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Immersion, Make and Break the Game - a Study on the Impact of Immersion

Tom Andersson
Hampus Strömsholm
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Tom Andersson
Computer science, Game Development
Malmö University
Malmö, Sweden
Email: tom_1995@msn.com

Hampus Strömsholm
Computer science, Game Development
Malmö University
Malmö, Sweden
Email: supmahampus@gmail.com

Abstract—Immersion can be considered as an essential part in digital games and developers are constantly challenged when trying to create immersive game experiences to an ever growing demand. However, as previous work suggests, immersion is not an easy concept to grasp and the area must be divided into smaller sub-areas. The sub-areas can then be investigated both individually and in relation to one another. This thesis breaks out three sub-areas (immersive features), that contribute to the overall feeling of immersion, to explore and test. The immersive features are used to create an artifact in the form of a game where all features can be tested. The data presented in this thesis shows that the three features have different amounts of impact on immersion. Furthermore, this thesis shows how the selected features relate to each other and how they together affect the overall game.

1. Introduction

In the digital game industry immersion is considered to be a crucial part in designing creative and innovative user experiences. Furthermore, developers have numerous times attempted to increase immersion to help gamers sink deeper into a game, with the ultimate goal of achieving total immersion [1]. Immersion in digital games is a vast topic where previous work suggests that it is not a simple concept to grasp [1] [2] [3], hence, to fully understand the topic it has to be researched further.

Immersion in digital games have numerous times capitalized on user experiences regardless of developers intentionally implementing it or not, having players saying:

“You might look at your watch and think, you know, I’ve been playing computer games for hours and hours I could have been outside or talking to other people...” [1]

Some research even shows that immersion has the potential to be powerful enough to help overcome usability issues and that once immersion is achieved players can miss apparent changes in both graphics and game play [4].

Immersion in games is an incredibly wide area, ranging from sound [5] all the way to the concept of flow [6]. In order to understand the area as a whole one has to divide it into sub-areas (from now on immersive features) and carefully analyse each part. In addition, a lot of research focus on determining what immersion in games entails [1] [2] [3] [4] [7] but only a small number of researchers investigated what actually causes it and these studies isolate the research area to on one specific feature [5] [6].

1.1. Purpose

The purpose of this study is to further explore some immersive features to get a deeper understanding of how developers can build games around specific immersive features, in order to further enhance the immersive feeling. This was done by, based on related research, picking three immersive features that were implemented in a game created from the ground up and tested with experienced gamers. The game this study based the tests on will be referred to as the artifact from here on and the three immersive features were the following:

- Flow
- Graphics
- Fear
The authors aim to provide a deeper understanding of these immersive features and contribute to the field by further looking into and testing the relations between them. The essence of the paper derived from finding the answer to "How do immersive features measure when compared to one another?".

1.2. Research approach

The research approach continues the study of immersion in games by emphasizing the previously discussed immersive features and brought them into the artifact. The artifact served as the testing ground for exploring this paper’s purpose and was implemented in a manner where the different immersive features can be toggled on or off. Players were presented with the artifact containing seemingly similar scenarios throughout various test cases. However, small changes were made to analyze the players’ perception of the artifact and whether they experienced more or less immersion in the different tests. All in all, the artifact tested three predefined immersive features in different combinations including and excluding one another.

1.3. Related work

Brown & Cairns described immersion as the degree of involvement with a game and argue that you can divide immersion into three levels of involvement: engagement, engrossment and total immersion [1]. In addition, Brown & Cairns researched deeper into the sections and described, case by case, specific barriers standing between the players and the players’ immersion. The research into those barriers acts as a part of the foundation of this study, since it allows the paper to expand upon their following arguments -

"Removing these barriers, however, only allows for experience and does not guarantee immersion... In many ways, the barriers to immersion act to define and scope the level of involvement with the game."

Furthermore, Bastos et al. described seven possible immersive features [3] and created a game based on some of them, to investigate how they impact the overall feeling of immersion. In addition, numerous research articles and papers investigated immersion as a whole but when it comes to looking into specific immersive features, and how they relate to each other, the research is lacking. Ermin and Mâyra also suggest that future work should focus on the aforementioned area and argue that further research in immersive features is crucial to fully understand immersion as a whole [8].

1.3.1. Flow. Csikszentmihalyi has made extensive research in the area of flow [9] and described it as an optimal experience, in which individuals can be so involved in an activity that the entirety of their attention is devoted to that one specific moment. Csikszentmihalyi divided flow into eight components: clear goals, high degree of concentration, loss of the feeling of self-consciousness, distorted sense of time, direct and immediate feedback, balance between skill level and challenges, sense of personal control [10]. When pinning the definitions of flow and immersion against each other there is an apparent overlap in the sense of how both of them are time distorting. In other words, immersion is described as a precursor for flow due to the sense of being involved in such a way that nothing else seems to matter. However, flow is expressed as an optimal experience i.e a specific amplified experience whereas immersion is not required to [4].

In addition, Weibel & Wissmath also touch upon the role of flow in computer games concluding that flow is important for immersive experiences in computer games and argue that games seem to be ideal to induce flow as an immersive feature. Weibel & Wissmath also found that flow can directly influence enjoyment and performance [6].

Another research, about flow in games, was conducted by Cowley et al. and it was found that a well balanced game can produce an ongoing cyclic balance between new challenges and already acquired skills [11]. This balance will be discussed further in the paper later on.

Figure 1. Csikszentmihalyi’s theory

Flow is the most ambiguous immersive feature discussed in this thesis due to the overlap between it and immersion. Flow, in the context of good games, can be described as the golden middle between challenges and abilities; a game is not challenging to the extent that players feel anxiety and not trivial enough to cause boredom [9]. Therefore, when this paper takes note on flow as an immersive feature it strives towards the aforementioned middle ground.

Flow was implemented in the artifact with Csikszentmihalyi’s theory in mind, where he brought the topic of how flow is the sense of control or as the lacking sense of worrying about losing control. The sense of control in a game comes from the fact that it follows a specific set of rules. Then the rules form a logic the players subconsciously agree upon, and in return the players expect the game in question to abide by those rules. Therefore, in the test, where flow is meant to be turned off, the initial rules are broken by removing some and adding new ones. In addition, Csikszentmihalyi argues towards the importance of having a clear goal and this theory is also exploited to break the flow in a test case.
1.3.2. Graphics. Moving into graphics in games as an immersive feature Bastos et al. emphasized on impressive graphics as an enhancement to immersion. All in all, the paper argues that graphics must be credible when seeking to achieve the feeling of presence and that bad graphics may break the immersion in a game. In addition, Bastos et al. argued that good graphics is important for immersion and found that gamers considered suitable graphics as a fundamental feature to feel a heightened level of involvement in a game. The study of Bastos et al. showed that the graphics must be relevant to a game, however, not necessarily good in a sense of realism [3].

The same conclusion is supported by another paper as well: Haywood and Cairns conducted an experiment where they looked at how children respond to an interactive museum. Haywood and Cairns showed that meaningful graphics is extremely important for immersion, but also that the preferences in graphics is subjective on a case by case basis, where the various children showed appreciation for different graphics [2].

However, Janette et al. used tetris as an example of a game that can invoke the immersive feeling despite its lack in graphical elements. The paper then moves on to argue that even games with simple graphics, similar to that of tetris, can get a player to be deeply immersed [4].

On the other hand, Cheng and Cairns contradicted the aforementioned studies arguing that in some cases this is not true. This was shown when Cheng and Cairns conducted an experiment in which they altered the graphics at a certain point in time and changed the environment from a realistic to a cartoonized style. The conclusion was that the change in graphics is not enough to break the feeling of immersion [7].

This paper implemented immersive graphical features in its artifact with Bastos et al. and Haywood and Cairns ideas in mind. The graphics in the artifact are fairly simple and kept to a minimum for further ease in controlling it. The graphics follow a futuristic theme with bright, neutral neon light colors (mainly blue and white). By having neutral colors the artifact can easily communicate with the players through visual cues, in this case sudden changes in colors at points of interest.

1.3.3. Fear. Juul discussed the element of fear in games [14] but focused on the fear of failing rather than fear per definition, where he found that the player naturally does not want to fail, ergo, there is a generalization saying “players fear failing”. Furthermore, Juul found that failing makes the player reconsider his strategy and the process of winning provides gratification, but more interestingly that winning without failing leads to dissatisfaction [12]. In addition, Juul wrote about the paradox of failure in games, where people in general fear the failure yet seek out games for their challenge. Despite the likelihood of a player experiencing failure, an experience people tend to want to avoid, success has the potential of becoming bitter-sweet if the road towards it lacks a moment of failure. Juul also mentioned fear as a way of controlling the player’s actions and to force the player to adapt his behaviour in order to succeed in a game [13].

In the artifact fear is based on Juuls theory regarding the fear of failing; this is done with both enemies and the structure of the levels. The levels are built in such a way that they are easy to learn but hard to master ergo the players understand the objectives of the level, however, they will fail a couple of times before finishing the artifact. To further invoke the fear of failing there is a never ending swarm of enemies and the players will have a constant fear of getting knocked off the map or even killed from a health depletion causing an entire level to reset.

1.4. Contribution

This paper contributes to the study of immersion in games by:

- Presenting an analysis of three immersive features.
- Testing immersive features, previously only tested separately, together.
- Providing a deeper understanding of the importance of various immersive features when creating a game.

2. Method

The method’s process followed a Design Science Research Methodology [14] (from now on DSRM). DSRM is a research methodology following a process including six steps, and is used to create and evaluate IT artifacts with the purpose of solving a specific problem [15]. The process of DSRM involves the following steps [14]:

1) **Problem identification and motivation:** The first step is to define a research problem and to justify the value of a solution. The problem definition will be used to develop an artifact that can provide a solution.

2) **Objective of the solution:** This is the step where one connects objectives of a solution to the problem definition and also determine what is possible and feasible. These objectives can be either quantitative or qualitative.

3) **Design and development:** In this step one creates the artifact, this includes: resolving its functionality and developing it.

4) **Demonstration:** In this step the artifact’s ability to solve one or more instances of a problem is demonstrated using an appropriate activity e.g. case study, simulation, experimentation etc.

5) **Evaluation:** In this step the paper measures how well the artifact supports a solution to the problem. This involves comparing the objectives of a solution to the actual observed results from the demonstration.

6) **Communication:** In the last step the problem is communicated and its importance as well as the artifact as the suggested solution.
With the above mentioned approach this paper aimed to design three different immersive features in the artifact, and in turn test their design leading up to the final presentation of the results.

2.1. Method description

The goal of this study was to explore three immersive features to understand how they relate to each other. This was done by developing the artifact that was built around the three chosen immersive features (flow, graphics and fear). Due to the research process being built upon the DSRM meaning; the paper followed the six steps as defined and explained by Peffers et al [14]. Furthermore, below is a short description of how that methodology was utilized:

1) **Problem identification and motivation:** Immersion is described as an important element in good games, where previous work suggests that different immersive features have an impact on immersion [3]. Research has been done to understand how these features work [5] [6], however, the subject of how they relate to one another is still an unexplored area. By narrowing the scope down to three immersive features, and comparing them to each other, the paper can contribute to the area of concern by exploration.

2) **Objective of the solution:** The range of immersion in games is too wide to take on at a deeper level all at once and is not a feasible approach. However, by limiting the scope to a restricted amount of immersive features, the paper can still contribute to the research field. Therefore, the first objective was to determine the limitation of said scope and to establish what immersive features could fit into it in order to provide with enough data. Since this research has not been done before there was also a need for a dedicated testbed (the artifact), and it needed to be built by following the outlines of the chosen immersive features done by related work. Using related work as foundation to the artifact provides a stable start for a deeper exploration into the intended area of research. This would expand the possibility of providing more knowledge with the potential of bridging the gap between flow, fear and graphics.

3) **Design and development:** The third step entails the process of translating the immersive features into game mechanics. Once the artifact was built, with the core game mechanics established, it was ready for testing. Lastly, what was left to do was to formulate a questionnaire and an interview template that would provide with the answers sought after in this study.

4) **Demonstration:** This is when the artifact was played by testers where they got to experience the various instances of it. How various instances of the game is played and how the artifact is demonstrated to the player are elaborated in the artifact section.

5) **Evaluation:** The study analyzed and evaluated the results found by the artifact which are elaborated in the data analysis section.

6) **Communication:** Finally the result of the work is communicated in this thesis. Through the tests the paper will sum up all the data and communicate the results together with a discussion.

2.2. Literature Review

To get a deeper understanding of immersion a literature research was conducted. Immersion is a wide area, thus, it was crucial to do a literature research to fully understand it. The study was also dependent on the literature research when picking immersive features, since it is based on the results from previous studies to determine whether an immersive feature is viable or not. To find relevant articles this paper defined some keywords that were used to search in various meta search engines: eg. Google scholar, Libsearch and IEEE.

Moreover, the authors of this paper are aware of the fact that some of the referenced studies were published a long time ago. However, more recent studies (based on the same references in this case) are nisched into areas irrelevant to the purpose of this paper. For example, [16] and [17] go deeper into ... and ... respectively and do not bring this study closer to understanding the relationships between immersive features.

2.3. Immersive feature selection

Based on the literature review three features were carefully picked, where, to simplify the selection process, inclusion and exclusion criteria were guiding the process. If more than three features passed the inclusion criteria the selection process would look at which feature was more feasible to provide the most data instead. Additionally, the inclusion and exclusion criteria looked at how a potential feature may affect other features. The inclusion criteria was:

- It had to have a clear potential impact on immersion.
- It had to be implementable and testable in a game.

The exclusion criteria was:

- It could not directly interfere with another already picked feature.
- An immersive feature’s research is not extensive enough to build a solid foundation for an artifact around it.

With the help of the inclusion and exclusion criteria three features were selected and they were the following: flow, graphics and fear. Based on the literature review it was found that these three features could be utilized to make an interesting and enjoyable game in which one could test immersion. Flow and graphics are both suggested by previous research to be fundamental for immersion as a whole and, therefore, it was interesting to this study to see
how they work in contrast to each other in a focused manner. Additionally, the authors wanted to add a feature that has not been extensively explored in the context of immersion and found fear to be an interesting feature befitting an eventful game. Moreover, these features could be implemented in the artifact without interfering with one another.

As a final note to the choosing of immersive features; other potentials did not adhere to the inclusion and exclusion criteria, and were not brought into this study as a result.

2.4. The artifact

The authors built an artifact based on the immersive features deemed as the most important to a game and the core gameplay features of the artifact are the translation from those immersive features, thus, they revolve around:

- Flow as challenging movement.
- Graphics as a graphically logical theme and visual cues.
- Fear where the player can die when facing enemies.

With the aforementioned points as foundation the artifact evolved into a fast-paced first-person shooter, taking place in a minimalist neon-filled sci-fi-themed setting. The player has the simple goal of escaping the world by unlocking a portal taking him to the next level, and this is done by fetching keys spread out on different parts of the map. However, some locations are rather difficult to reach, thus, the player is forced to rely upon a certain set of parkour-like skills. In this sci-fi world the player is faced by a never-ending army of robots trying to kill him, where the player receives a gun to fight them off.

To continue on the immersive features, the parkour skills are used to test the area of flow where the player can exercise mechanisms such as: run, jump, climb on walls and run on walls etc. This provides the player with tools to master which the artifact can in turn use to challenge him further.

Furthermore, the neon lights (the graphics feature) are used to set a theme as well as to show the player where to go, and a short range of different colors are used as visual cues to represent the various things the player can do. For example, red neon is used to represent danger and teal neon is used on walls the player can wall run on etc.

The next topic concerns enemies and how enemies can be a straightforward way of showing fear in a game. Enemies can be easily tuned in different ways to cause the player both stress and boredom, which is why they were implemented to represent fear.

By forming the artifact according to the three specific immersive features the study is able to see a clear divide between the features and is free to create clear and concise test scenarios in each separate area. Therefore, apart from the tutorial, all the levels are seemingly the same with only minor tweaks in different areas testing the immersive features - this was decided in order to achieve fairness in the test cases. Otherwise each test case could be a victim of randomness and potentially generate untrustworthy data.

2.4.1. Flow as a controlled immersive feature. When referring to flow as a feature in a game this paper refers to the middle ground between challenges and skills, in other words the path that leads to a well-balanced game. Thus, it is arguably crucial to give the players control over their character and establish logical rules they can follow. Giving the player control is done by making sure that the controls are working flawlessly and that the artifact has a set of rules that will be followed in its intended state. The feeling of flow will then be intentionally broken by altering with the controls and by pushing the player towards both boredom and anxiety as per Csikszentmihalyi’s model [9]. The alterations were done by changing the map’s layout in a way that made it harder to jump and wall run. For example, the map changes were done by moving walls further away from each other in order to increase the overall difficulty of the artifact. Furthermore, the character controls were altered by changing the friction between the player and the floor to nearly zero; even the slightest input in movement would set the character in a sliding motion unlike before where an input would result in a normal movement. Additionally, the wall run feature has numerous functions supporting the smoothness and response of a run (such as additional sensors looking for a nearby wall and aiming the camera along the wall if there is no input from the player) - these were also turned off. Lastly, the enemies were doubled in order to make the level next to impossible to traverse.

2.4.2. Graphics as a controlled immersive feature. The graphical immersive features rely on the notion that fitting and meaningful graphics are important for immersion [3]. By assuming that this is true the artifact can control immersion through graphics by removing colors, a feature that is otherwise very important for games since a lot is communicated through colors. To further explore the graphical immersive feature of the artifact, it introduced elements to test cases where the graphical feature is deemed to be turned off. The elements are meant to not fit into the artifact and it’s theme; they should not make any sense to the player. Figure 3 shows the artifact with the graphical feature turned on and figure 4 shows it turned off, followed by figure 5 displaying odd objects as an extension to the graphical immersive feature. The pictures illustrate the control of
graphical features through color and misplaced objects.

Figure 3. The *artifact* in its intended state with graphics “on”

Figure 4. The *artifact* when graphics are turned “off”

Figure 5. Example of odd objects in the *artifact*

2.4.3. Fear as a controlled immersive feature. The *fear* feature was implemented through the standard form of computer controlled enemies, making use of simple AI to track down and follow the player. The enemies also have the ability to hit the player when they are close enough and their goal is either to push the player out of the map or kill him. Furthermore, the *artifact* invokes the feeling of danger through the use of environment; the levels have pitfalls that can cause the player to fall off and partly lose the progress they made by being sent back to the beginning of the map. This gives the *artifact* the ability to control *fear* by removing the possibility of falling off the level and, therefore, removing the *fear of failing*. In order to do this the *artifact* first and foremost removed the enemies in those tests. Moreover, the levels were modified with added safety nets in the areas where the player has a possibility of falling off. There is an overlap between fear and flow as immersive features, since the changes made in order to break fear could also break flow. It could be argued that removing enemies would push the player towards boredom e.g. breaking flow. However, removing the enemies when breaking fear is an intention to remove the fear of failing and not to make flow less challenging.

Figure 6. The picture shows how enemies are presented in the *artifact*

2.5. Data collection

The purpose of this study was to get a deeper understanding of *immersion* and to attempt to bridge the gap between three *immersive features* in games. In order to do this three *immersive features* were explored and tested in different combinations to analyze how they were perceived by the player.

Traditionally speaking qualitative researches are a good way of collecting relevant data when testing *user experience* (UX) [18]. Hence, this paper argues for a qualitative research approach being the best way to move forward with the study. Furthermore, other papers [1][2][7] concerning the area are based on qualitative research methods and, therefore, one can argue for the relevancy to base this work on the same method.

2.5.1. Interviews. Each participant played a total of 4 levels and this will be elaborated on in the "Tests" section below. After playing the game the testers participated in a semi-structured interview [19], where they were asked about their experiences. The interview was guiding the focus towards some key areas; questions were circulated around the areas of the three *immersive features* specified for this study (*flow*, *graphics* and *fear*). All three key areas were divided into sub-areas that were more concrete and easy to grasp for the players. The interviewees were asked guided questions about each sub-area, with the goal of getting them to talk about each of the areas freely without too much interference from the interviewer.

The first topic, *flow*, was segmented into controls, challenges and logic. The three sub-areas can be used to describe *flow* as a whole and by using them as the focus the authors got a clear view of how the test subjects perceived *flow*.

When the interview reached the topic of *graphics* the questions were concerning the changes in: visual cues, theme and odd objects. In order to understand how the player was affected by those changes the questions would provide with answers to whether the player was thrown out
of immersion or not, and to what caused the breaking of it if so.

Lastly, the immersive feature fear took the interview towards pressure and the fear of failing. The paper set out to explore how fear associates with immersion and by asking how the players experienced fear in the form of pressure and fear of failing. This was also expanded upon by figuring out how fear was broken in each individual case.

The interviews had a time limit within a span of 20 minutes. Moreover, the interviews were recorded in order for the authors to be able to revisit specific moments and evaluate them again if needed. However, these recordings were not used excessively since the data collected during the interviews were clear enough.

2.5.2. Test. As mentioned each participant played a total of four levels, where the test cases are described in Table 1. Due to the risk of a fixed order to the test cases having an impact on how the artifact was perceived, it was decided to randomize the order they appeared in. The players were also asked to rank the levels they played in a rank based questionnaire [20] after they completed the tests. All tests were held face-to-face; the participants’ experiences were evaluated with a moderator at hand. By doing so the process provided with a deep understanding of what each and every tester experienced. However, this method is very time consuming and restricted the research to a limited amount of people.

<table>
<thead>
<tr>
<th>Table 1. SHOWING WHAT FEATURES THAT ARE ACTIVE IN EACH TEST CASE.</th>
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<tr>
<td>Flow</td>
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</table>

Each test started with a brief presentation of the artifact and how it is played ensuring that game design and mechanics did not interfere once the testing commenced. The testers were presented with a demo-level to familiarize themselves with the controls and how the artifact is supposed to be played before beginning the tests. This gave the testers an understanding of the basics of the game, which was crucial to establish the rules of the artifact - the immersive features could then be broken in the test cases. In addition, questions were asked about the tester to gather information about their experiences. Initially the playtime was estimated to 2-3 minutes per test but the actual playtime became inadvertently longer. However, interrupting the test midway would disturb the data which had to be avoided. By keeping the tests going the testers may have forgotten some details in the early parts of the test. The risk of the data being ruined by stopping the session was deemed higher than leaving some details out with the risk of being forgotten.

After two testers played the artifact it became clear that the levels were harder than intended and as a result the tests lasted longer than expected. Due to the risk of the testers forgetting about their experiences in the earlier tests, the levels were shortened. Although the initial tests were not executed the exact same way as the rest of the tests the study did not exclude them since the data collected from the tests were still viable.

Nonetheless, after the changes the play time per level was still longer than expected since players were dedicated to exploring the whole level before ending it. As a result the testers were given the option to skip a level if it took longer than 5 minutes, however, most of them did not choose that option. There were no further changes to the tests since the testers did not have any problems answering questions subtly directed towards immersion, and the seemingly longer gameplay only enhanced their experience and the data quality in the end.

After the testers played the whole game they did a post-study rating [18, p. 125] where they got to write down their opinions and also answer ranked based questions [20]. Lastly, the testers were asked to rate the levels they played from most enjoyable to least enjoyable.

2.6. Data analysis

The data collected from tests have been as straightforward as possible, allowing for a smooth transition between the results and statistical values. The structured data allows the study to distinguish between what elements caused the players to enjoy and dislike the artifact, in other words, to see in which state it was the most immersive.

The focus in both the questionnaires and the interviews were on how the different levels were perceived by players and if the different tests had varying impacts on immersion. Furthermore, the results from the questionnaires were used in combination with the interviews to get a wider understanding of what features were deemed as the most important for the overall immersion.

To begin with, by using ranks rather than scales, e.g. a Likert-type scale [18, p. 125], the results emerged as numerical answers making them easy to understand and analyze. In addition, the data received from those ranks were inserted into a scoring system, where it in turn was awarded points. All in all there were four test cases, hence, the awarded points had a range from the highest ranking of four to the lowest ranking of one; the most enjoyable level got four points and the least got one point.

Secondly, interviews allowed the testers to talk about their experiences with the artifact and how they perceived the different levels that were played. The questions that were asked in the interviews transpired as binary questions, e.g. “in which test did you feel the most engaged?” or “could you see any differences in between the first run and the second run?”. By guiding the interviews towards keypoints the follow-up questions occurred naturally; encouraging the interviewee to speak freely about the various experiences. Each interview provided comments about the three immersive features and these comments were used to compare the testers’ experiences with each other.
2.7. Scope

This thesis is set out on adding to the bridging of the gap between various immersive features but due to limitation in time the study will only discuss three of these features and how they relate to one another. The decision of having exactly three immersive features seemed like a reasonable amount, and emerged from the following foresight: the amount of different immersive features increase the number of test cases exponentially.

3. Results

The path this study took was initiated by the exploration of immersive features and led to a deeper understanding of the impact on immersion; the process was led by the Design Science Research Methodology \cite{14} (DSRM). DSRM suggests a process segmented into six steps as described in the method section and is a common method to use when the research requires an artifact to be built. This study’s artifact was based on related research in the area of immersion in games and it was built using three immersive features (flow, fear and graphics) as its cornerstones. In addition, the artifact was specifically built to effectively test the selected immersive features in a controlled manner. Control, in the context of this study, means that the artifact had the option to turn a specific immersive feature on or off on demand and this was used to gather data in the form of player experiences.

Data was collected and evaluated from 11 experienced gamers; the qualitative approach helped to get an understanding of how the immersive features were perceived by each individual player. The testers were between 20 and 30 years old and they played games for approximately 15 hours per week. These demographics were sought after since the testers would be expecting a certain experience due to industry standards, and this would lower the chance for a break in immersion to go unnoticed.

Furthermore, each tester got to play a total of four levels (excluding the tutorial) and in those tests there were questions this study sought to be answered. First and foremost, there was a precaution towards distinguishing between immersion and enjoyment. Therefore, there was a need to know which level the testers enjoyed the most and which one they enjoyed the least. As well as in which level they felt the most respectively the least immersed in. However, the results showed the distinction to be next to none; this helps the study to bolster what the testers see as immersion (even though the actual definition differs). In other words, there will be no divide between enjoyment and immersion from the results in this study.

Moving on, as mentioned in the data analysis section the players were asked to rank their experiences and this data was used in a scoring system, where the results were then gathered as displayed in table 2 below. To explain the scoring system further; a level got an accumulated score based on each of its rankings ranging from 1-4. For example, a tester ranked level one as the most immersive giving it a score of four but another tester ranked it as the second most immersive giving it a score of three; the end result between the two would then simply add up to seven.

Going back to the results, most players ranked level one, where the artifact had all features turned on, the highest with a total score of 41 points. Only two players ranked another level higher than level one. Levels two, three and four had a closer spread in amount of points split among them and the testers seemed to have a harder time determining which level was the worst. In the end, level four, where the flow was intentionally broken, resulted in being the least immersive.

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<tr>
<th>Description</th>
<th>Level 1</th>
<th>Level 2</th>
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<tbody>
<tr>
<td>Score</td>
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Two testers rated level four (in which flow was turned off) as the most immersive level. Both of the testers got to play the level as the first test in line and fully committed to conquering it, and spent a substantial amount of time playing the level. One of these players motivated his decision by saying “it is incredibly hard but for me that is fun since i like hard games”, the other player who rated this level the highest motivated it by saying that in this level she felt like she was well balanced and that it, despite being hard, provided them with both a challenge and a fighting chance. Some testers also mentioned that the aforementioned level was where they fully understood the controls, worth mentioning is that these testers happened to get it as their third or fourth test case in line.

Moving on as mentioned in the data analysis section the players were asked to rank their experiences and this data was used in a scoring system, where the results were then gathered as displayed in table 2 below. To explain the scoring system further; a level got an accumulated score based on each of its rankings ranging from 1-4. For example, a tester ranked level one as the most immersive giving it a score of four but another tester ranked it as the second most immersive giving it a score of three; the end result between the two would then simply add up to seven.

Going back to the results, most players ranked level one, where the artifact had all features turned on, the highest with a total score of 41 points. Only two players ranked another level higher than level one. Levels two, three and four had a closer spread in amount of points split among them and the testers seemed to have a harder time determining which level was the worst. In the end, level four, where the flow was intentionally broken, resulted in being the least immersive.

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In the last question the players were asked in which level they felt the least immersed and the results were not as clear as in previous questions. Most testers rated level three and four as the least immersive. Level four was rated the least immersive level by having five people picking this as the one where they felt the least engaged. Almost all of the testers mentioned two reasons for level four being the least immersive with comments similar to: the controllers did not work and all of a sudden the way the artifact was played differed from before, secondly the enemies had too much of an impact and were almost impossible to avoid or kill. People also mentioned that they got frustrated and eventually just gave up since they felt there was nothing they could do. The second least immersive level according to testers was the one where there was barely any risk of failing. Four testers rated this the least immersive and said that it was incredibly boring and, in spite of the fact that the objective of the levels were the same throughout all of them, there was nothing to do in that level. All in all, the testers mentioned two reasons for level four being the least immersive with comments similar to: the controllers did not work and all of a sudden the way the artifact was played differed from before, secondly the enemies had too much of an impact and were almost impossible to avoid or kill. People also mentioned that they got frustrated and eventually just gave up since they felt there was nothing they could do. The second least immersive level according to testers was the one where there was barely any risk of failing. Four testers rated this the least immersive and said that it was incredibly boring and, in spite of the fact that the objective of the levels were the same throughout all of them, there was nothing to do in that level. All in all, the testers who rated this as the least immersive level mentioned that it was too boring. Two testers rated level 2 as the least immersive and said that their immersion was broken due to the fact that the level’s difficulty was too unfair. In general the players said that it felt more like a bug rather than part of a game. Lastly, zero testers rated level 1 as the least immersive and were, for the most part, satisfied with their achievements relative to their efforts. 

Finally, a field in which testers had the opportunity to write down final thoughts about the artifact was included, however, the data collected from the field was discarded since it was not relevant to the study.

3.1. Interviews

After each test a semi-structured interview was conducted and the testers spoke freely about their experiences. As mentioned in the data collection section; interviews were based on key areas with a few questions to guide the conversation towards the immersion topic. Below are sections with results from the interviews divided by the key areas discussed with the testers.

3.1.1. Flow. When talking about flow the interview focused on the elements of the artifact that altered the way the player’s skills were controlled in order to break immersion. One of the first questions asked was whether they could feel any differences in how the different levels were played or if they felt like the levels became more difficult over time; just as progression would proceed in the average game. The testers agreed that in some cases they were pushed way beyond their expected skills, and all players could pinpoint to the exact level and place where this happened to them. Almost all testers mentioned that they felt as though they all of a sudden lost control over their character and that they felt there was nothing they could do. For example, one player said:

“I felt like the game no longer followed the same rules as before and I honestly felt like I was playing a different game or an earlier broken version of it. Pretty soon I felt like there was no use in trying and I just wanted to quit the game”

Another player continues on the same track:

“As long as I understood the rules of the game I enjoyed playing. But in one level, where the rules were no longer followed, I felt like the level didn’t belong to the game and that I was not given the opportunity to practice in order to meet the new challenges that I encountered”

A third player said:

“Level 4 felt faster and harder, I had to change my tactics but it was still too hard”

When asking him about the controls in that level he said:

“I didn’t really notice anything different with them besides that I was faster and slipped around a lot, but now that you mentioned it, I felt like it was harder to run on walls”

When talking about flow in the interviews; 9 out of 11 testers said that they were almost instantly thrown out of immersion when they encountered the level in which flow was broken. All 9 testers who said that they were thrown out of immersion said something along the lines with the quotes above or they felt that something was wrong but could not tell exactly what cause it. One of the two participants who said that they were not thrown out of immersion instead mentioned the opposite of the other players:

“...unfair, yes, but I did not feel like I lost control, it just felt as if the game’s difficulty changed. The level was incredibly hard but not unbeatable, I liked the challenge”

The other one said about the same and both of these players emphasized on how they enjoy extremely challenging games. Both of them played for a substantial amount of time and refused to give up.

Worth mentioning when talking about flow is that some players mentioned the level with no enemies as a relief and the study wanted to know how the players perceived the artifact when this feature was turned off, and if they could spot odd objects that did not logically fit into a game.

The first question asked if they could spot any graphical differences in the different levels. All participants stated the obvious change in color or rather the lack of color in one level. However, the continuation lead to knowing more about what they thought about this level and the interview kept on asking questions how this affected their gameplay, if it made it better, worse or if it did not matter. Many of the participants thought that it was harder to play the black and white level. One tester said:

“...
3.1.3. Fear. The last interview focused on the fear of failing and how this may affect immersion in a game. The questions regarding fear were focused on stress and the fear of losing and having to start over. The aim was to discover how the players were affected by the fact that failing and dying had consequences.

Firstly, the conversation was led towards stress and what caused them to feel stressed or pressured in the artifact. The responses were divided and many mentioned that they, for brief moments, felt stressed in specific places in the levels. One player stated:

“The black and white map made it harder to see what was going on. The graphical changes made it harder to tell the difference between the floors and the walls, they kind of blend together. Other than the fact that this made it harder to play the map I could not see or feel any differences.”

Another player who happened to get level 2 as the first level said:

“I had a hard time understanding the objective of the game and could not really orientate myself in the level but as soon as I understood where the keys were supposed to go I actually enjoyed playing that level. I also had some problem to distinguish whether a wall was runnable or not.”

The predominant part of the testers said something along the lines of the two players above, they first stated that it was slightly harder to play the level and that it was hard to understand what the objects in the level are and knowing what to do. However, almost all tester still found this level to be enjoyable, this is also reflected on in the data collected from the questionnaires, as it is ranked as the second most enjoyable level.

Level 2 also included some odd objects to see whether objects that did not fit the theme broke immersion. When asking the question if they noticed anything weird about the level, besides the fact that it was black and white, only one player (the only player who got to play level 2 as the first level) said that he noticed the palm trees and skulls placed around the level and he said:

“One of the first things I noticed was the palm in the second section of the level but I didn’t think about afterwards, it didn’t seem to have any obvious meaning to the game.”

The other testers did not mention that they saw the odd objects at first but when told about the odd objects most of them had a reminiscence and said that when they thought about it they could recall the odd objects. One tester said:

“...now that you mention it I could recall the skull and the palms but I did not reflect on them so much since they didn’t seem to matter for the game”

This was a common reaction and almost all testers filtered out these objects. But when remembered about them they could say, not only what it was, but also where it was in the level.

Another player felt more curiosity than fear and said:

“I was not really afraid or stressed I was just curious about what happened when you died or fell off...”

When asking the testers about their experiences of stress many of them answered that they at the first encounter with enemies felt a bit stressed. However, as soon as the tester understood that the enemies kept on swarming and how the areas worked like a gauntlet, he then started to adapt and could continue to play the artifact. The curious player above continued:

“... but as soon as I satisfied my curiosity I started to play and accepted the enemies as a part of the game. And by that time it was more of a fear of dying and having to start over.”

Another player said:

“At first I felt kind of stressed by the enemies but after a while I just felt annoyed by them.”

The interview was also led towards the fear of failing as described by Juul [13]. The interview was aiming to know if the player feared dying within the artifact and if so how that affected their immersion. When talking about the fear of failing the players are confirming what juul said. The testers do not want to fail, if they failed they adapted by reconsidering their strategy. Instead, winning provided gratification and winning without failing leads to dissatisfaction [12]. One player sums up fear as the following:

“In the level where there were no enemies I felt bored and when I got to the end I was kind of disappointed, I felt like I accomplished nothing. When there were a lot of enemies in another level I first started to run the same way as I did in the easy level, however, I soon realized that was not going to work and I had to use the environment in order to survive.”

Another player said:

“In the level with an insane amount of enemies I felt like it was impossible at first but after a couple of failed runs I got the hang of it and even though it took a long time to finish the level I felt really happy when I reached the goal.”

4. Discussion

This paper set out to explore three immersive features and how a game could be built surrounding them. Given the resulting findings the three immersive features can indeed be used to build an immersive game experience, additionally the data collected from each of them showed a relative weight in each of their impacts. Thus, the initial purpose
of exploring immersive features, previously only studied separately [10] [4] [13], in combination has proven to be successful. The impact of each of the immersive features have been observed and could help bring the research field further; eg. in moments of time constraint it could be beneficial to prioritize the immersive features that outweigh others.

Presented in this paper are three immersive features developed into game mechanics that can be turned on and off, and are as insulated as possible. However, it is impossible to fully isolate features of a game since it has to work in all instances of it. In other words, even though the artifact was mainly built around three immersive features there are other features that are needed in order to make the artifact function.

First noteworthy finding was that the three implemented immersive features, in harmony with each other, can break down the barriers as described by Brown & Cairns [1] and provide with an immersive experience. However, just as Brown & Cairns argue, it is not guaranteed; a few odd cases show a preference in immersive features deviating from the standard implementation of this study’s game.

The second major finding was that, when breaking down immersion one can see that some features seem to have more impact on immersion than others. This study broke the artifact down into three different immersive features and all three had different impacts on immersion as a whole.

The first, flow, was proven to be the most game-breaking when turned off. Although this is not surprising, since it has been proven on several occasions. Weibel & Wissmath found that flow can directly influence enjoyment [6] and the findings of this paper demonstrates similar. However, it is interesting to the study to what extent breaking flow spoils the gaming experience and how it, unlike other features, could not be overlooked by testers. This might be due to the fact that flow has an overlap with immersion as a whole ergo breaking flow can break immersion despite having other immersive features active. All in all, it would seem as though flow goes hand-in-hand with the overall game design and, thus, becomes the most vital part to all games when it comes to immersion.

The second feature, graphics, turned out to be the least game breaking and despite breaking the feature as far as possible whilst still keeping the artifact playable. Bastos et al. argue that suitable graphics is fundamental in order to feel some level of involvement with a game [3], however, it seemed like, when changing the graphic to not suit the artifact, immersion was not broken as suggested by Cheng & Cairns [7]. In fact some testers even preferred the change over the original graphics. This paper found two things when it comes to graphics as an immersive feature. Firstly, the graphics can be drastically changed without breaking immersion, as long as the changes are not directly gamebreaking eg. making it impossible to play. However, changes in graphics may affect how a game is played and its difficulty. Secondly, once immersion is achieved and odd or unfitting objects (that do not directly interfere with a game) are presented players notice them but filter them out.

The third immersive feature, fear, turned out to be pretty neutral in comparable impact when it comes to breaking immersion and no clear conclusion can be drawn from the data collected in this paper. The results from both interviews and questionnaires were scattered, this could be due to the fact that when collecting data about fear the definition of fear was ambiguous and the testers did not fully understand what was meant by it. However, one can clearly see an overlap between fear and flow in the sense that fear of failing [12] can be used in order to make the challenge greater and force the player to become better. Therefore, one could argue that rather than fear being a separate feature of immersion it could be seen as a tool that can be utilized to control other immersive features.

Finally the authors had the aim to see how these three immersive features relate to each other. One relation has already been established, the one between fear and flow. Furthermore, it would seem apparent that there is a relation between graphics and flow since graphics affected the difficulty of the artifact which means an affect in flow in terms of challenge. However, further research is necessary in order to say something more concrete about the relations between graphics and flow. Limitation in time and resources prevented the authors of this paper to further investigate the relations of the immersive features in the aforementioned case.

5. Conclusion

Immersion in video games is a complex area that needs to be researched further. This thesis contributes to the area by further researching features that contributes to the overall immersion of a game. An artifact was created, tested and evaluated, the artifact successfully tested each feature and the evaluation resulted in a range of comparable data.

Theories from related work have been confirmed case by case, as well as added to in a collective manner. The rest of the conclusion will summarize the collected data.

If this study had time to explore immersion in games further it would expand upon the research into the immersive feature of fear. This paper argues whether fear should be considered an immersive feature or not, and it would rather propose fear to be utilized as a tool to enhance other immersive areas.

On the other hand, the immersive feature of graphics is more elusive in its use where, in this study, it rather became a matter of personal taste. Graphics were more forgiving in the eye of the average player and entire objects taken out of context were completely ignored by most players. However, this area should be expanded upon since there is a difference in the perception between static and moving objects for example, and due to the lack of time this study could not cover all aspects.

Looking back at the immersive feature of flow it became the pivot point to the overall immersion in the artifact. Although, the conclusion of flow being the central part to immersion in all games cannot be entirely drawn it is without
a doubt one of its central parts, and flow supports other areas of immersion as well as holding its own ground.

Moreover, the study would continue to look into additional immersive features to expand upon their relations; eg. purpose, objectives, rewards and audio. Lastly, the full scope would ideally lead the research to finding all the relations connecting all the immersive features, mapping them out for game developers to orientate within.

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