phase"*	30
Removed all stars and added phone.		*("Game user research" OR GUR methods OR tool OR approach OR practice OR study OR test OR study) AND (Onboarding phase OR intro phase OR learning phase OR introduction phase device OR platform Mobile OR tablet OR phone User OR player OR gamer)*	11416

Usability in games:

"Usability"

AND methods* OR tool* OR approach* OR practice* OR study OR test* OR study*

AND User* OR player* OR gamer*

AND Mobile OR tablet*

AND Device* OR platform*

AND game*

Databases:

- ACM Digital Library
- ProQuest
- IEEE
- Springer

Words:

Usability	Methods	User	Mobile	Device	Game
	Study	Player	Tablet	Platform	
	Tool	Gamer			
	Approach				
	Practice				
	Test				

Search refinements and results found:

Change:	Database	Search	Results
	ACM	*"Usability"* *AND methods* OR tool* OR approach* OR practice* OR study OR test* OR study** *AND User* OR player* OR gamer** *AND Mobile OR tablet** *AND device* OR platform** *AND game**	279,451
Removed: *AND User* OR player* OR gamer* AND device* OR platform**	ACM	*"Usability"* *AND methods* OR tool* OR approach* OR practice* OR study OR test* OR study** *AND Mobile OR tablet** *AND game**	254,589
Removed:	ACM	*"Usability"*	55,290

AND methods OR tool* OR approach* OR practice* OR study OR test* OR study**		*AND Mobile OR tablet* AND game**	
Changed from any field to title with both	ACM	*"Usability"* *AND Mobile OR tablet** *AND game**	25,370
	SpringerLink	*"Usability"* *AND methods* OR tool* OR approach* OR practice* OR study OR test* OR study** *AND User* OR player* OR gamer** *AND Mobile OR tablet** *AND device* OR platform** *AND game**	65,077
Added: *Mobilegame** and removed *game**		*"Usability" AND methods* OR tool* OR approach* OR practice* OR study OR test* OR study* AND User* OR player* OR gamer* AND Mobile OR tablet* AND device* OR platform* AND mobilegam**	8
Removed: *AND User* OR player* OR gamer**	SpringerLink	*"Usability"* *AND methods* OR tool* OR approach* OR practice* OR study OR test** *AND Mobile OR tablet** *AND device* OR platform** *AND game**	68,518
Removed: *AND methods* OR tool* OR approach* OR practice* OR study OR test* OR study* AND device* OR platform**	SpringerLink	*"Usability" AND Mobile OR tablet** *AND game**	15,939
Searched without: *AND User* OR player* OR gamer* AND device* OR platform** And with less wildcards due to database limitation.	IEEE	*"Usability" AND methods* OR tool* OR approach* AND Mobile OR tablet* AND game**	42
Removed: *AND methods* OR tool* OR approach* OR practice* OR study OR test* OR study* AND game**	IEEE	*"Usability" AND Mobile OR tablet**	36,063
Searched without all wildcard due to database limitation.	ProQuest	*"Usability" AND (methods* OR tool*) AND (Mobile OR tablet*) AND (device* OR platform*) AND (User* OR gamer*) AND (Game*)*	10,528 results, 3,243 e-books
Removed: *AND (device* OR platform*) AND (User* OR gamer*)*	ProQuest	*"Usability" AND (methods* OR tool*) AND (Mobile OR tablet*) AND (game*)*	11,837 results, 3,591 e-books

Player motivation in games:

"Self-determination theory" OR "motivation" OR "player motivation"

AND game*

AND Player* OR gamer* OR user*

AND Mobile OR tablet*

AND Device* OR platform*

Databases:

- ACM Digital Library
- ProQuest
- IEEE
- Springer

Words:

Motivation	Game	Player	Mobile	Device
Self-determination theory		Gamer	Tablet	Platform
Player motivation		User		

Search refinements and results found:

Change:	Database	Search	Results
	ProQuest	*("Self-determination theory" OR "motivation" OR "player motivation") AND game* AND (Player* OR gamer*) AND user* AND (Mobile OR tablet*) AND (Device* OR platform*)*	1,472
Removed: *"Self-determination theory" OR "motivation"*	ProQuest	*("player motivation" AND game* AND (Player* OR gamer*) AND user* AND (Mobile OR tablet*) AND (Device* OR platform*)*	7
Removed: *"motivation" OR "player motivation"*	ProQuest	*("Self-determination theory") AND game* AND (Player* OR gamer*) AND user* AND (Mobile OR tablet*) AND (Device* OR platform*)*	38
Removed: *"Self-determination theory" OR "player motivation"*	ProQuest	*("motivation") AND game* AND (Player* OR gamer*) AND user* AND (Mobile OR tablet*) AND (Device* OR platform*)*	1,471
Added: intrinsic to motivation	ProQuest	*"intrinsic motivation" AND game* AND (Player* OR gamer*) AND user* AND (Mobile OR tablet*) AND (Device* OR platform*)*	141
	SpringerLink	*"Self-determination theory" OR "motivation" OR "player motivation" AND game* AND Player* OR gamer* OR user* AND Mobile OR tablet* AND Device* OR platform**	0
Removed: *"Self-determination theory" OR "player motivation"*	SpringerLink	*"player motivation" AND game* AND Player* OR gamer* OR user* AND Mobile OR tablet* AND Device* OR platform**	0
Removed: *"player motivation" OR "motivation"*	SpringerLink	*"Self-determination theory" AND game* AND Player* OR gamer* OR user* AND Mobile OR tablet* AND Device* OR platform**	0
Removed: *"player motivation" OR "Self-determination theory"*	SpringerLink	*"motivation" AND game* AND Player* OR gamer* OR user* AND Mobile OR tablet* AND Device* OR platform**	0
Removed: *"Self-determination theory" OR "motivation" OR "player motivation" AND Player* OR gamer* AND user* AND Mobile OR tablet* AND Device* OR platform** And added: *"intrinsic motivation"*	SpringerLink	*"intrinsic motivation" AND game**	2
	IEEE	*"Self-determination theory" OR "motivation" OR "player motivation" AND game* AND Player* OR gamer* OR user* AND Mobile OR tablet* AND Device* OR platform**	0
Removed: *"player motivation" OR"motivation"*	IEEE	*"Self-determination theory" AND game* AND Player* OR gamer* OR user* AND Mobile OR tablet* AND Device* OR platform**	0

Removed: *"Self-determination theory" OR "motivation"*	IEEE	*"player motivation"* *AND game* AND Player* OR gamer* OR user** *AND Mobile OR tablet* AND Device* OR platform**	0
Removed: *"Self-determination theory" OR "player motivation"*	IEEE	*"motivation"* *AND game* AND Player* OR gamer* OR user** *AND Mobile OR tablet* AND Device* OR platform**	0
Removed: *"Self-determination theory" OR "motivation" OR "player motivation" AND Player* OR gamer* OR user** *AND tablet* AND Device* OR platform**	IEEE	*"intrinsic motivation"* *AND game** *AND Mobile*	11
	ACM	*"Self-determination theory" OR "motivation" OR "player motivation" AND game* AND Player* OR gamer* OR user** *AND Mobile OR tablet* AND Device* OR platform**	208,106
Removed: *OR "motivation" OR "player motivation"*	ACM	*"Self-determination theory" AND game* AND Player* OR gamer* OR user** *AND Mobile OR tablet* AND Device* OR platform**	203,703
Removed: *"Self-determination theory" OR "motivation" OR "player motivation"* And added intrinsic to motivation	ACM	*"intrinsic motivation" AND game* AND Player* OR gamer* OR user** *AND Mobile OR tablet* AND Device* OR platform**	122,667
Removed: *AND Player* OR gamer* OR user* AND Device* OR platform**	ACM	*"intrinsic motivation" AND game* AND Mobile OR tablet**	48,914
Removed: *AND Mobile OR tablet**	ACM	*"intrinsic motivation" AND game**	14,130
Removed: *"intrinsic motivation"* And added: *AND game**	ACM	*"Self-determination theory"* *AND game**	115,676

10.1 Appendix B: Game order

In this appendix, the order of the games can be found, which was randomized in order for each game to become first, in the middle and last.

Participant:	Game One	Game Two	Game Three	Games
1	B	A	C	A = Candy Crush Jelly Saga
2	C	B	A	B = WinterForts
3	A	C	B	C = PogoChick
4	B	A	C	
5	C	B	A	
6	A	C	B	
7	B	A	C	
8	C	B	A	
9	A	C	B	
10	B	A	C	
11	C	B	A	
12	A	C	B	
13	B	A	C	
14	C	B	A	
15	A	C	B	
16	B	A	C	
17	C	B	A	
18	A	C	B	
19	B	A	C	
20	C	B	A	
21	A	C	B	
22	B	A	C	
23	C	B	A	
24	A	C	B	
25	B	A	C	
26	C	B	A	
27	A	C	B	
28	B	A	C	
29	C	B	A	
30	A	C	B	

10.2 Appendix C: Flow state scale questionnaire

In this appendix, the FSS questionnaire can be found, which the TP had to answer after each play session, in order to measure any potential flow with the TP both overall and in each of the three games.

Please answer the following questions in relation to your experience in the play session you have just completed. These questions relate to the thoughts and feeling you may have experienced during the play test. There is no right or wrong answers. Think about how you felt during the event and answer the questions using the rating scale below. Circle the number that best matches your experience from the options to the right each of each question.

Rating scale
Strongly disagree: 1
Disagree: 2
Neither agree nor disagree: 3
Agree: 4
Strongly agree: 5

		1	**2**	**3**	**4**	**5**
1	I was challenged, but believed my skills would allow me to meet the challenge	1	2	3	4	5
2	I made the correct movements without thinking about trying to do so	1	2	3	4	5
3	I knew clearly what I wanted to do	1	2	3	4	5
4	It was really clear to me that I was doing well	1	2	3	4	5
5	My attention was focused entirely on what I was doing	1	2	3	4	5
6	I felt in total control of what I was doing	1	2	3	4	5
7	I was not concerned with what others may have been thinking of me	1	2	3	4	5
8	Time seems to alter (either slow down or speed up)	1	2	3	4	5
9	I really enjoyed the experience	1	2	3	4	5
10	My ability matched the high challenges of the situation	1	2	3	4	5
11	Thing just seemed to be happening automatically	1	2	3	4	5
12	I had a strong sense of what I wanted to do	1	2	3	4	5
13	I was aware of how well I was performing	1	2	3	4	5
14	It was no effort to keep my mind on what was happening	1	2	3	4	5
15	I felt like I could control what was happening	1	2	3	4	5
16	I was not worried about my performance during the event	1	2	3	4	5
17	The way time passed seemed to different form normal	1	2	3	4	5
18	I loved the feeling of that performance and want to capture it again	1	2	3	4	5

10.3 Appendix D: Player Experience Graph

In this appendix, the player experience graph can be found, which the developers from the two mobile game companies have filled out in relation to what they perceive as the indented experience of the onboarding phases in the three games.

10.4 Appendix E: Informed Consent

In this appendix, the informed consent can be found, which the TP had to sign before the test session began. In order to ensure that the TP were informed about the purpose of the research, what data would be obtained, that they would remain anonymous and that the test was voluntary and they could leave at any time or refuse to answer any questions if they found them uncomfortable.

The user experience of three mobile games
We are working with Execution Lab on researching the user experience of different mobile games: Candy Crush Jelly Saga, WinterForts and Pogo Chick, with a focus on the onboarding phase. Therefore, you will be playing the onboarding phase of those three games and the session will take approximately one hour and twenty minutes.
Purpose of the research
The purpose of the research is to gain a deeper understanding of which problems new users encounter when playing a game. Through this research, we hope to create insights on how we can improve the user experience of games and ultimately help users to play and enjoy the game more.
Data collection and handling

Throughout this test session, you will be interviewed and the screen of the tablet, which you will use in this test, is being observed. Furthermore, we ask you to wear different devices that enable us to collect your physiological data, heart rate variability and galvanic skin conduction, while playing the game. The entire test session will be audio and video recorded.

Confidentially and anonymity

You are guaranteed total confidentiality concerning anything you say or do during the test session. You will not be asked anything that could harm or distress you in any way. All data that is collected will be identified by a functional name, which is only known to the researchers. We cannot guarantee you total anonymity, because the test requires you to be at our lab.

Voluntary involvement

You are free to leave the test session at any time, and you can refuse answering if you are not comfortable with the question that we ask. You are furthermore allowed to ask as many questions during the test session as you like.

Please sign and date this form. Thank you for your participation.

Signature: Date:

10.5 Appendix F: Test Script

In this appendix, the test script can be found, which was used to help the researchers in always knowing what to do now and next in the test sessions and worked as kind of manuscript for the test sessions. This script enabled the test sessions to be as similar as possible.

Hi, *subject name.* We are Cathja, Falko and Line and we are going to be walking you through this session today.

Before we begin, we have some information for you; I'm just going to read it to make sure that we cover everything.

We are asking participants to play three different tablet games while wearing these sensors in order to collect physiological measurements. The data we get from the user test session will provide us with some biometric feedback of how you felt during the session and thus say something about your experience hereof. We will afterwards ask you to go through the video material of the session and explain what elements of the game provoked the reaction.

Also the first thing we want to clarify is that we are testing the program and not you. So you do not have to be afraid to make any mistakes. In fact, any problems you encounter will help us to improve the game experience. You are the expert and your experience matters to us. Also, don't worry about hurting our feelings; we are doing this to improve the system, so we would appreciate to hear your honest reactions.

During the test we ask you to sit relatively still, and not move the hand with the electrodes on, more than necessary. As this can cause the data to be contaminated with noise, which is signal that is not related to emotional effect but movement. We want to avoid this as much as possible.

If you have any questions throughout this session, please do not hesitate to ask them. We might not be able to answer them right away, since we are interested in knowing what people are doing when they do not have someone sitting next to them to help but if you get completely lost we will help you. And if you still have any questions after this session we will try to answer them. Also, if you need a break during the session, just let us know.
We would furthermore like to ask you, if we can record this session. The recording will only be used to help us figure out how to improve the system, and it will only be used by people working on the project. It will also help us to be more present during the test as we do not need to take as many notes during it.
If you can allow this, we would ask you to read and sign this simple permission form for us. It is just stating that we have your permission to recording and that the recording will only be used by the people working on the project.

- **Give test subject permission form and pen.**
- **Start recording while subject signs.**

Do you have any question so far?

Test procedure:
Ok. Before we start the actual play tests lets go through the user test session as a whole. This will give you an idea of what activities we will be doing the next hour and twenty minutes.

Pre-game interview:
The test will start with a short post session interview were we collect some demographics, preferences within games, experience and motivation for playing games.

Play session:
After the pre-game interview, we will attach two sensors one to your fingers and one to your ear lobe.
When the sensors are attached and the data recording is started, we will be collecting a three minutes' baseline. This means that you just have to sit still for three minutes and try not to think too much about stressful tings in your life ("Go to your happy place"). Hereafter you will be asked to play the onboarding phase of a mobile game on this IPad. Approximately 7 min.
When you are done playing the onboarding phase we will ask you to draw a user experience graph (show sheet) visualizing your engagement during the play session you just finished. This graph is your personal interpretation of how you saw your engagement. Then you will be asked to answer the first part of a questionnaire.
Afterwards, we will watch the video footage of the play session for you to recall what you experienced and how you felt during the session. We kindly ask you to speak your thoughts aloud in order for us to have a conversation about it.
Then you are asked to draw a second graph as you might recall the incidents different after watching the video footage for the play session.

Everything is then repeated with the other two games; baseline, playing a game, answering a questionnaire etc.
Any questions so far?

Pre-game interview and questionnaire:
Before we start the play sessions, we would like you to answer this questionnaire about your motivation as a player.

- **Give Quantic foundry questionnaire**
- **Pre-game interview starts**
- **Remember to screen shot all four pages**

Demographic and use questions:
Thank you. Now we just need the last couple of questions and then the play sessions can begin.

- Do you have any heart related issues?
- Do you have any prior experience with the game? (Pogo chick, Winter Forts and Candy Crush: Jelly Saga)
- Do you play mobile games?
- In a typical week, approximately how many days do you spend at least 10 minutes or more playing a mobile game?
- What are your top favorite mobile games of all time?
- What are some recent mobile games you have enjoyed playing?

Great, we are now done with the questions, and can now move on to the actual play session.

Game sessions 1:

- **Attach electrodes on the participant's hand and earlobe**
- **Insure the participants are sitting comfortable**
- **Start measuring 3 min baseline**
- **After 3 minutes - give subject game tablet**
- **Let subject play onboarding phase**

Thank you.
Now we would like to ask you to draw a graph over your game engagement.
The x axe is the time of the play session and the y axe is your engagement level.

- **Give subject game engagement coordinate system and pen**

Thank you.
Now that you have played the onboarding phase of the game, we would like you to answer this questionnaire.

- **Give participant FSS questionnaire and pen**

Post-game interview 1:
We will watch your game video. Do not worry about how well you did or how you looked. It is done in order for you to better recall how your experience was thought out the game session. I will now ask you some questions about e.g. what you thought at particular events in the game and you just answer the best and honest you can.

- **Stimulated recall: Show subjects the game video and ask what is happening**

- How was the play session?
- How would you describe your experience?
- What do you think about the game?

Thank you.
Lastly, we would like to ask you to draw a graph over your game engagement again after we just watched the game video. Did your perception of your experience change?

- **Give subject game engagement coordinate system and pen**

The x axe is the time of the play session and the y axe is your engagement level.

- **Give participant PGQ questionnaire**

Game sessions 2:

- **Insure the participants are sitting comfortable**
- **Start measuring 3 min baseline**
- **After 3 minutes - give subject game tablet**
- **Let subject play onboarding phase**

Thank you.
Now we would like to ask you to draw a graph over your game engagement.

- **Give subject game engagement coordinate system and pen**

The x axe is the time of the play session and the y axe is your engagement level.
Thank you.
Now that you have played the onboarding phase of the game, we would like to answer this questionnaire.

- **Give subject questionnaire and pen**

Post-game interview 2:
Now we will watch your game video, do not worry about how well you did or how you looked. It is done in order for you to better recall how your experience was

- **Stimulated recall: Show subjects game video and ask what is happening**

thought out the game session. I will ask you some questions about e.g. what you thought at particular events in the game and you just answer the best and honest you can.

- How was the play session?
- How would you describe your experience?
- What do think about the game?

Lastly, we would now like to ask you to draw a graph over your game engagement again after we just watched the game video. Did your perception of your experience change?

- **Give subject game engagement coordinate system and pen**

- **Give participant PGQ questionnaire**

The x axe is the time of the play session and the y axe is your engagement level.

Game sessions 3:

- **Insure the participants are sitting comfortable**
- **Start measuring 3 min baseline**
- **After 3 minutes - give subject game tablet**
- **Let subject play onboarding phase**

Thank you.
Now we would like to ask you to draw a graph over your game engagement.
The x axe is the time of the play session and the y axe is your engagement level.

- **Give subject game engagement coordinate system and pen**

Thank you.
Now that you have played the onboarding phase of the game, we would like to answer this questionnaire.

- **Give subject questionnaire and pen**

Post-game interview 3:
We will watch your game video. Do not worry about how well you did or how you looked. It is done in order for you to better recall how your experience was thought out the game session. I will ask you some questions about e.g. what you thought at particular events in the game and you just answer the best and honest you can.

- **Stimulated recall: Show subjects game video and ask what is happening**

- How was the play session?
- How would you describe your experience?
- What do think about the game?

Lastly, we would now like to ask you to draw a graph over your game engagement again after we just watched the game video. Did your perception of your experience change?

- **Give subject game engagement coordinate system and pen**

The x axe is the time of the play session and the y axe is your engagement level.

- **Give participant PGQ questionnaire**

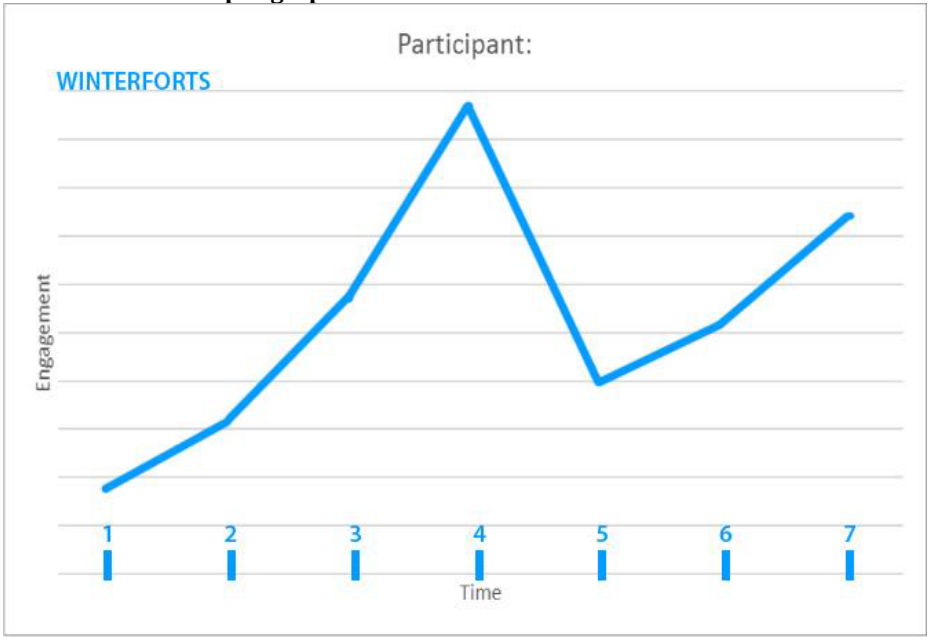
Done:
Thank you for your help, we appreciate that you could help us with this project.
Do you have any questions that you want to ask?

- **Follow subject out!**

10.6 Appendix G: Developer graphs

In this appendix, the three experience graphs and the related explanations from the developers of the three games can be found. These were used to get an understanding of the indented experience of the onboarding phases in the three mobile games, as seen from the developer's point of view.

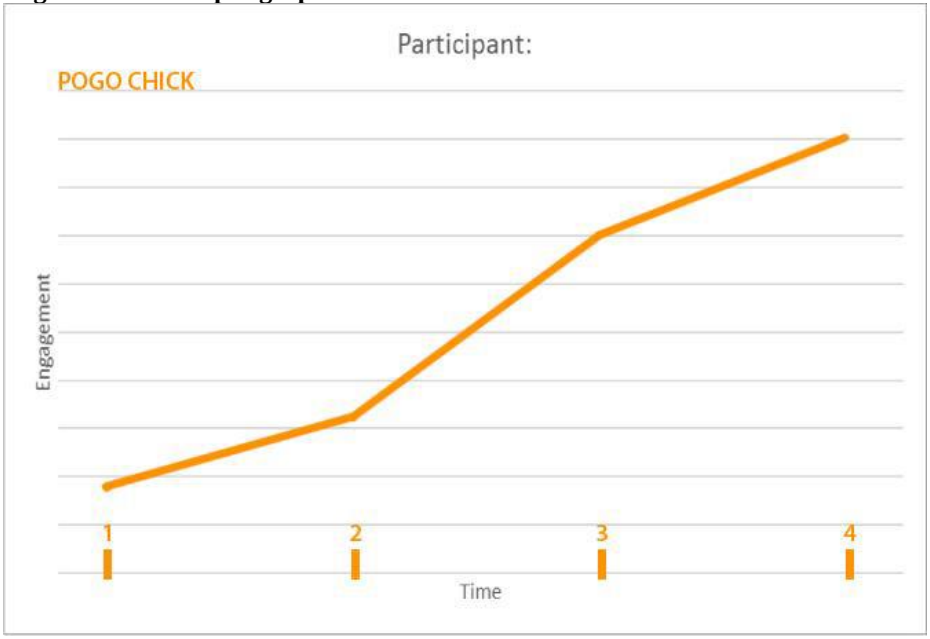
WinterForts developer graph:



1) Game begins. Player is greeted by a Lady who welcomes them back warmly. Her attitude changes rapidly as they've been followed. Helzeroth appears and threatens the player. This set things in motion for the player, who feels a mix of pleasure and urgency.
2) Player is asked to collect resources. The worker walks to go mine the meat, which is a mechanic very different from other strategy games and reminiscent of games like Age of Empire and the likes. Player feels that the game is offering something new.
3) Player removes snow blocks and places a path. It is followed by Helzeroth's attack which they repel. The player understands that the path mechanic is important. They feel good about winning the battle and feel like the game is again offering something new.
4) Player now attacks Helzeroth. The battle system feels different because of the path and spawn mechanic, which again is great. The fort looks advanced (buildings/units). The player feels good about winning and knows about what's to come if he keeps on playing.
5) Player grows their city by purchasing a Worker, a Building and upgrading another one. They must also spend Hard Currency, which reveals the game monetization,

which reduces their level of engagement but also make them progress. So mixed feelings.
6) Player is asked to choose a name, which is a big step in establishing their connection to the game. The fact that the game does not prevent two players from having the same name also decreases friction by possibly asking the player to select another name.
7) Player is told that they're all counting on them and is introduced to Quests to give a sense of objective. When closing the panel, the camera pans to the Gold Pit to encourage them to collect it and remind them of the mechanic. The player is now free to progress.

Pogo Chick developer graph:

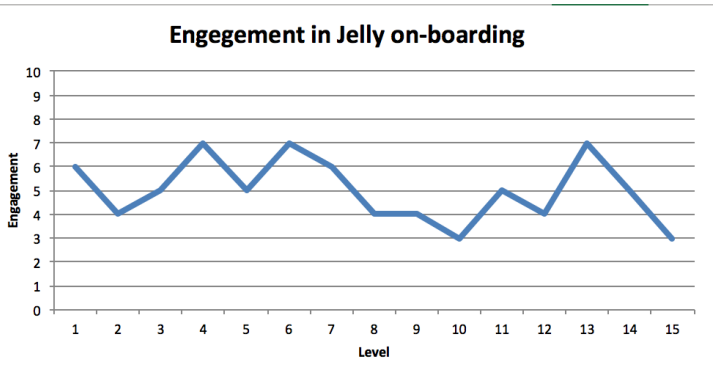


1) Game begins. Player is greeted by the game name and instructions in the form of thumbs on the virtual buttons. This is done to teach them how to hold the device. The player feels like the game is offering something fun thanks to its quirky visuals and music.
2) Player taps on a virtual button, feels a wow moment as the hero tilts very rapidly on one side of the other. After 5 seconds, the player normally dies. He feels a mixture of amusement because of the funny visuals and death sound, but also of challenge.
3) Player taps on the central button in the result screen to redeem a 2nd Chick. He faces the big Chicken Gacha, taps on the Corn button and observes the animation. He has a wow moment as the animation is cute and the earned Chick great. He taps play to start again.
4) Player now gets the concept of the game: go as far as possible and earn corns to unlock new Chicks. As the terrain is procedural, it proves to be a real challenge. As

they try again and again, the frustration feeling becomes one of mastering and accomplishment.

Candy Crush Jelly Saga developer graph:
I have made it based on our Jelly level designers' feedback. In general, they view the on-boarding as the first game session, which we choose to be 15 levels. Their aim is that engagement will go up as we introduce new features, like game modes or blockers. Also, the aim is to increase the engagement over time as more features are introduced and players get more hooked on the game.

level	engagement
1	6
2	4
3	5
4	7
5	5
6	7
7	6
8	4
9	4
10	3
11	5
12	4
13	7
14	5
15	3



10.7 Appendix H: Notes from meetings with the companies

In this appendix, the notes from the Skype meeting with the Julian Maroda CEO of Norsfell and the Skype meeting with Jonathan Magnusson the Team Lead Candy BPU of King in Stockholm can be found. These meetings were both used for gaining an understanding of the two companies, the three games and ask any tending questions found in relation to the investigations of this thesis.

Notes to Meeting with Julian Maroda the CEO of Norsfell:

- WinterForts was the company's first game.
- They focus mostly on replayable multiplayer experiences.
- WinterForts was aimed at creating a stepping stone for the company, where they took something that they know works and create a product out of that.
- They wanted to release WinterForts quickly and did not have time for try and fail research.
- With WinterForts they want the player to feel carrying towards their city and they implemented customization possibilities in order for the player to express themselves freely.
- Made the game so that it was competitive and had a social aspect, however did not have the means to push it further then the possibility of adding friends and attack or group with them.

- PogoChick was a gamejam thing and only used a month creating it – quickly released – was based on Flappy Bird and Crossy Road - wanted it to be really hardcore and hard to master but still funny with the sound and chick eyes.
- Changed the setting in PogoChick so that it changes during play – the new chick was added for retention.
- In January they made PogoChick a little easier in order for the graphics to fit the difficulty and audience – before you could only get like five meters – found out that the problem was that they were pushing the game to hardcore players but it looked too cartoonish for them but was too difficult to casual gamers who downloaded it - the game is where they want it to be at this point.
- They do not plan on taking the games down – has not related costs – however no developments are planned.
- They mainly track telemetry data and look at similar games on the marked (Telemetry data was also how they discovered that PogoChick was too hard) and do internal user testing every month to watch people play and get feedback.
- The target group of WinterForts are 18-30 year old western males – core players as it has more sophisticated controls in terms of steps to take to do something – more parameter to play with - got a lot of critique about it being too cartoonish and not fresh and mobile enough.
- PogoChick firstly had the same audience as Flappy Bird but when it was made easier, it became closer to Crossy Road – it targets more casual players now, that would not spend too much time on it – still addictive – play a couple of days to a few weeks.
- WinterForts combine a lot of elements to motivate player – own something – customize it – build and show it to friends (social aspect) – the strategy builder games give a lot like social aspects – that is why it they are so popular and addictive.
- PogoChick motivates by being a trend – it can be played in really short sessions and is funny – players likes the game but not for long – in PogoChick you can also play against friends and see who get most far – mostly the motivation is about mastering the game.
- They have not used flow in the creation of the games – they mere try and error and look what works in other games in the marked.

Notes from meeting with Jonathan Magnusson Team Lead Candy BPU Analytics at King:

- They work with progression in the games and that the game starts out easier and then becomes more challenging as the game progresses.
- The motivation of the players in Candy Crush Jelly Saga is that they want to reach higher and higher in game levels.
- The game has a really diverse user base and a lot of different players.
- The game aims additionally at letting the players escape everyday life, relax like people traditionally do with TV.
- King does consider flow and does a lot of user testing in general in the creation and maintaining of their games.

- Candy is played when people are in a context like on a bus or train or has a break – therefore the game are designed to be able to be played in both shorter and longer periods of time.
- They try to have flow in mind then developing their games and during user testing but they do not directly implement it in the user testing sessions.

10.8 Appendix I: One-way repeated measures ANOVA

In this appendix, the calculations from the one-way repeated measures ANOVA can be found. This both includes the descriptive statistics with a plot visualizing the M values of the three games against each other and the within-subjects factors, telling which game is 1, 2, and 3. Mauchly's test of sphericity is also included and the main ANOVA containing: the test of within-subjects effects. Lastly, the within-subjects contrasts and explanation of the game levels and the post hoc test containing: the pairwise comparisons can be found.

Descriptive statistics and plot:

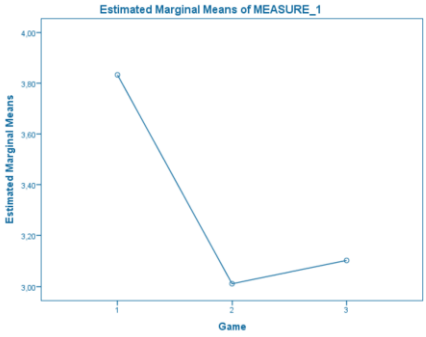
Descriptive Statistics

	Mean	Std. Deviation	N
Score Candy	3,8333	,43291	26
Score Pogo	3,0107	,57500	26
Score Winter	3,1026	,66975	26

Within-Subjects Factors

MEASURE_1

Game	Dependent Variable
1	Score_Candy_Mean
2	Score_Pogo_Mean
3	Score_Winter_Mean



Manchly's Test of Sphericity:

Mauchly's Test of Sphericity[a]

MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Game	,969	,766	2	,682	,970	1,000	,500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: Game

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

The Main ANOVA:

Tests of Within-Subjects Effects

MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Game	Sphericity Assumed	10,567	2	5,283	16,730	,000	,401	33,461	1,000
	Greenhouse-Geisser	10,567	1,939	5,449	16,730	,000	,401	32,442	,999
	Huynh-Feldt	10,567	2,000	5,283	16,730	,000	,401	33,461	1,000
	Lower-bound	10,567	1,000	10,567	16,730	,000	,401	16,730	,976
Error(Game)	Sphericity Assumed	15,789	50	,316					
	Greenhouse-Geisser	15,789	48,477	,326					
	Huynh-Feldt	15,789	50,000	,316					
	Lower-bound	15,789	25,000	,632					

a. Computed using alpha = ,05

The test of Within-subjects Contrasts:

Tests of Within-Subjects Contrasts

MEASURE_1

Source	Game	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Game	Level 1 vs. Level 2	17,596	1	17,596	32,629	,000	,566	32,629	1,000
	Level 2 vs. Level 3	,219	1	,219	,300	,589	,012	,300	,082
Error(Game)	Level 1 vs. Level 2	13,482	25	,539					
	Level 2 vs. Level 3	18,314	25	,733					

a. Computed using alpha = ,05

Game[a]

MEASURE_1

Dependent Variable	Game	
	Level 1 vs. Level 2	Level 2 vs. Level 3
Score Candy	1	0
Score Pogo	-1	1
Score Winter	0	-1

a. The contrasts for the within subjects factors are: Game: Repeated contrast

The Post Hoc test:

Pairwise Comparisons

MEASURE_1

(I) Game	(J) Game	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	,823*	,144	,000	,526	1,119
	3	,731*	,155	,000	,412	1,050
2	1	-,823*	,144	,000	-1,119	-,526
	3	-,092	,168	,589	-,438	,254
3	1	-,731*	,155	,000	-1,050	-,412
	2	,092	,168	,589	-,254	,438

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

10.9 Appendix J: Spearman's rho calculations

In this appendix, the Spearman's correlation coefficient between the flow score of all 78 answers and the age, gender and gamer types can be found. Also the descriptive statistics can be found, both regarding the overall M and SD concerning the flow score, age, gender and gamer types from all 78 answers and in from answers to each of the individual games. Additionally, the Spearman's correlation coefficient between the six motivational factors from The Gamer Motivation Profile questionnaire (Quanticfoundry, 2016) and flow score from the FSS (Jackson & Marsh, 1996) in each game is also included.

Below are the Spearman's correlation coefficient between the overall flow score across all three games on all 78 answers and the demographic data, and the descriptive statistics on the demographic data:

		Age	Gender	Gamer types
N		78	78	78
FlowScore (Spearman's r_s)		.065	.121	.227
Sig. (2-tailed)		.573	.290	.046
Confidence intervals 95%	**Lower**	-.285	-.089	.010
	Upper	.126	.307	.417
Bias		.005	-.004	-.001
Std. Error		.103	.103	.103

FlowScore (M and SD on all 78 answers)	M=3.3155	SD=.67161
Age	M=25	SD=3.39595
Male	M=25	SD=.60331
Female	M=3.2710	SD=.69477
Casual Gamers	M=3.2469	SD=.68470
Core Gamers	M=3.6790	SD=.54982
Hardcore Gamers	M=3.4907	SD=.56154

Below are Spearman's correlation coefficient statistics between the flow score of each game and the six motivational factors and the descriptive statistics on the six motivational factors:

		Action (Act)	Mastery (Mast)	Achievement (Ach)	Social (Soc)	Immersion (Imm)	Creativity (Crea)
N		26	26	26	26	26	26
Candy Crush Jelly Saga (Spearman's r_s)		-.022	.179	.101	.038	.156	-.115
Sig. (2-tailed)		.915	.381	.623	.852	.445	.577
Confidence intervals 95%	Lower	-.429	-.215	-320	-.355	-.263	-.513
	Upper	.421	.569	.529	.412	.555	.294
Bias		-.007	-.001	-.004	-.009	-.003	.001
Std. Error		.209	.203	.212	.196	.205	.204
WinterForts (Spearman's r_s)		.107	.259	.119	.246	.025	-.094
Sig. (2-tailed)		.604	.202	.561	.225	.904	.649
Confidence intervals 95%	Lower	-.299	-.131	-.274	-152	-372	-.468
	Upper	.478	.597	.493	.630	.414	.327
Bias		.001	-.004	-.001	.003	-.007	.000
Std. Error		.197	.185	.195	.203	.205	.200
PogoChick (Spearman's r_s)		.228	.208	.086	.182	.297	.199
Sig. (2-tailed)		.262	.309	.675	.372	.141	.330
Confidence intervals 95%	Lower	-.255	-.225	-.362	-.308	-.202	-256
	Upper	.643	.615	.527	.580	.764	.593
Bias		-.001	.010	-.002	-.001	.002	-.001
Std. Error		.238	.224	.229	.217	.241	.220

c. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Act	M= 1.88	SD= 1.423
Mast	M= 2.04	SD= 1.280
Ach	M= 2.27	SD= 1.313
Soc	M= 2.15	SD= 1.434
Imm	M= 1.46	SD= .761
Crea	M= 1.77	SD= 1.142

Below are Spearman's correlation coefficient between flow score in each game and the demographic data, and the descriptive statistics on each game and the demographic data:

		Age	Gender	Gamer types
N		26	26	26
FlowScore Candy Crush Jelly Saga (Spearman's r_s)		.145	.122	.084
Sig. (2-tailed)		.480	.554	.683
Bias		-.007	-.011	-.006[d]
Std. Error		.197	.201	.176[d]
Confidence intervals 95%	Lower	-.255	-.279	-266[d]
	Upper	.510	.505	.420[d]
FlowScore WinterForts (Spearman's r_s)		-.378	.156	.286
Sig. (2-tailed)		.057	.446	.157
Bias		.001	-.004	-.007[d2]
Std. Error		.160	.197	.222[d2]
Confidence intervals 95%	Lower	-.672	-.242	-.203[d2]
	Upper	-.023	.513	.643[d2]
FlowScore PogoChick (Spearman's r_s)		-.050	.359	.381
Sig. (2-tailed)		.809	.072	.055
Bias		.015	.009[d3]	.000[d]
Std. Error		.199	.199[d3]	.187[d]
Confidence intervals 95%	Lower	-.409	-.079[d3]	-.014[d]
	Upper	.356	.693[d3]	.695[d]

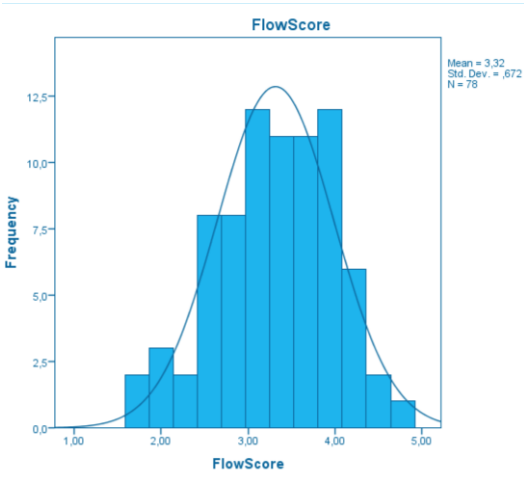
Candy Crush Jelly Saga	M= 3.8333	SD= .43291
Male	M=3.7540	SD=.41556
Female	M=3.8626	SD=.44651
Casual Gamer	M=3.8201	SD=.4312
Core Gamer	M=4.0556	SD=.14699
Hardcore Gamer:	M=3.6389	SD=.35355

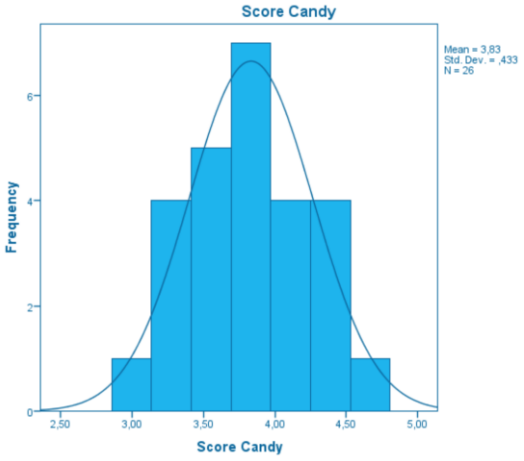
PogoChick	M= 3.0107	SD= .57500
Male	M=3.2540	SD=.68182
Female	M=2.9211	SD=.52225
Casual Gamer	M=2.9223	SD=.56368
Core Gamer	M=3.2778	SD=.69389
Hardcore Gamer	M=3.5278	SD=.19642

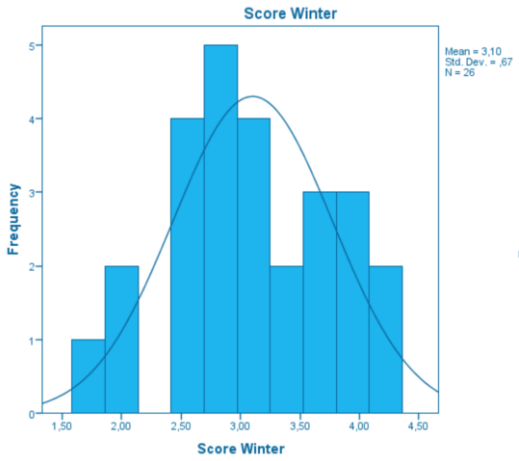
WinterForts	M= 3.1026	SD= .66975
Male	M=3.3016	SD=.63087
Female	M=3.0292	SD=.68503
Casual Gamer	M=2.9974	SD=.63306
Core Gamer	M=3.7037	SD=.50103
Hardcore Gamer	M=3.3056	SD=.1.13923

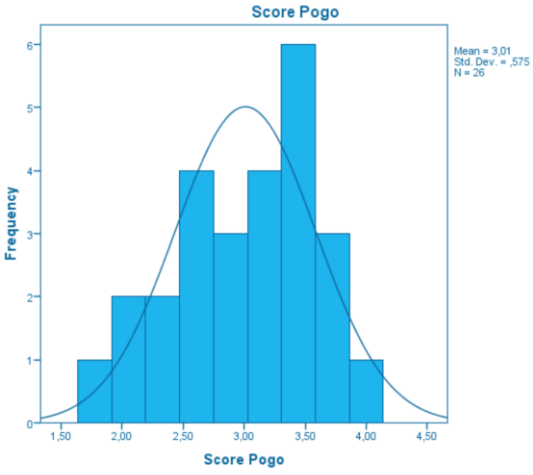
10.10 Appendix K: Histograms

In this appendix, the four most important and overall histograms can be found, which visualizes the overall flow score, the flow score in Candy Crush Jelly Saga, the flow score in WinterForts and the flow score in PogoChick. These histograms in particular but also the others, which can be found in the digital appendix: Digital appendix 3 – Histogram, were used in order to visually gain an understanding of the data, the distributions and the results.









10.11 Appendix L: Individual open coding notes

In this appendix, a sample containing notes regarding two TP out of 26 can be found. These notes were created based on the audio files and are implemented in this appendix to give an understanding of where the categories and subcategories emerged from. The additional notes, which stretch over 66 pages, can be found in the digital appendix: Digital appendix 4 – Individual coder notes.

WinterForts P3 coder one categories:

- Read the info carefully if something was important
- Likes to know the story if there is one
- Both nice it shows you what to do but also annoying
- Did not like having to use valuables – would normally rather wait
- Nice to know speeding it up is a possibility but I do not always want to – so nice that you did not have to
- Took a short moment to realize that it was opponents castle – not clear
- Knew that we were fighting but not where at first
- Too much to look at on the screen
- All of a sudden things just happen
- Understood the point in building – good explanation
- Gets tired of spending gems – they might be important to have – do not know
- Nice sound for setting the mood – medieval
- Keep calling me jarl, do not understand why
- Think I know what is named
- Thought a lot about the name
- Fine test session – only done differently than home = using gems
- Not sure I would play again
- Okay experience – do not hate the game – liked PogoChick better
- Okay game – decent if you like this genre
- Did not pay much attention to the menu – did not seem very interactive

WinterForts P3 coder two categories:

- Reading the info in case it was important
- Like to know the storyline if one is present - would like to know it
- Skeptical about using gems when asked to, but when it's a test session, there are not much time to explore the game, so why not use them
- Nice to know that you can speed things up, but not always first choice
- Took a minute to see that they were fighting at another castle, but noticed that they were in a fight
- Fighting was weird because the knights was entering through the flags in the middle of the castle
- Thinks that there are too many things happening on the screen at the same time.

- Want to save gems when upgrading the buildings because they might be useful later in the game
- Think I understood what the name is for
- Music was nice for setting the mood
- Would normally have used less gems
- Finds the game okay, but will not play again
- Sees the information boxes and menus, but do not care about the information there are telling, just interesting to see the status of gems

Candy Crush P3 coder one categories:

- Quickly goes past the intro and moves fast because I have experience with candy crush games
- Similar to soda saga
- Biggest difference is playing against the jelly queen
- Usually play with the sound off – plays in trains – do not want to annoy others
- But delightful sound – happy
- Likes the outbursts – awesome
- Likes the sound but not enough to choosing to take on headphones
- If playing at home, plays while watching TV or something else – not complete attention to the game
- The animated things are fun
- Makes quick decision – scans the game and look after special candy and empty spots with no jelly
- Contains levels within the level
- Likes everything exploding – rewards for doing things faster than you should
- Play session weird at the beginning but pretty fast forgot being watched
- Fun experience
- Liked playing against the machine – different than the other candy games – another aspect to the game – like that it is a fictional person and not friends – should thereby not worry about what they think – not make fun of you

Candy Crush P3 coder two categories:

- **E**asy start similar to other games played
- Different gameplay then normal candy crush, because of spread the jelly and the jelly queen.
- Have forgotten how delightful and energetic the music was, because she always plays with the sound of.
- Like the speaker comments
- Scans the plate to see the next move, but also focuses on the areas where there are missing jelly
- Likes the fiches.
- It was weird being watched at first, but then it was quickly forgotten
- Fun experience, fun game and fun with some challenge from the jelly queen as a new element to candy crush.

PogoChick P3 coder one categories:

- Figured out how the controls worked and that the chick needed to go forward

- Did not know why corns was important
- The game wants me to get further and get corn so they must be good – do not know what is better
- Fine sound not that fun but not annoying – kind of distracting at point – reminds of an Elvis song – did not stop me from playing
- Bad at this game
- Not my kind of game – not good at hand coordinating – maybe if I knew why the corn matter it could get more fun
- Games need to have some kind of meaning for me
- Did not know that it was an add – do not like – stressful –waste of time
- Would not play the game again
- Did not like the game – cute chick but I do not care
- Found the new chick section but do not know why you would want a new chick – found out the corns are money but do still not know why I care about the corn – might be more important to save the corn
- Would have stopped after the add
- Do not see the point or goal of the game

PogoChick P3 coder two categories:

- Need to figure out what the buttons do
- Have the general idea that the chick needs to go forward
- Do not see the point in the game
- Do not know the meaning with the corns or why to get them, it is good for something, but do not know what.
- Do not know what is best, to go as far as possible or collect corns
- Sound is all right, but not as fun as candy crush
- Music is disturbing because it sounds like a familiar song
- Would have stopped playing the game, it is not her type of game
- Would have been more interested, if she knew what the corn was for, or what was important, corns or distance
- Test session was all right
- Confused about the add popping op, it was stressful
- Would never play the game again, just not her type of game.
- Liked the graphic and the chicken, but would have stopped after the add.
- Took forever to get far in the game.

WinterForts P4 coder one categories:

- Hoped the intro told you what you should – just wanted to get going
- Story like
- Very controlled all the time what you had to do with the arrows – there the understanding of the game is not really there
- You are not allowed to try for yourself and when you are you do not know what to do – therefor the guide is not successful
- Arrows okay for getting started but too much that you cannot try anything – are not allowed to think
- Too much information
- Do not need to understand the game, just follows the arrows

- You are asked to click on the flags – do not know why – some people are coming- Wins and that is good – still do not understand and when you do not understand why you win you do not get hooked on the game – the flags only worked the first time
- Thinks the opponents castle is your own
- Might needed to read more carefully what it said – but I am not the type to do that – does not look like the most complicated game
- The story means something to me – gives a frame to things
- Too much information when you just want to get started
- The game tries to catch a medieval atmosphere in the sound – was not irritating – might make the time go faster
- Not sure what the name is for, maybe one's man in the game
- Properly not I game I would play or maybe I just needed to get going
- Sensors were fine
- Was not caught by the game – good graphically – very guideish game – complicated game – many possibilities in it and that is why they need to guide you
- Tried clicking around after end tutorial – confused do not know what to do
- There did not come more men when the flags came – inconsistency in game elements
- Potential in the game but too complicated
- Do not think I totally understood the game

WinterForts P4 coder two categories:

- Reads the info, despite she just wants to get started
- It is very controlled in the start what you can do, so she does not know what to do later on
- Tries to think for yourself but that you are not allowed to
- The guide was not good – not independent enough – did not teach you just told you
- Do not understand the flags, the battle or why you have won – the flags do not work the second time
- The story puts a frame on things
- The music is fitting for the theme and is not irritating
- Do not know what is named
- Not a game I would play again I think
- Was fine to have the sensors on
- Not a catchy game
- Good graphically
- Too much guide
- Very complex game
- Do not understand why the flags do not work when you want to use then for the second time
- Sees a potential in the game but it is too complicated for me

Candy Crush P4 coder one categories:

- Did not want to read but then a film popped up showing me what to do – that was nice

- Did not get that with spread the jelly everywhere – just thought I should do something – do not understand it at all and do not understand what it tries to tell about it
- Did not really concentrate on there being a certain amount of moves possible – did not really notice it
- The sound fits the theme
- Might have the sound on if you were alone – could be cozy and nice that the moves fit with the sound – could also play without = did not really contribute to the experience – but gave an additional dimension to the game so maybe would prefer it on
- A little more challenging but still reminds of the old candy crush
- Likes that the levels are so short so you see when you are done – goal always in sight
- Good balance in how difficult the game is
- Insanely beautiful game – very nice and well-made game both visually and with the sound and so on
- Thinks it is fun and understand why you can get addicted to it
- But then you reach a point where you have played the same level over and over again and are stuck, I would not want to play anymore
- Likes the help function that shows you what to do if you are stuck
- Try and error not like WinterForts where you do not understand anything
- There is progress even if you do not totally understand what it says – liked that

Candy Crush P4 coder two categories:

- Good with intro film as I do not want to read a lot
- Do not understand spread the jelly
- Notices the music a lot – very high – but fine and not irritating
- Do not play with sound when I am with others but sometimes at home – gives the game another dimension
- Good experience – Is easy to play
- Beautiful game – well made – stable game
- Balanced challenge
- Good that the levels are short enough to just wanting to play one more
- Likes the help functions
- In doubt when the info comes up again – am I that bad?

PogoChick P4 coder one categories:

- Just pressed the biggest button and that's that – then came in where you could by something (Thought that a new chick costs money)
- Hard time figuring how to control the chick and make it go forward – too hard to concentrate on hitting the corn all the time – corn second priority
- Do not see the point in the game – just starts over all the time – did also not seem to make a difference with the corn – did not get something more – did not feel like you got any rewards and the game did not change – something should happen during gameplay – like becoming more difficult or different after 35m
- Would have stopped after 2 deaths

- Comes a point where I make stupid flaws because I do not concentrate anymore
- A game you can play if you have 2 – 5min to kill
- The sound is a little stressing – in a loop but gives clear feedback when something happens or you die – it does not end when you die so it is kind of a try again sound
- Not the type to play very much – not much progress in the game and when you feel you master it, then it is just that – not a game you could nerd like the first
- Does not mean anything to die
- Well-made game – simple but the goal and the motivation is not high – not a motivating game – no rewards – could be as simple as starting a new place
- The corns should do something difference to the gameplay

PogoChick P4 coder two categories:

- Though you could buy a new chick – costs money – therefor closed the menu
- Difficult to figure out how to control the chick
- Difficult to hit the corn
- Felt that there was a lack of rewards – low motivation
- The game was just the same and the same and did not change – it should change during gameplay
- Would have stopped playing before end play session – 2 deaths – stopped concentrating at some point and made stupid mistakes
- A game for small play sessions
- Music is stressing but sound effects gives good feedback on something happening
- Need a game with more progress other than mastering it
- Did not care about dying
- The corns should contribute in changing the gameplay

10.12 Appendix M: Open coding categories & subcategories

In this appendix, the categories and subcategories for each game can be found, and which TP had statements regarding each of the subcategories with P stating participant, followed by their number. All categories and subcategories are color coded depending on whether they are positively anchored (Green), negatively anchored (Red) or neutrally (Gray).

Candy Crush Jelly Saga categories:

Likes outbursts - good and reinforcing feedback:	
Positive(Outbursts) reinforcements but not deeply satisfying/Good feedback:	**P9, P12, P13, P14, P16, P22, P8, P23**
Really likes outbursts/good feedback:	**P16, P8, P24, P25, P26, P3, P19**
Positive outburst makes the game whole/unconscious satisfying/Makes you want to play again:	**P16, P8, P23, P25, P26, P3, P19**
Do not like outbursts - disturbing/irritating:	
Nothing should pop up when the game exclaims feedback (Sweet etc.):	**P10, P17, P5**
Do not like outbursts:	**P15, P17, P20, P21, P7, P28, P27**
Too old voice in feedback:	**P11, P28**

Outburst is fine as a start but becomes irritating:	**P14, P22**
Likes the sounds - relaxing and fun/happy:	
Energetic/Fun sounds and colors:	**P22, P8, P26, P3**
Likes the game sounds and music (Inspiring, cozy):	**P11, P13, P15, P17, P18, P8, P4, P19**
Relaxing music:	**P17, P8**
Sound was fun and happy:	**P13, P8, P25, P26, P3**
The sound is fine and fits the theme:	**P4, P19**
Do not like the sounds - irritating and too much/disturbing:	
Sound has no meaning/do not really notice the music:	**P9, P12, P17, P21, P23, P24, P6**
Sound effects can be disturbing:	**P17, P20, P7, P28, P27**
Irritating music (Would mute it):	**P10, P12, P16, P20, P22, P7, P5, P28, P27**
Music okay but irritating in the long run:	**P22, P25, P26**
Music too much:	**P14, P15, P16, P20, P21, P22, P7, P25**
Irritating music/Monotone:	**P12, P15, P16, P20, P22, P7**
Sounds habits in general:	
Always play with sound on:	**P18, P8**
Never played with sound before:	**P11, P15, P17, P20, P19**
Never play with sound:	**P21, P22, P7, P23, P25, P3, P19, P28, P27**
Statements positively related to flow - enables:	
Clear goals in the game/Do not need much thinking/goal always in sight:	**P9, P10, P11, P13, P14, P16, P17, P20, P22, P6, P21, P7, P8, P23, P24, P25, P26, P3, P5, P28, P27, P23**
Relaxing game/Got you relaxed from everyday stress/Flee into the world of phone(Less thought then WinterForts/Minutes of thinking nothing/noncommittal):	**P10, P11, P9, P13, P14, P15, P17, P18, P20, P21, P22, P7, P8, P23, P28, P27**
Too high challenges at first but better later:	**P11**
Mastered the game:	**P13, P14, P15, P16, P17, P18, P20, P21, P22, P7, P8, P23, P25, P26, P6, P3, P28, P27**
Could get addicted to this kind of game because of clear goals:	**P14, P4**
No strings attached:	**P13, P15, P14, P16, P18, P20, P21, P22, P7, P8, P23, P28, P27**
Good balance between skill and challenge:	**P4**
Time accelerates when you play:	**P22, P8, P23**
Good progression:	**P14, P17, P20, P22, P8, P23**
Not in doubt about you are doing well:	**P14, P16, P20, P7, P8, P24, P25, P26**
Easy to navigate/intuitive/easy to play:	**P14, P16, P17, P21, P22, P7, P27, P4**
Good experience/feels like a success:	**P14, P17, P18, P20, P21, P22, P7, P23, P25, P26, P19**
Things happen automatically:	**P27, P28**
Statements negatively related to flow - disables:	
Do not understand what you are not doing well:	**P24, P4**
Skill exceed challenges:	**P9, P20, P21, P23, P6**
Ahead of the game allows for:	**P9, P11, P6**
No control when too much happens/explosion irritating (Got one out of the zone, should think, takes too long time):	**P10, P15, P20, P22, P7, P8, P25, P26, P5, P27**
Irritating that at one point you had to do what the game told you to:	**P15, P20, P7, P17, P24, P6**
Rules too strict, needed more control:	**P16, P17**
Statements comparing with original candy and other games:	
More plates then normal candy crush:	**P11, P17, P20, P22, P26**
Liked it but liked the original one better:	**P15, P20, P23, P28**
Definitely a candy game:	**P5, P19, P27**
Reminds me of be jewels:	**P25, P6**
Got confused about new features compared to the original:	**P15, P16, P8, P26, P27**
Liked the new features compared to the original, liked it better:	**P17, P22, P3**
Positive experience with game:	
Liked it:	**P10, P11, P13, P14, P16, P17, P18, P20, P15, P21, P22, P7, P8, P23, P25, P26, P3, P4, P5, P19, P28, P27**
Would have continued playing if they could:	**P11, P13**
Would play again:	**P11, P10, P18, P20**
Happy about recognazability:	**P13, P18, P20, P7, P8**
Fun and simple:	**P10, P11, P13, P14, P15, P17, P18, P20, P21, P22, P7, P8, P23, P24, P25, P26, P5, P28, P27**
Eger to play:	**P11, P28**
Cozy and nice/Enjoyable:	**P11?, P15, P17, P18, P22, P7, P8, P23, P24, P25, P26, P3, P19, P28, P27**

Fine experience was engaged:	**P5, P19, P28, P27**
Got involved in the game:	**P14, P17, P18, P20, P21, P22, P7, P8, P23, P25, P26, P3**
More fun than WinterForts:	**P22, P7, P25, P4, P19**
Bad experiences and frustrations towards the game:	
Disliked it:	**P9, P12, P6**
Would have stopped playing if they could:	**P12**
Frustrating and boring:	**P12, P9**
Did not understand the game:	**P12**
Childish:	**P22, P6, P28**
No fun:	**P12, P6**
Would not play again:	**P12, P9, P13, P24, P6**
Okay experience but not great:	
Fun when you are in the context/or a context:	**P13, P16, P20, P21, P23**
Entertaining but not catchy:	**P16, P24**
Irritating but fun:	**P5**
Bad continence when playing, should be doing something else:	**P22**
Cozy but waste of time:	**P6**
Positive and good in-game elements:	
Exploration of the game:	**P10, P16, P17**
Liked the animations:	**P17, P22**
Fun with different elements that act differently:	**P14, P16, P17, P7, P25, P26**
History do not matter for good experience:	**P8, P5**
Likes that you have to use a little brain:	**P25**
Liked the fish/understood - Mental reward:	**P16, P17, P26, P3**
Like the game being fast - enhanced the experience:	
Experience peaked when game became faster:	**P12, P21**
Liked the game being fast:	**P7, P12, P21**
Likes when everything explodes/ Liked that it did something itself:	**P13, P19, P24, P26, P3, P27**
Good help functions and info - easy to understand:	
Quickly learn game features:	**P10, P13, P14, P17, P20, P21, P22, P7, P8, P23, P25, P26, P6, P3**
Good help function:	**P10, P14, P16, P8, P4, P5**
Easy menu:	**P14, P20**
Simple graphic/All you need is in front of you:	**P10, P27**
Good start info:	**P10, P4, P27**
Should have been more info - little confusion:	
Took a little to orientate in the games many features:	**P18, P22, P8, P24, P26**
Lack of info sometimes:	**P11, P12, P24**
Bad in- game elements and functions:	
Do not enable for multiple task at a time in each level/Lack of exploration possibilities:	**P9, P11, P12, P16, P6**
Lack of tempo:	**P12**
Bad rules:	**P16**
Confusions towards the in- game elements - things not understood:	
Took some time to get to know what elements need to be in line and purple/pink:	**P10, P8, P24**
Did not understand the striped candy:	**P12, P15, P19**
Do not feel that you make everything explode:	**P24, P7, P25, P27**
Do not understand fish:	**P8, P25, P19**
Did not know why I won:	**P12**
Did not understand limited amounts of moves:	**P4, P5**
The game is overdriven in all aspects:	**P14, P6**
Irritating that it helps too fast and boring information:	
Irritating that it helps too fast before you feel you are stalled/does to much:	**P16, P6**
Boring information/Intro too long, impatient:	**P9, P23, P26, P6**
Positive statement on playing against the machine:	
Got more engaged and challenged when playing against the computer:	**P21, P3**
Fun to play against the computer:	**P7, P3**
Negative statement on playing against the machine:	
Did not give you much that you play against the machine:	**P20, P28**
Did not understand that you played against the machine at first:	**P11, P20, P21, P7**
Did understand that you play against the machine:	**P15, P3, P28**
Thought it was weird playing against the computer/jelly queen:	**P15, P20, P28**
Positive stamens towards spread the jelly:	
Understands spread the jelly:	**P23, P26, P3**
Negative statements and frustrations towards spread the jelly:	
Spread the jelly confusing:	**P10, P15, P22, P7, P8, P24, P25, P4, P19**

Spread jelly irritating:	**P15, P24**
More concerned with three in line then spreading the jelly/understood that better:	**P15, P24, P19**
Test session in general:	
Fine test session/Not uncomfortable:	**P12, P15, P16, P21, P24, P5, P28, P27**
Normally take more time to understand game when alone and not tested on:	**P21**

PogoChick categories:

The corns are difficult to understand - Lack of information about them:	
Do not think there is a point in corns:	**P9, P15, P16, P3, P4**
Hard to hit the corns:	**P11, P13, P16, P26, P4, P8**
Did not know if the corns were dangerous:	**P12**
Do not care about the corn but know what to do with them:	**P21, P22, P25**
Difficult to understand the corn but understood them at last:	**P13, P25**
Did not understand the corns:	**P12, P14, P15, P16, P20, P7, P23, P26, P3, P4, P5, P19**
Difficult in general to understand the game and in-game elements:	
Took a long time to understand the game:	**P12, P13, P18, P20, P8, P19, P27**
Did not understand the menu:	**P15, P7, P19, P27, P28**
Did not understand the arrows:	**P13, P14, P18, P20, P21, P7, P23, P19, P27**
Tried going backwards:	**P14, P18, P25**
Confused about if it is important to get far or most corns:	**P14, P15, P16, P3, P8**
Get a new chick confusing - thinks it costs money/do not know what to do with it:	
Though that something costs money and did not understand it:	**P10, P12, P7, P19**
Thought that a new chick costs money:	**P12, P7, P4, P8, P19**
Do not understand the meaning with the new chick:	**P14, P17, P22, P3**
The new chick did not mean anything to me:	**P21, P25**
Tried to see if it moved by itself/Though the chick would jump by itself – it did not:	**P16, P15, P19, P7**
Lack of general information:	
Lack of intro:	**P10, P12, P13, P14, P15, P20, P3, P19, P27**
Lack of general information:	**P15, P16, P3, P19, P27**
Tried to find other levels and information - could not find:	**P15, P19, P27, P28**
Game did not react accordingly/inconsistency in game controls:	**P15, P11, P23, P27**
Irritating that the game did not have milestone possibilities:	
After several deaths becomes irritating:	**P11, P12, P13, P18, P20, P22, P23, P26, P4, P6, P19**
Irritating to have to start over every time you die:	**P21, P22, P26, P4, P6, P8**
Should have contained milestones:	**P15, P20**
Irritating that nothing more happens:	
Lack of something more than standard gameplay/The game should evolve or change during gameplay:	**P9, P10, P11, P12, P14, P15, P16, P17, P20, P23, P4, P5, P28**
Think that there might happen something in the game with longer gameplay:	**P23, P24, P25, P28**
Simple game but nothing else happens:	**P5, P6**
Did not care about dying:	**P10, P11, P18, P4, P6**
Thought that the corns could give a new level or something else:	**P15, P16, P18, P20, P28**
Frustrating and irritating in-game elements:	
Did not care about winning but does typically not do that in mobile games:	**P11, P18**
Do not like that the setting keeps changing:	**P18**
Difficult to navigate:	**P20, P22, P7, P23, P24, P26, P4, P8, P19, P27, P28**
Chick hopped a little slow – quickly gets better and might not be challenging enough later:	**P24**
Did not think about the other menu icons:	**P13, P7, P6**
Noticed the setting change:	**P5, P8**
Simple but difficult:	**P27, P28**
Likes about towards the in-game elements:	
Intro made sense:	**P9, P21**
Thought it could be fun if it had motion control:	**P14, P25**
Fun and good in- game elements:	
Simple with no gameplay flaws/Simple and silly:	**P9, P10, P21, P7, P24, P25, P26, P5, P6, P28**
Fast reaction in chick:	**P20**
Fun to get a new chick:	**P13, P14**

Like to compete with yourself:	**P7, P21? P24, P25**
Liked that there is no history:	**P7, P24**
Fun experience, good game but would not play again:	
Would not download it, afraid of spending too much time playing/getting addicted:	**P7**
Fun to start with, would only play once:	**P12, P16, P22, P26**
Liked it but did not have an interest in it:	**P9, P12, P22**
Would not install it, or delete it quickly after install:	**P9**
Did not like the game - too long time in play session:	
Disliked it:	**P10, P11, P13, P12, P15, P14, P16, P17, P18, P20, P23, P26, P3, P4, P5, P19, P27**
Too long play time in play session, would have stopped before:	**P12, P13(5-6deaths), P15, P23 (3 deaths), P16, P18 (5 deaths), P22, P26 (5/6/7 deaths), P3, P4 (2 deaths). P6, P19 (2-3min), P27**
Would not play again:	**P10, P11, P9, P12, P13, P15, P16, P18, P20, P22, P23, P26, P3, P5, P19**
Frustrating game:	**P11, P13, P14, P15, P18, P20, P22, P26, P3, P19, P27**
Did not understand the game:	**P10, P12, P13, P18, P3, P4, P5, P19, P27**
Bad experience/boring/Not engaged:	**P10, P11, P13, P15, P17, P18, P20, P23, P26, P3, P19, P27, P5, P16**
A game for younger people:	**P6**
Stressing game:	**P6**
Childish:	**P17, P20**
Needs great concentration/cannot be played in the train/not a game to go back and forth to:	**P14, P7, P28**
Liked the game and understood it:	
Liked it:	**P21, P7, P24, P25, P8, P28**
The difficulty was appropriate for new players:	**P24**
Cozy and simple but irritating:	**P20, P21, P22, P6**
Would have played longer then play session:	**P24, P25, P28**
Very engaged:	**P21, P7, P24, P25, P28**
Liked the graphics:	**P15, P20, P3**
Liked the simplicity and simplicity and that you just die and start over/Uncomplicated:	**P24, P25, P28**
Understand that you can win a new chick:	**P14, P17, P21, P25, P5**
If you played with friends it could be fun to try to be best:	**P14**
Cute universe/silly:	**P14, P24, P25, P28**
Positive flow elements in the game:	
The chick eyes gave good feedback:	**P12, P17, P22, P7, P8**
Skills became better during gameplay:	**P12, P7, P24**
Clear goals:	**P9, P21, P7, P24, P25, P28**
Simple to master:	**P9, P16, P21, P7, P24, P25, P6, P28**
Quick feedback:	**P9, P17, P21, P22, P7, P23, P24**
Felt challenged because of the fluent goal:	**P21, P7, P24, P25**
Clearly knew what to do:	**P22, P7, P24, P25, P28**
Kills time/relaxing/get away from thoughts:	**P21, P7**
Good sound effects/gave good responses/feedback:	**P13, P14, P15, P16, P17, P22, P7, P23, P24, P4, P8**
Negative flow elements in game:	
Too high challenge to skills/not a good balance:	**P19, P27**
Lack of response/feedback on you dong good or bad:	**P19**
Lack of purpose/do not see the point in the game:	**P10, P13, P15, P16, P17, P20, P3, P4, P5**
Fun at start but becomes boring when it is not mastered:	**P22, P26, P5, P6**
Made up an unexciting story:	
Made up a whole not existing story:	**P18, P7, P24**
Thought you need corns for food to chicks:	**P18**
Neutral towards Sound - did not hear it/did not give anything:	
Did not hear the music:	**P18, P23, P26, P8**
Most focus on corn popping sounds:	**P16, P23, P24**
Music was okay but did not give anything:	**P9, P26, P3, P28**
Irritating sounds and music - too fast and stressing:	
Irritating music:	**P13, P12, P20, P21, P22, P7, P25, P26, P19**
Irritating popping sound:	**P20, P25, P5**
Did not like the chick and the chick sounds:	**P15, P11, P27**
Music too fast and stressing:	**P22, P7, P25, P26, P4**
Sound and eyes was over dramatic:	**P10, P15**

Likes the sound and music - relaxing and fun:	
Sound made it okay and more fun to die:	**P22, P7, P5**
Liked the music:	**P14, P15, P16, P17, P6, P27**
Relaxing music:	**P17, P24**
The chick and chick sounds are fun:	**P5, P28**
Own goal:	
Caught as many corns as possible:	**P10, P11, P12, P13, P16, P26, P19**
Get as long as possible/high score:	**P9, P13, P15, P16, P17, P21, P22, P7, P23, P25, P5, P28**
Both get as long as possible and get as many corns as possible:	**P16, P18, P20, P24**
Play session in general:	
Yawns during test:	**P10, P16**
Noticed during gameplay that body moved according to the game/chick:	**P10, P18**
Fine play session and did not notice the sensors too much but would like to have used both hands:	**P17, P22, P23, P26, P3, P5, P8**
Noticed the sensors on the hands/Little uncomfortable:	**P20, P25**
Commercials irritating - should not just pop up - tricks you to click:	
Did not know that it was a commercial that is being clicked/Irritating/Cons you to see commercials:	**P14, P26, P3, P28**
Commercial irritating:	**P14, P17, P11, P26, P3, P28**
If you explored the game you just got commercials:	**P14**
Game comparison:	
Elvis song (Thought they recognized melody):	**P10, P16, P3**
Flappy bird like:	**P13, P14, P7**
Knows the kind of game:	**P21, P7, P25**

WinterForts categories

The game are too controlled - just tells you what to do:	
No decision in what to do in game:	**P9, P11, P15, P16, P17, P20, P22, P8, P25, P26,P4, P19, P27**
No chance for self-exploration of the game:	**P9, P11, P15, P16, P20, P8, P4, P19, P27**
No choices/Lack of free control:	**P9, P11, P15, P16, P17, P20, P22, P8, P25, P26, P4, P19, P27**
A little irritating it tells you what to do but also nice:	**P3, P4, P19, P28**
Do not feel part of the game:	**P9, P15, P16, P20, P8, P23, P26, P27**
Need more control:	**P9, P11, P15, P16, P17, P20, P22, P8, P25, P26, P4, P19, P27**
Just want to get started:	**P9, P11, P16, P8, P26, P4, P7, P27**
Does not matter that you have won - did not do anything for it:	**P20, P25, P26, P19**
Irritating that you do not get to participate in the fight:	**P14, P8, P23, P24, P25**
Does not feel anything about winning as one have not contributed to it:	**P15, P20, P8, P25, P26, P19**
Do not know or understand what you are doing/Lack of the right general info:	
Just clicks where the arrows points, do not know why:	**P9, P10, P11, P12, P13, P15, P16, P19, P18, P20, P22, P8, P25, P26, P4, P7, P27, P28**
Did not understand the gold/Forced to upgrade/Thinks that it costs money:	**P10, P16, P17, P20, P8**
Did not know why one have won:	**P10, P11, P13, P15, P16, P20, P8, P26, P3, P7, P19, P27**
Simple layout but do not understand it:	**P10**
Needed info on battles:	**P11, P16, P24, P25, P26, P3, P19, P28**
Bad info:	**P11, P8, P28**
Though the I button was a info button:	**P14**
Only read the start info:	**P15, P21**
Does not know what happens in the battle:	**P15, P16, P20, P8, P24, P25, P26, P3, P4, P7, P19, P27, P28**
Confused about having to do something you do not have meat for:	**P5**
Do not know the purpose of collecting stuff:	**P8**
Do not know why they are in battle other then it shows the it is possibility:	**P23, P25, P3, P19, P27, P28**
Do not understand why you have to build a gold chamber:	**P23**
Did not understand all the info text:	**P12, P18, P8, P25, P26, P3, P7, P19, P28**
Confusing game design/layout:	
The castle of the opponent looks like one's own/Cannot see the difference:	**P9, P10, P14, P15, P16, P20, P22, P8, P23, P24, P3, P7, P19, P27, P28**
Do not know where he/she is in the game:	**P9, P10, P13, P15, P16, P20, P22, P8, P26, P3, P19, P27, P28**

Thought something costs money therefore clicked away:	**P8**
No identification with the game:	
Lack of identification/Do not know or understand ones in game personality/Do not feel like you have one:	**P9, P15, P8, P3, P28**
The only fun thing in the game was the name:	**P8**
Did not understand what they named:	**P9, P10, P12, P15, P16, P20, P8, P25, P26, P4, P7, P19, P27, P28**
The history and the naming does not matter:	**P15, P20, P5**
Clear what to do first but confused after the onboarding:	
Clear info as a start (But did not know what to do after):	**P9, P10, P11, P12, P24, P25, P3**
Confusion after end tutorial:	**P9, P10, P11, P12, P13, P20, P22, P8, P24, P26, P4, P27, P28**
Should have been help functions after the tutorial/Maybe after 30sec where nothing happens:	**P10, P12, P28**
Negative in-game elements:	
Irritating that you are forced to use gems/money/diamonds/would normally save them:	**P17, P18, P25, P3, P5, P6**
Good guide at first but then too much:	**P9, P27**
Easy to be in battle, should not do anything/Off cause I won:	**P11, P18, P21, P22, P25, P19**
Confused on game elements and status bar:	**P12, P20, P24**
Did not know the order of upgrades, irritating:	**P17**
Irritating that you should at least use three letters in name:	**P20**
Quickly read introduction:	**P14, P18, P23, P25, P26, P5, P7, P6, P19**
Too strategic:	**P16, P20, P27, P28**
Game control flaws/confusing:	
Lack of consistency in game controls/Could click on the flag first but then not anymore:	**P9, P10, P11, P4**
Would have liked to zoom or scroll but could not get it to work:	**P8, P5, P9**
Tries to click around, nothing or some do not work:	**P15, P16, P22, P8, P24, P26, P4, P19, P27**
Too much clicks and too much text/Clicks and waits:	**P20, P25, P26, P27**
Commercials irritating - just pops up:	
Short commercials but irritating that it just pops up:	**P14, P17, P23, P24, P26, P27, P28**
Did first not understand that it was a commercial and not part of gameplay:	**P15, P26, P27, P28**
Likes the tutorial/onboarding and info:	
Likes the arrows points and feels it makes it clear what you should:	**P21, P24, P3, P19**
Tutorial easy to understand/Good explanations throughout the game:	**P23, P24**
Liked the info:	**P14, P17, P18, P21, P23, P24, P3**
Interesting with storyline and start tutorial:	**P17, P18, P21, P3, P6**
Intuitively build but much elements in small app/Very advanced:	**P14, P21, P24, P3**
The victory was clear and nice but expected:	
Clear why you won:	**P5, P6**
Fun to win/makes you think you know what to do:	**P22, P24, P19**
The victory was expected as an intro:	**P21, P22, P25**
The naming was nice and made sense:	
Think the name is personifying:	**P10, P18, P21, P3, P6,**
Feel she/he understands what is named:	**P11, P13, P17, P18, P21, P22, P23, P24, P26, P7, P6**
Fun and positive in- game elements:	
Understand that the castle is the opponents:	**P11, P17, P18, P21, P23, P24, P25, P3, P6**
Fun to build your own castle:	**P14, P21**
Like that you need to use more brain:	**P14, P21**
Exciting for the first time when you could do something yourself/engagement raised:	**P15, P21, P22, P8**
Like it is strategic:	**P17, P14, P21, P6**
Might understand gameplay after longer gameplay:	**P10, P13, P16, P22, P19**
Boring game - do not like it at all/would not play again:	
Dislike:	**P9, P11, P12, P15, P16, P20, P22, P8, P25, P26, P3, P28**
Boring game:	**P9, P11, P12, P15, P16, P20, P22, P8, P25, P27, P28**
Negative before starting, do not like that kind of game:	**P20, P28**
Did not understand the game:	**P9, P11, P12, P13, P15, P16, P20, P22, P8, P25, P26, P3, P4, P7, P19, P27, P28**
Would not play again:	**P3, P4, P7**
Do not know what is happening:	**P12, P15, P16, P20, P22, P8, P25, P26, P4, P7, P19, P27, P28**
Would have closed the game before end session:	**P16, P22, P25, P28, P7**
Confusing experience:	**P10, P13, P16, P20, P22, P8, P26, P3, P4, P19, P27, P28**

Other games in the genre is more advanced:	**P17, P25**
Do not allow for engagements:	**P8, P27, P28**
Too advanced game:	**P20, P22, P8, P4, P28**
Liked PogoChick or Candy Crush more/less engaging then other games, PogoChick=better immersion:	**P24, P3, P23, P28**
Not something new in the genre – not exciting:	**P25**
Liked the game - good experience:	
Like:	**P13, P14, P17, P18, P21, P24, P6**
Would have continued a little longer then the play session, to figure the game out:	**P13**
Understood the game – it made sense:	**P14, P17, P18, P21, P24, P5, P6, P23**
Would read forums for tips and tricks:	**P14**
Might want to download it at home:	**P14, P17**
Relaxing and cozy game:	**P18, P21, P6**
Better then PogoChick you can get immersed into this game:	**P23**
Positive flow elements:	
Clear info and understood the history of the game:	**P14, P17, P18, P21, P24, P25, P6**
Sounds are good to give clear feedback:	**P9, P10, P14, P17, P23, P24, P27**
Kills time:	**P21**
Good progression:	**P14, P21**
Clear goals:	**P17, P18, P21**
Simple to master because to the intro:	**P23, P24**
Sounds could be a means of immersion:	**P23**
Exciting and challenging:	**P21, P6, P19**
Negative flow elements:	
Unsure of the end goal of game:	**P16, P8, P28**
Needed more challenge:	**P11, P8, P25, P26**
Feels dump/No challenges (Game makes you feel dump):	**P9, P11, P8, P26**
Lack of clear goal:	**P24, P28**
Positive towards sounds - fitting to the theme/relaxing - means of immersion:	
Fitting mid-evil music and sounds (Immersion):	**P9, P10, P11, P13, P14, P18, P21, P26, P3, P4, P7, P6, P19, P27**
Relaxing sounds:	**P23, P24, P26**
Music relaxing:	**P17, P23, P24, P26**
Negative towards sounds - would take it off/irritating:	
Would take the sound off:	**P9, P17, P22, P25, P7**
Too violent sounds:	**P10, P22**
Irritating sounds:	**P10, P22**
Neutral towards sounds - fine but not much noticeable:	
Fine sound but did not notice it much:	**P20, P24, P25, P26, P28**
Did not hear the sounds:	**P16, P20, P6, P19, P27**

10.13 Appendix N: Inter-coder reliability calculations

In this appendix, the inter-coder reliability sheet can be found; this sheet was used for categorizing a sample of the individual coder notes into the discovered categories, by two individual coders. This was done in order to find the percentage agreement of the two coders and thereby the inter-coder reliability. Each of the percentages based on the total number of possible matches and actual total agreement matches for each TP can be seen in yellow. The average agreement of all calculated percentage agreement can be seen in green alongside the explanation of 1 being equal to agreeing and 0 being equal to disagreeing.

1	Agree
0	Disagree
Average agreement	91%

PogoChick Categories:	The corns are diffucult to understand - Lack of informati	Difficult in general to understand the game and in-game	Get a new chick confusing - thinks it costs money/do not know	Lack of general information:	Irritating that the game did not have mileston e possibiliti es:	Irritating that nothing more happens:	Frustrati ng and irritating in-game elements :	Likes about towards the in-game elements :	Fun and good in-game elements :	Fun experien ce, good game but would not play again:	Did not like the game - too long time in play session:	Liked the game and understo d it:	Positive flow elements in the game:	Negative flow elements in game:	Made up an unexsisti ng story:	Neutral towords Sound - did not hear it/did not give anything:	Irritating sounds and music - too fast and stressing :	Likes the sound and music - relaxing and fun:	Own goal:	Play session in general:	Commer cials irritating - should not just pop up - tricks you to click:	Game comparis on:		
PogoChick P5 coder one categories																								
Starts by figuring the controls out	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Match 298
Do not understand the corns or the thing either counting corn or showing what you have	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Total 329
Mostly focused on jumping then collecting corn	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Agreemer 91%
Hoped something would change in the gameplay when you get further but did not get fa	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	
Gave up when I did not see the point	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Fine play session – not a game for me – simple game but nothing happens	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	
Simple to start playing and maybe something new will happen when you change charac	1	1	1	1	1	0	1	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	
Tried the getting a new chick because the game became boring	1	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
The chick sound is fun when it falls – do not get the popping sounds	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	
Boring after the first minutes	1	1	1	1	0	0	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	
Would not play again	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	
Not a game for me	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Do not get the point and do not enjoy it	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Matter do die if you are far	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Noticed the landscape change	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
PogoChick P5 coder two categories:																								
Try to understand the game controls as a first	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Match 210
Did not understand what the corns were for – was it counting corn up or down	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Total 220
Own goal was to jump not collect corn	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Agreemer 95%
When you get further in the game I hoped that the gameplay would change – do not thi	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Not a game for me	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	
The play session was fine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Got a new chick when everything got boring	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Fun sound in the chick when it is falling – did not understand why the corn had a poppir	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	
Would not play again	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	
Do not understand the goal – do you need to get far or most corn	0	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	
PogoChick P19 coder one categories:																								
At fist did not understand that the arrows are the commands	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Match 353
Looked after something else because of that	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Total 395
Thought that a new chick costs money	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Agreemer 89%
Now understood the controls but could not get very far	1	0	1	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	
Did not exactly understand how to play it – tries the menu again	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
The purpose of the game is to get corn and thereby points and balance the chick	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Confused and tried if it would move by it self	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Noticed the music – the same music all the time – boring music	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	
Did not notice the chick sound	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Need more experience to like or not like it	1	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Did not feel in control – was very challenged	1	0	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	
Took a long time to figure out how to control the game – could not go very far	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Boring – do not like the game	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	
Should be easy at the start so that you can learn and get to enjoy it – too steep learning	1	0	1	0	1	1	0	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	
Would never play it again	1	0	1	0	1	1	0	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	
Would have stopped before the test session ended – a few deaths – 2-3 minutes – lost	1	0	1	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	
Not an informative game – did not tell you if you do good or not	1	0	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	
Same again and again – do not feel like you are doing good – should tell me how to cor	1	0	1	1	0	0	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	
PogoChick P19 coder two categories:																								
Cancelled getting a new chick - thought they cost money	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Match 207
Confused about how to play the game	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Total 220
Saw the purpose as getting eggs/corns to get points	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	Agreemer 94%
Same music all the time – boring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Need more experience to like the game – finds it difficult	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Took some time to figure the game out	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Boring because of the hard/steep learning process	1	0	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	
Will never play the game again	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	
Would have stopped before end of play session – 2-3 minutes	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	
Missing acknowledgement and info about controls	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	

WinterForts Categories:	The game are too controled - just tells you what to	Do not know or understand what you are doing/Lack of the	Confusing game design/layout:	No identification with the game:	Clear what to do first but confused after tutorial:	Negative in-game elements:	Game control flaws/confusing:	Commercials irritating - just pops up:	Likes the tutorial and info:	The victory was clear and nice but expecte	The naming was nice and made sence:	Fun and positive in-game elements:	Boring game - do not like it at all/would not play	Liked the game - good experience:	Positive flow elements:	Negative flow elements:	Positive towards sounds - fitting to the theme/relaxing -	Negative towards sounds - would take it off/irritat	Neutral towards sounds - fine but not much notacebl		
Winterforts P24 coder one categories:																					
Reads the info to know what to do in the game	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	Match	290
Good introduction and guide – the arrow point to what to do	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	Total	338
We are being attracted – goes good but next time my warriors will not go there so it goes really bad – Should have learned something from the first war	1	0	0	1	0	0	1	1	1	1	0	1	1	1	1	0	1	1	1	Agreeme	86%
Can just enter opponents castle – clicks on flag and defeats the enemy	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1		
Becomes happy about winning	1	1	1	1	1	1	1	1	1	1	1		1	1	0	1	1	1	1		
Commercials irritating – never commercials you want, that is something for you – gives you bad associations to what is being commercialized	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1		
Thinks it is one self being named – was weird having to find a name but fun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Tries to click around because do not know what to do now and tries building things	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1		
Gets many diamantes from start, therefore things can go fast	1	1		1		1	1	1	1	1	1	0	1	0	1	1	1	1	1		
No plan of action on what to do after end tutorial	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1		
Disappointing that you cannot win the second battle – do not know why – though you would have had more control over the battle	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1		
The worriers do not do anything and cannot get them to participate in the fight – do not understand why you cannot control the players	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	0	1	1	1		
Frustrating that the thing you have just build are destroyed	1	0	0	1	0	1	0	1	1	1	1	1	1	1	1	0	1	1	1		
You cannot know that you cannot not win the new battle as you have just won	1	0	1	1	0	1	0	1	1	1	1	1	1	1	1	0	1	1	1		
Maybe you have to upgrade but it was not clear	1	0	1	1	0	0	0	1	1	1	1	1	1	1	1	0	1	1	1		
Did not notice the sound much, was relaxed	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1		
Fun game but Pogo was more fun, it was bigger and more advanced but you did not know what to do – lack of goal	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1		
Not as engaged as in pogo	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1		
Winterforts P13 coder one categories:																					
Did not understand the info	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	Match	258
In doubt if it is good to use the diaments	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Total	304
Tired of reading	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	Agreeme	85%
Can do things without reading because it says what you should	1	0	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1		
Do not know it is the opponants castle	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0	1	1	1		
Do not know you have won	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1	0	1	1	1		
Not nice to win when you do not know why	1	1	0	1	1	0	0	1	1	1	1	1	0	1	1	0	1	1	1		
Would not play again	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Confusing	1	0	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1		
When you are on your own is where you need to figure out what you can in the gan	1	0	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1		
Do not feel that the game had really started yet	0	0	0	1	1	1	0	1	1	1	1	1	0	1	1	0	1	1	1		
Would have continued a little longer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Think one know what is named	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
You can build something	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1		
If you really gets into the game it might be good	0	1	0	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1		
Finds out you can attack after end tutorial	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1		
Winterforts P13 coder two categories:																					
Hard to understand the intro	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	Match	224
Thinks a lot	1	0	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	Total	247
Tired of reading	1	1	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	Agreeme	91%
The arrows help and makes you know what to do without reading	0	1	1	1	0	1	1	1	0	1	1	0	1	1	1	1	1	1	1		
Understands that she is up against something else	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1		
In doubt about the games massage	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1		
Do not understand that one has one – have not done anything for it	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
The sound gives atmosphere	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1		
Thinks that it is the player which is named	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
If you get to understand the game it could be good	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1		
Finds out that you can go into war after end tutorial	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Would not have started playing at home	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1		
Would have continued a little longer	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1		
Winterforts P24 coder two categories:																					
Reads the info – good info/instructions in arrows	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Match	188
Trains a knight and goes into war	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	Total	208
Does not totally understand the fight and why the men are not hurt	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Agreeme	90%
Think it is your own castle that are being attacked	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1		
Irritating commercial	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1		
Thinks it is yourself you are naming – thinks it is weird but fun – understands that y	1	0	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1		
Does not know exactly what to do after the intro – tries building a building and colle	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1		
Lacks control over the warriors in the fights – when fighting after end tutorial – confu	1	1		1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1		
Thinks you might have to upgrade your men – not clear	1	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1		
Relaxed sounds besides the war sounds – not bothering	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0		
Cozy game	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1		

Candy Crush Categories:	Likes outbursts - good and reinforsing feedback	Do not like outbursts - disturbing/irritating:	Likes the sounds - relaxing and fun/happy:	Do not like the sounds - irritating and too much/disturbing:	Sounds habits in general:	Statements possitively related to flow - enables:	Statements negatively related to flow - disables:	Statements comparing with orginal candy and	Positive experiences with game:	Bad experiences and frustrations towards the	Okay experince but not great:	Positive and good in-game elements:	Like the game being fast - ehanced the experinc	Good help functions and info - easy to understand:	Should have been more info - little confusion:	Bad in-game elements and functions:	Confusions towards the in-game elements - things	Irritating that it helps too fast and boring informati on:	Positive statement on playing against the machine:	Negative statement on playing against the machine:	Positive staments towards spread the jelly:	Negative staments and frustrations towards spread	Test session in general:		
Candy Crush P10 coder one categories:																									
Reads what is says in the intro to understand the game and understood that you had to r	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Match	346
Was confused about spreed the jelly	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Total	368
Did not understand that everything had to be pink	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	Agreemen	94%
The music was terrible would mute it	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Do not need outburst to get through the game - mostly irritating as a start, forgets it a little	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Plays as a way to pass time while being in a bus or train and therefor usually mute	1	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1		
It makes you relax and disconnect	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Relaxed doing gameplay, which I did not in winterforts	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0		
Allow you to have minutes of thinking nothing	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
That everything explodes is confusing and a little too much	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1		
Confused about it told the game rules again	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1		
Losses a little of ones relaxing and immersion when too much happens	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1		
Suddenly finds out that everything has to be purple/pink	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1		
There should not come something up when it comes with outbursts	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1		
Very funny	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Simple and everything you need is in front of you	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Candy Crush P10 coder two categories:																									
Relaxed in the game	1	1	0	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Match	234
It made sense what you had to do	0	1	1	1	1	1	1	1	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1	Total	253
Confusing controls	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	Agreemen	92%
Not in total contro,l problems with understanding what you had to do in a brief moment	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1		
Did not get that it had to me pink	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
The melody is terrible, irritating, would have liked to mute it	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Uses it for passing time	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Fantacy game	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
Got an erge for candy	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Fun game	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
Everything you need is right in front of you	1	1	1	1	1	0	1	1	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1		
Candy Crush P16 coder one categories:																									
Started by getting an overview of what the game was	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Match	404
It was okay	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Total	434
Read the info but wondered how they swapped things around and found out that you should not touch but slide	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	Agreemen	93%
Not switch window	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1		
Should needed to find the limitations and find out what you could and could not do	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1		
Was a pretty simple game, guides you if you do not do something, it can be discussed if it could ruin the fun but it's very good if you are stuck	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
The underlay music is annoying	1	1	1	1	1		0	1		1	1	1	1	1	1	0	1	1	1	1	1	1	1		
The outbursts are fun, it gives a break	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Did not pay as much attention to the music when playing it so it compliments game	1	1	0	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
The fish is very fun when it bounces across the screen	1	1	1	1	1		1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
Laughed about outbursts, it seems out of place, instead of it just falling down	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
Needed to get an overview, has a tendency to lose overview in general but try to find systems	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
It's a bit annoying that there are things you just cannot do but that you must play by the rules	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0	1	1	1		
The god damn fish is positive, it is a fun element when it comes in it gives a mental reward about that you have done well	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
The experience is fine, did not think that it would be a game that caught me, but it was entertaining enough when it is just in front of you and you play it	1	1	1	1	1	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0		
Fine pastime thing, positive if you do not have anything else to do you can just sit and play it	1	1	1	1	1	0	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
The value in it passing time is that it does not require as much of you but you still do something yourself in contrary to winterforts	1	1	1	1	1	0	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
You needs to find out what to do, so you use your head a little	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
Test session was fine, no problem with the sensors but felt the clip in the ear was about to fall off but do not think about it when you are playing	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Candy Crush P16 coder two categories:																									
Starts by getting an overview	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Match	367
Info okay	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	Total	391
Just needed to find the limitations of the game	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	Agreemen	94%
Simple game	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
It guides you	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Irritating at one point not getting to think for your self but having to do what it says	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	0	1	0	1	1	1		
The music is annoying	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
The outbursts are entertaining	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
The outburst makes the game whole	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Needs to get an overview a long the way, have a general tendency to lose the overview	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	0		
Irritating that you have to play by the rules	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1		
The fish is a fun element – mental reward	1	1	1	1	1	0	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1		
Fine experience but not catchy	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Entertaining when you are in the context and the game is right there	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Passing time kind of a game	1	1	1	1	1	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1		
Does not need much of you to play	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Fine to have the sensors on	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		

10.14 Appendix O: Digital appendix explanation

In the digital appendix all the data from the participants; the filled out FSS, PGQ, their experience graphs and the audio recordings of each test session ordered after participant number, starting with the three pilot test and P3 and ending with P28. This is found under; Digital appendix 1 – Participants Data. Furthermore, the data spreadsheet containing the FSS answers to each game can be found under; Digital appendix 2 – Game data. Additionally, all of the histograms, both the four examples which can be seen here and the additional histograms can also be found in the digital appendix under; Digital appendix 3 - Histograms. Lastly, the rest of the individual coder notes from the stimulated recall can also be found in the digital appendix under: Digital appendix 4 – Individual Coder Notes.