

Motion Control: In control or out of control?

A study about possible changes in gameplay
experience using different mapping of controllers.

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Abstract

To get the player completely immersed within a game is considered to be the holy grail in game development, and something that every game developer is trying to achieve. Gamepads are today's standard input device, which only contribute the basic and minimal forms of immersion. In this study we focus on motion controllers and examine if they enhances the gameplay experience compared with gamepads. We used grounded theory and interviewed people that got to play with both types of controllers and explain the pros and cons of these. The result of the study is that motion controllers can enhance the gameplay and make players more immersed, but only if it lives up to the player expectation. If motion controllers feels unnatural and weird it could break the players immersion. Our study also shows that motion controllers are a part of the future, but it is unclear if it is tied to a specific genre. The results from this study gives a better understanding on the factors that increase immersion for players and how motion controllers could be improved in the future.

Keywords

Gamepad, Immersion, Motion controllers, Virtual reality.

Contents

1	Introduction	5
1.1	Introduction and Background	5
1.2	Problem	6
1.3	Research question	7
1.4	Aim	7
1.5	Delimitation	7
1.6	Outline	7
2	Method	8
2.1	Choice of method	8
2.2	Methods and material	9
2.3	Interview structure	10
2.4	Ethical issue	11
3	Theory	12
3.1	Immersion	12
3.2	Gameplay Experience	13
3.3	Controller mapping	14
3.4	History	14
3.4.1	Previous controllers	14
3.4.2	Present controllers	15
4	Result	18
4.1	Defining the participants	18
4.2	Core variables	18
4.3	Gameplay experience	19
4.3.1	Immersion	19
4.3.2	Movement	22
4.3.3	Enjoyment	24
4.4	Opinions regarding the concept of Motion Controllers	25
4.4.1	Genre	25
4.4.2	Implementation of Motion Controllers	28
4.4.3	Personal thoughts	31
4.4.4	Future thoughts on motion controllers	33
5	Analysis	35
5.1	Analysis and Discussion	35
5.1.1	Gameplay Experience	35
5.1.2	Opinions regarding the concept of Motion Controllers	36
5.2	Conclusion	37
6	Concluding remarks	42
6.1	Critique	42
6.2	Future work	42
	Ludography	43
	Bibliography	44
	Appendix A	47
	Appendix B	48

List of Figures

3.1	The Power Glove	15
3.2	Left: Wii remote, Right: PlayStation Move	17
4.1	Participants Start Hardware Setup	18
4.2	Core variables	19
5.1	Expectation Gap	39
5.2	Expectation and Experience map	40

1. Introduction

1.1 Introduction and Background

Twenty years ago it was more common to develop games in 2D, but today games are more often developed in 3D. Back then it was standard to use mouse and keyboard or a gamepad, today these are still the standard for input devices. Game development have focused on software which are mental and emotional, while science program research have focused on sensory-input hardware. The software approach have become more successful, because it is more popular and cheaper for the users and the developers. Today game developers focus more on the sensory-input hardware then before, and new motion controllers that have become more realistic and more sophisticated, which brings games closer to virtual reality. [Cas05]

A player could with the help of technology forget what reality is and believe that he or she is inside the game. This is called Virtual Reality [AR03]. Partial virtual reality can be achieved with one of the following categories. The first category is output. Output is all sort of information the user is receiving, i.e graphic, sound and story. The second category is input, which is all input data from the user, i.e button pressed and mouse movement. The third and last category is hybrid. Hybrid combines both input and output, such as controllers with force-feedback [New07]. All three categories have more or less evolved with time to enhance gameplay. In Synthetic World, Edward Castronova say this about virtual reality and immersion through output:

"When children play at their little handhelds and when executives fiddle around with games on their smartphones, there's immersion going on, a virtual reality brought about by games rather than devices"

[Cas05]

Gameplay is something that always have been hard to define. Andrew Rolling and Ernest Adams say that defining gameplay without referring to games is like defining the color red without referring to colors. It is common when defining gameplay that one refers to games. Rolling and Adams definition of gameplay is "One or more casually linked series of challenges in a simulated environment" [AR03]. The definition of gameplay by Salen and Zimmerman is "Gameplay is the formalized interaction that occurs when players follow the rules of a game and experience its system through play" [SZ04]. One of many factors in gameplay experience is immersion [Nac10].

Immersion is a technique that is used to remove the barrier between people and their entertainment [Woy08] and is considered to be very important for games [BC04]. Immersion has the ability to draw people in and let them lose themselves in a virtual reality [BC04]. In Andrew Rollings and Ernest Adams on Game Design the authors define immersion as: "The better a game supports the illusion, the more thoroughly engrossed you become, and then the more immersive we say the game is". They also state that to achieve full immersion is the holy grail for game developers [AR03]. Immersion can be achieved either with hardware or software. For a player to get immersed with hardware the sensory-input has to be so good that the player actually believes that the virtual world is genuine. The player becomes immersed with software, if the player is involved mentally and emotionally with the game [Cas05]. When achieved full immersion a person enters the state suspension of disbelief and accept that the game, book or movie is actual reality [Woy08].

Game designer François Dominic Laramée defines the term suspension of disbelief as following:

"All forms of entertainment strive to create suspension of disbelief, a state in which a player's mind forgets that it is being subjected to entertainment and instead accepts what it perceives as reality. . . Interactive entertainment can create immersion in a variety of ways. Games focusing on action, hand-eye coordination, and personal identification between the player and the hero will strive to create immersion through sensory input: realistic visuals, positional audio, force-feedback, dramatic acting, and so forth. Games of strategy will prefer intellectual immersion: information is presented as whole, often viewed from above, and players are fed a constant stream of abstract decisions to make."

[Lar02]

To achieve suspension of disbelief, input and output has to become more immersive. Today there is a new generation of controllers that is trying to become the new standard, just like the gamepad has been for decades. According to Andrew Rollings and Ernest Adams a special controller can become a standard in various ways. One of them is to have a very popular game where the playability is enhanced with a special controller, i.e Dance Dance Revolution [AR03].

Gamepad is a device that uses buttons, sticks and d-pads to control a game, and goes under the definition of Directional Natural Mapping. Generally a gamepad or mouse and keyboard are used when playing games, but there are other controllers such as for the Nintendo Wii, which is using motion controllers. [Cum07].

The definition of motion controllers could vary a little bit, but our definition is simple: If the game device register player movement or position in the real world then it is a motion controller. For example: Wii Remote is a motion controller because it register player movement. Another example: A steering wheel for a racing game is not a motion controller, because it does not measure player position or movement. The steering wheel work more or less like a gamepad.

Today there exist a demand for research on motion controllers, mainly from the gaming industry that has a great interest in knowing if motion controllers enhance the player's gameplay experience [Van10]. From both game research labs and the gaming industry there has been a shift of focus in the research since the introduction of Nintendo Wii. The focus now lay on human computer interaction (HCI) from a user experience perspective. What makes a game successful is one of the main question in the game industry [Nac10]. Nacke state that one of the current research problems for game interaction evaluation is: "what mental processes relate to which experiential constructs and how to measure them." [Nac10]. There also exist research about games in general, most commonly about the negative impacts from gaming, such as the impact of violent content and addiction to playing. One of the research area is to try to understand the gameplay experience and the subjective experience immersion [NL08].

1.2 Problem

How the player is interacting with the game is a big part of gameplay. Today gamepads are the most used input device. Gamepads are only contributing with the basic and minimal forms of immersion [New07]. When a player is controlling an avatar with a gamepad it is hard for the player to become completely immersed with the avatar. There exist a barrier between the player and the game [BC04]. There is a problem that today's input device are not contributing enough to break the existing barriers between the player and the game, and therefore is not enhancing the gameplay experience.

1.3 Research question

Does motion controllers enhance the gameplay experience for players in games in comparison with gamepads?

1.4 Aim

The aim of this thesis is to examine if motion controllers get the player more immersed than gamepads. The aim is also to see if motion controllers as they are today are more fitted for a specific game genre.

1.5 Delimitation

In this study we will only focus on PlayStation Move and Nintendo Wii. The main reason why we are not choosing Microsoft Kinect, Iphone and similar devices is because there exist no or very few games that could be used both with gamepads and motion controllers.

1.6 Outline

In the *Introduction and Background* chapter we present an introduction, which leads to research and a research problem.

In the *Method* chapter we discuss which research method is the most suited to solve the problem in the study. We will describe different methods and motivate why our method is more suited than others.

In the *Theory* chapter we present previous research which is related to this study and how our result could contribute to their study. We will also give a brief history about controllers that could be considered as motion controllers.

In the *Result* chapter we present the result gathered from the executed method.

In the *Analyze* chapter we connect previous research with our result and try to come to a conclusion. We will discuss all the important data we collected and try to generate a hypothesis.

In the *Concluded remarks* chapter we discuss what went wrong in this study and what how it altered the result. We also discuss about future work that could expand our research.

In the *Ludography* and *References* chapters we give a detailed list about our references and games we mention in the study. These chapters are followed with the appendices.

2. Method

2.1 Choice of method

There are two common methods to measure the gameplay experience that the respondents is feeling. The first method is to connect the participant to a system that measures brain waves [NL08] using either electroencephalography (EEG), magnetoencephalography (MEG) or brain-computer interface (BCI) [Reu08]. This method is very detailed in how the participants experiences the game, but that resource was not available for this study. One more reason why this method will not be used is because a similar study were recently made where they measured brain activity with EEG while playing Resident Evil 4 with both a PlayStation 2 controller and a Wii Remote [Nac10].

The second method is to ask the respondent about the possible changes the participant felt using the different controllers in the form of an interview or survey. Since the study is about game experience the most interesting is how the participant experience the gameplay and the possible change using different kind of controllers. A qualitative approaches is the most common method in researching user experience in games [Nac10]. To be sure to get detailed answers a qualitative interview is the most suitable method.

Ethnography is described to be one of the most natural analyse method. The method is used to produce a written account of a particular group or institution or local culture. The data is collected through observations, interviews and questionnaires. Ethnography is a time consuming method because the interviewer has to spend long time in a setting and ask a small number of question to a limited number of people. Ethnography is not suited for this research because it is more about defining sub-cultures in our own society. [Gil05]

Analytic Induction is a method of data analysis, which is based on a scientific research problem. The research problem leads to a hypothesis that explain the problem. After a hypothesis is created the researcher starts to collect data. Every time the data do not agree with the hypothesis, the hypothesis have to be redefined to fit the the data. Collection of data is being made until no new data is disagreeing with the hypothesis. The negative with the method is that the collection of data could go on for a long time. It only takes one interview that is not agreeing with the hypothesis to force a new definition of the hypothesis and a new research period. Because of the risk that the study could continue for a long time, Analytic Induction is not a popular choice for qualitative researcher, for this reason Analytic Induction will not be used in this study. [Bry01]

Glaser and Strauss method, Grounded theory, is one of the most common methods in qualitative research. Grounded theory is used to create a theory, which later could be tested in another research project. In Grounded Theory there is a close connection between the collection of data, analyzing data and the result which make it possible to collect data until the research question is answered and a theory created. The method is using coding, such as open coding, axial coding and selective coding, which means that the key points of the data will be gathered and categorized. In the selective coding a core variable will be created that all the categories relate to. The reason why Grounded Theory is the most suitable analyze method is because it is important not only answering the research question, but also examine what the result is based on and create a theory. [Bry01]

Theoretical sampling is the most common sampling method when using Grounded Theory. Theoretical sampling is a sampling method where choosing data sources that are most suited to develop a theory and compare it to a previous research. [LO02]

Judgement sampling is a sampling methods, where the selection of data source is based on a criteria, such as age. The data source will be selected if an expert thinks it will contribute to answering a particular research question. [Bak02]

Another common sampling method is convenience sampling, which exclude no data sources that are available at that time. Convenience sampling is the most suitable method for selecting participants for this study, because the focus is not about what kind of gaming experience or gender the participants has and because no core variables has been decided. No available participants will be excluded from this study. Convenience sampling will therefore be used as the sampling method. The method discriminant sampling could later be used to validate the theory by returning to the data source that seems to be most suited. [LO02]

A structured interview is an interview where all the questions are decided before executing the interview. With a structured interview the margin becomes smaller that the interviews differ from each other, and therefore easier to compare the data from the participants. A unstructured interview is the opposite to a structured interview, where the questions do not have to be decided before the interview and instead of structured questions are terms used throughout the interview. A researcher may perhaps only ask one question during the interview, and let the participant answer the question freely. A unstructured interview reminds much of a normal conversation. A semi-structured interview is much like a structured interview, but it is more flexible and allow new questions to be asked. Semi-structured interviews will be used in this study because it is suited for this study. With semi-structured interviews the interview could be structured, but still allow the participants to freely answer the questions. The questions will be structured, but the questionnaire can keep asking question if the participant mentioned something that the questionnaire wants the participant to expand and explain. [Bry01]

The two different methods for transcribing described by Oliver et al are Naturalized Transcription and Denaturalized Transcription. Naturalized Transcription is not only transcribing all what the participant said but also include codes for when there is pauses in speech, not spoken activities and similar activities. Denaturalized Transcription is focusing in the informational content of the speech. The authors express that it is often used when using grounded theory, making this the more suitable of the two methods. The transcribing method Denaturalized Transcription will be used in this study. [OSM06]

Three guidelines from Gillhams book Research Interviewing will be used when transcribing the taped interviews. The first one is omitting interjections that do not add any meaning to the transcript. The second is the interview format.: Interviewers speech is printed with bold style while the interviewees speech is printed with regular style. The third and last is appropriate punctuation, which means adding punctuation when transcribing making sure not to alter the meaning of the spoken words. [Gil05]

2.2 Methods and material

The method will be qualitative interviews with participants before and after they play two different games using both gamepads and motion controllers. The games that will be used for this report are from the latest console generation i.e. Nintendo Wii and PlayStation 3. One of the latest motion controller on the market today is Microsoft Kinect. Kinect is still fairly new and there exist no games that use both motion controller and gamepads, so Kinect could not be used in this study. The reason why two different consoles will be used is to ensure that result will be tied to a certain console. In this study the Nintendo Wii will use a GameCube controller as gamepad and a Wii Remote with steering wheel shell as motion controller. Playstation 3 will use a PlayStation Sixaxis controller as gamepad and PlayStation Move as motion controller.

The interview is divided into two parts, one before and one after the gaming session (See Ap-

pendix A). The interviews will be recorded with a sound recording device. This method will provide data about how the participants feels towards the games before and after the gaming session, to examine if there have been any changes. The reason the participants use both motion controllers and gamepads is to determine if there was a positive or negative change in gameplay experience when using different types of controls. The participants will not be observed or asked questions during their gaming session. Interfering with the participants during the gaming session can break their immersion [BKea10]. Each interview is planned to take around one hour to execute. Every participant get to play 20 minutes on each game, 10 minutes playing with the gamepad and 10 minutes playing with motion controllers. The interviews will be performed in two rooms in Department of Computer and Systems Sciences (DSV), Stockholm University (SU). The rooms are 20 m^2 and has a window. Each room contains one table, one 32 inch television and three chairs.

The first room has a Nintendo Wii connected to a television and the second room has a PlayStation 3 connected to a television. When the first game have been played the participants will change rooms and continue playing on the other console. During the game session and the interview no one is allowed to be in the room except the participant and the interviewers.

The participants will play two games of different genres, to later conclude if some genres are more suitable for motion controllers then others. Today there are a lot of casual games that use motion controllers, although there is still a relatively small selection of hardcore games that uses motion controllers. Play test of various games that use both motion controllers and gamepads were made to find two appropriate games for the gaming part of the method. The games that were chosen for this study are the casual game Mario Kart Wii and the hardcore game Resident Evil 5. The reason why these two games were chosen is because they function well with both motion controllers and gamepads.

When the participants are playing Mario Kart Wii they have to play Mushroom Cup at 50cc with a character of the participants choice. The participant can choose to either play all 10 minutes with each controller or stop if they have made up their mind, but only if they have played at least one course with both controllers. When the participants is playing Resident Evil 5 they have to play all of the 10 minutes with both controllers from the beginning of the game without seeing the cut scenes.

Information about the study and request for participation will be distributed at the DSVs open online forum and in a DSV lecture (See Appendix B).

Once the interviews are transcribed the participants will receive an email with the transcribed interview. The participant will then have seven days to review the material and they can freely change, add and remove what they want. After seven days the material will be analyzed.

The coding of the interviews will be made in steps. The first thing that will be done is an open coding where the definition and identification of categories will be made. The second step will be axial coding, where concept and appropriate categories will be created. The third and last step is to find one or more core variables, to which all data will be connected with using selective coding.

2.3 Interview structure

The first part of the interview is to define the participant and how the participant regard motion controllers. The first part has questions regarding gender, age and which gaming habit the participant have.

The second part of the interview is done after the gaming session. In the second part the partici-

pants will explain how they experience the two different genres with the different controllers. The participant will get the same question that was asked in the first part of the interview: “What is your feelings regarding motion controllers?”. This could be used to determine if there have been any changes during the gaming session. The participant will also say if they preferred gamepads or motion controllers. In the end of the interview participants will be asked if they think motion controllers are a part of the future and if they will buy it. The participants will be asked if they have any opinions regarding the execution of the method or if they have anything else to say.

2.4 Ethical issue

All participants in our study will be informed that participation is voluntary and that they can stop the interview at any time and there will be no consequences by doing so. The interviews will be audio recorded and all that is said can be used in the report. When the interview is transcribed the respondents will have a chance to make adjustments and corrections to their statements. The interviews are anonymous to ensure that the respondents cannot be traced. [Ejv09]

3. Theory

3.1 Immersion

To get a better understanding of what immersion really is and the relationship between people and videogames, Jennett et al compare the three main engaging experiences with immersion. The first engaging experience is *Flow*, the state where a person is so involved in an activity that nothing else seems to matter. The big difference from immersion is that flow is more extreme than immersion. A person can be immersed in the game, but still be aware of time and the surrounding. Another big difference is the criteria; just because a person is immersed does not mean that they meet the criteria of flows components, such as clear goals and balance between ability level and challenge.

The second experience is *Cognitive absorption (CA)*. CA is a state where a person is deeply involved with a software through five dimensions, temporal dissociation, attention focus, heightened enjoyment, control and curiosity. The difference between research on immersion and on CA is the research goal. CAs main research goal is to create a greater understanding between users reactions and information technology (IT), and therefore has an attitude towards IT in general. According to Jennett et al immersion research is about: “experience of a particular occasion of playing a videogame”. Immersion is clearly linked to both CA and Flow.

The third and last experience is *Presence*, a term that is not completely defined yet. The first definition of presence is: A psychological sense of being in a virtual environment. The other definition is: A environment that responds realistic to the users actions. The big difference about these definitions are the methods used to measure them. Presence and immersion are often used as synonyms [EM05]. Jennett et al argue that presence is only a small part of the game experience because presence is only a state of mind, while immersion is an experience in time. Games with simple graphics that does not involve presence (non-presence), such as Tetris, can get a player immersed. [JCea08]

Jennett et al study shows a connection between engaging experience with immersion and how it is related to video games. Our study could contribute how games and input could enhance the immersion and gameplay.

Brown and Cairns conducted a qualitative research where they let participants play their favorite game and answer questions about issues of immersion. The result was three definitions of levels that represent involvement by removing barriers between the game and the player. They also state in their result that some barriers can be removed by human activity, such as concentration, while others can be removed by the game, such as the game construction. This means that removing the barriers in the game does not guarantee immersion. The player also has to remove the human barriers by wanting to become immersed. The first level is *Engagement*, in which a part of the barrier is that the players needs to master the controls, at least the main controls. The second level is *Engrossment* were the players emotions are directly affected by the game. The last level is *Total immersion*. Total immersion breaks almost all barriers, such as empathy and atmosphere, which connect immersion to graphic, plot and sound. [BC04] Total immersion is used as a synonym for the concept of presence. [NL08]

With the knowledge from Brown and Cairns study our study could show how barriers could be removed between the player and the game using motion controllers.

In the article “Postmodernism and the Three Types of Immersion” Ernest Adams state that there is at least three different kinds of immersion:

- “Tactical immersion”
- “Strategic Immersion”

“Narrative Immersion”

Tactical immersion is the kind of immersion that is common in fast action games where the player have to make quick decisions, otherwise there is a risk that the player will break the immersion. To achieve tactical immersion the game has to have simple challenges that allow the player to solve them fast. Ernest Adams state that it is what people sometimes call “in the zone” or “in the groove”. *Strategic Immersion* is the kind of immersion where the player get immersed by a mental challenge in a strategic decision. In Chess the player is only interested in trying to find the best move and therefore is focusing all the brainpower to find the solution. *Narrative Immersion* is when the player is being immersed by the narrative and start carry-ing about a character. This is the same kind of immersion one gets from books or movies. [Ada04]

3.2 Gameplay Experience

In Pine and Gillmores book “The Experience Economy: Work is Theatre & Every Business a Stage” they categorize different types of experiences with two dimensions: participation and connection. Participation can vary from active to passive, while connection can vary from absorption to immersion. Absorption is the opposite to immersion and means that instead of being apart of an experience, it is referring to an experience that is brought to mind. There is four realms of experience, which all can be defined with these two dimensions:

“Aesthetic (immersion and passive)”

“Educational (absorption and active)”

“Entertainment (absorption and passive)”

“Escapist (immersion and active)”

[IG06]

With these categories Ermi and Mäyrä categorized gameplay under the escapist category. [EM05]

There is different elements of games and gameplay that is used to define a large group of people. This is done so that developers can easy define what kind of game they are making and who their target audience is. Core gamers, a synonym for hardcore gamers, is the type of gamers that define games more than just light entertainment. Core gamers are more willing to spend time and money on games then casual gamers. A casual gamer is a player that play games just for the sheer enjoyment. One of the big difference between casual and core gamers is that core gamers tolerate frustration and will keep trying until they win, casual gamers on the other hand would stop playing. [AR03]

With the definition of casual and hardcore gamers, our study could categories players and examine if motion controllers suits better for one type of players.

Nacke conducted a research in 2010 where he measured the brain activity while participants were playing a hardcore game, Resident Evil 4, with both a gamepad (PS2 controller) and a motion controller (Wii Remote). His study contained of two methods to receive data from the participant, measure brain activity with an electroencephalography (EEG) and with a short version of a game experience questionnaire (GEQ). His results were an increase in delta power when participants were playing using the Wii Remote. Nacke stated that this was surprising because delta power usually indicates sleep and drowsiness. One of the reasons why the delta power was so high in general could be because of the hardcore players. The result showed that the hardcore players did not have to concentrate that much when playing with the Wii Remote. He also found out that the participants that have been playing Resident Evil 4 before but another version showed increased beta power, which indicate information process because they had to

learn the controllers. In their conclusion they demonstrate that the use of EEG spectral power and survey measuring can be used to get a greater understanding of gameplay experience from a cognitive processing perspective. [Nac10]

The research Nacke conducted showed that there were different brain activity with different types of player, such as casual and hardcore, and with different types of controllers. This study is very closely related to our study because our study focus on comparison between different controllers, game genres and gamers. With our study we continue to examine why there occurs different experience with different types of gamers and controllers.

3.3 Controller mapping

In the article “Mapping the road to fun” the authors define three types of control mapping:

“Directional Natural Mapping”

“Kinesic Natural Mapping”

“Realistic Tangible Natural Mapping”

“*Directional Natural Mapping*” is basic controllers that do not use any kind of motion detection. This includes all kinds of gamepads. “*Kinesic Natural Mapping*” is a mapping that use no handheld devices and is using the player’s body to control the game. This includes EyeToy and Microsoft Kinect. “*Realistic Tangible Natural Mapping*” is a mix of the two earlier groups. This includes controllers such as Nintendo Wii remote and PlayStation Move. [SLea07]

3.4 History

3.4.1 Previous controllers

Motion controllers are far away from something new, in fact they have quite a long history. This is a brief history of controllers that leads us to today’s motion controllers.

Light gun

The first controller that could be defined as a motion controller was the light gun and first appeared in the 1930s [New07]. When using the Light gun the player had to aim at a target on a screen and fire. There have been many versions of a light gun, but one of the most famous is Nintendo’s “NES Zapper” that was first released in Japan 1984. The “NES Zapper” was not Nintendo’s first try when it comes to light guns. In 1973 Nintendo created a light gun game called “The Laser Clay Shooting System”. The game was based on their previous toy, Beam Gun, that had been released two years earlier. Just like the Beam Gun, the guns in the “The Laser Clay Shooting System” used a solar-powered light gun.¹

Le Stick

Three years before Nintendo released the “NES Zapper”, and 25 years before they released Nintendo Wii a company named DataSoft created the motion controller Le Stick for home consoles. Le Stick was formed as a short stick and only had one button, which was placed on top of the controller. Le Stick used mercury to detect player movement and was designed to be compatible

¹<http://nintendoland.com/consoles/toy/history.php>

with both Atari 2600 and Commodore 64. Since no games were designed for Le Stick and the video game crash came two years after its release, this product was short lived. ²

Dance Pad & Balance board

The Dance Pad, also referred to as Dance Mat, is one of the biggest successes when it comes to special controllers. A Dance Pad is a large square that consist of nine small pads that reacts when the player is standing on them. The Dance Pad is particularly popular in arcade games such as “Dance Dance Revolution” and “Pump it up”.

The Balance Board contains pressure sensors that measures the balance point of the player. One of the most famous balance boards is Nintendo’s Wii Balance board, that was released in 2007. The main idea about Wii Balance Board was not just about playing games, but it was also about getting exercise and become more healthy.

Power glove

The Power glove (See figure 3.1) was developed by Mattel in 1989 for the Nintendo Entertainment System. The Power Glove was basically one glove that contained a smaller controller on the top of the arm. It also measured finger bending and hand position using ultrasonic transmitters. The Power Glove was compatible with many games, but did not work as well as it was supposed to and it made the developers go bankrupt [New07]. In 2006 the game website IGN ranked the Power glove as the seventh worst game controllers throughout time [Har06].



Figure 3.1: The Power Glove

EyeToy

The EyeToy is a camera that recognise colours and movement. EyeToy allowed players to interact with games that were designed for it, without holding a controller. The EyeToy was developed by Sony Computer Entertainment and was released in 2003. In the end of 2003 the EyeToy had sold more than 2 million units in Europe and 400,000 in the UK [Pha04]. The EyeToy was the predecessor to PlayStation Eye for the PlayStation 3 which was released in 2007.

3.4.2 Present controllers

Motion controllers that exist today in the market are Nintendo’s Wii Remote, Sony’s PlayStation Move and Microsofts Kinect.

²<http://classicgames.about.com/od/consoleandhandheldgames/p/LeStickProfile.htm>

Nintendo Wii

The Nintendo Wii was released in 2006 and first went under the code name “Revolution”. The official Wii website explained the change of name: “Wii sounds like “we,” which emphasizes this console is for everyone. Wii can easily be remembered by people around the world, no matter what language they speak. No confusion. Wii has a distinctive “ii”” [Car06]. The main focus of the console, unlike its competitors, is not really on the graphics but rather on the controller³. The Wii controller is named Wii Remote (See figure 3.2) and includes a three-axis motion sensor. The Wii Remote also has regular buttons, which allows it to be used as a regular gamepad⁴. With the Sensor bar that comes with the Wii, the Wii Remote could also be used as a pointing device⁵. Around one and a half month after its release, in the end of 2006, the Wii had shipped up to 3.19 million units worldwide⁶. Four years later, at the end of 2010, the Wii had shipped 84.64 million units worldwide⁷. In the middle of June 2009, Nintendo released an expansion to their Wii Remote with the name Wii MotionPlus. The expansion is connected into the Wii Remotes jacket. At the end of June MotionPlus had sold nearly 374,000 units in the U.S. alone⁸.

Microsoft Xbox 360

In late 2001 Microsoft released their first gaming console the Xbox. 2005 came its successor, the Xbox 360. In June 2009 Microsoft announced its motion controller Project Natal. It was released in November 2010 named Microsoft Kinect. Using kinesic natural mapping it has a 3D camera that registers movement. Unlike Nintendo Wii and Sony PlayStation Move the player does not need a handheld controller [Tak09]. In the first sixty days Kinect sold 8 million units to stores [Tho11].

Sony PlayStation

Sony got into the gaming industry by being contracted by Nintendo to develop a CD-ROM expansion to a Nintendo console but there was an argument about the revenues and in the end Sony released their own console⁹. The PlayStation was released in late 1994 and it was the first console that sold over 100 million units¹⁰. Its successor, the PlayStation 2, has sold over 150 million consoles¹¹. The latest console from Sony up to date is the PlayStation 3 and it was released in November 2006. Motion controllers for the PlayStation 3 is named PlayStation Move (See figure 3.2) and was released in 2010. It uses the PlayStation Eye to determine the position of the wands (controllers) position and has inertial sensors in the wand that detects its motion [Sin10]. In sixty days PlayStation Move sold 4.1 million units to stores [McE10].

³<http://wii.ign.com/launchguide/hardware1.html>

⁴<http://nintendoland.com/History/Hist2.php>

⁵<http://web.archive.org/web/20080212080618/http://wii.nintendo.com/controller.jsp>

⁶<http://www.nintendo.co.jp/ir/pdf/2007/070125e.pdf>

⁷<http://www.nintendo.co.jp/ir/pdf/2011/110127e.pdf>

⁸<http://ds.ign.com/articles/100/1004768p1.html>

⁹<http://www.next-gen.biz/features/the-making-of-playstation>

¹⁰<http://www.scei.co.jp/corporate/release/pdf/051130e.pdf>

¹¹http://www.scei.co.jp/corporate/release/110214_e.html



Figure 3.2: Left: Wii remote, Right: PlayStation Move

4. Result

4.1 Defining the participants

The participants consisted of nine males and one female in ages ranging between 21 and 38 years old. Four expressed their gaming habit as hardcore, three expressed themselves as casual gamers and three somewhere between casual and hardcore. Seven out of ten participants plays video games a couple of hours every day, two out of ten are playing in periods and one of ten plays four to five hours each week. All but one of the participants has a game console in their home and all of them have tried motion controllers prior to this test. Seven of the ten participants own some kind of motion controllers. Half of the participants started with the casual game while the rest started with the hardcore game. Two participants that started with casual game started with gamepad, while the rest of the participants that were playing the casual game started with motion controllers. Three participants that started with the hardcore game started with a gamepad, while the rest of the participants that were playing the hardcore game started with motion controllers. (See figure 4.1)

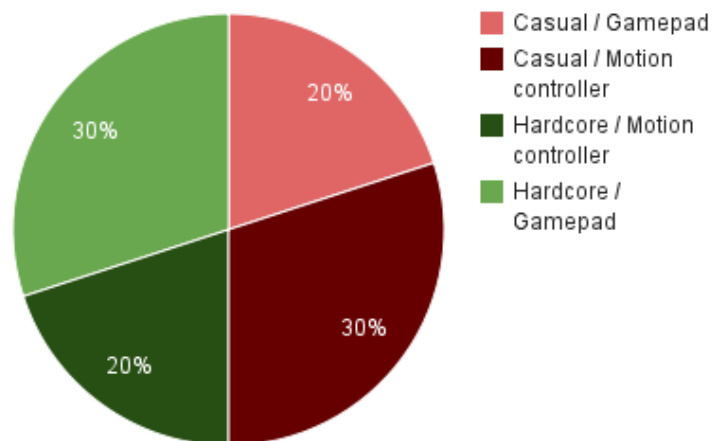


Figure 4.1: Participants Start Hardware Setup

4.2 Core variables

In this study there are two core variables (See figure 4.2). The first variable is “Gameplay Experience”, which is focusing on how the players experience the gameplay. The first variable consist of three categories; “Immersion”, “Movement”, “Enjoyment”. The second variable is “Opinions regarding the concept of Motion Controllers”, which is focusing on the personal thoughts about the concept of motion controller in general. The second variable consist of four categories; “Genre”, “Implementation of Motion Controllers”, “Personal thoughts”, “Future thoughts on motion controllers”.

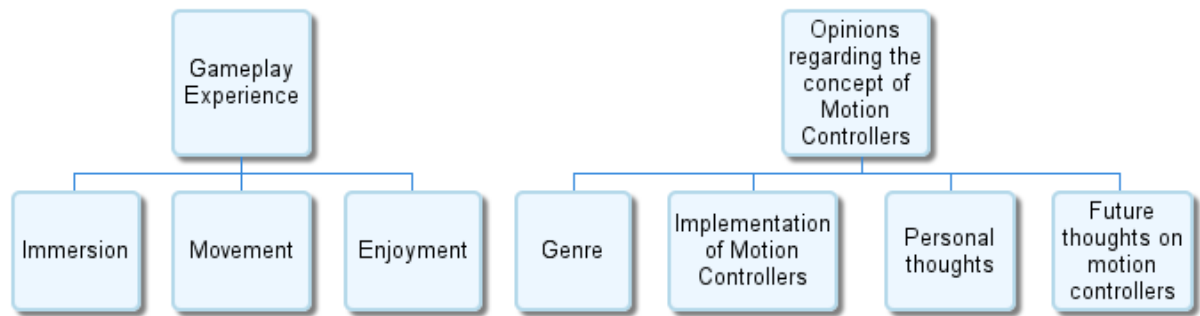


Figure 4.2: Core variables

4.3 Gameplay experience

4.3.1 Immersion

Participant 10 talks about the first time the participant tried Wii Sports and how intuitive the motion controllers were:

"It was very natural, when I loaded Wii sports and played tennis, of course the difficulty level is set accordingly also, but it works. It requires no training."

This was confirmed by two other participants (6,7) after they had played Resident Evil 5. Participant 7 said like this:

"It was positive that it felt more intuitive than the gamepad."

Participants 10, 6 and 7 thought that motion controllers are more intuitive but on different genres. Participant 10 is not saying anything about if motion controllers is more intuitive in Resident Evil 5, and participants 6 and 7 is not saying anything about if Mario Kart Wii is more intuitive. Participant 2 felt different about the intuitive feel of the motion controller, this is what the participant said regarding of the use of motion controllers in Resident Evil 5:

"Main negative was that it felt so non-intuitive. In one of those games I would like to be able to check and spot all the time with the motion controller. It feels so strange. It didn't feels so good to look around with the controller you use here. It gets too jumpy and weird. I thought the motion controllers would be much nicer than what it was. I really hate to use a gamepad in the first-person shooter, but it was even worse with motion controllers."

Participant 9 do not agree with either participant 10, 6, 7 or 2 and thinks that it is the same no matter what controller the player is using:

"I don't think there is much difference. If someone who never played before it would probably take as long to learn how to use motion controllers as gamepads."

Participant 2 said this about the difficulty and feeling after playing Mario Kart Wii:

"In Mario Kart Wii the motion controllers are easier. It feels like you get more feeling in the controls than what you would get with a analog stick."

Participant 6 said the opposite about the difficulty but agrees that there were more feeling with the motion controllers:

"It was fun, it was harder and I got more immersed with the motion controllers. Because it became more difficult so it was fun, because I thought it was too easy with the gamepad."

Both participant 1 and 8 agrees with participant 6 on the difficulty. Participant 1 express it like this:

"A little more fun. It gets a little bit harder, because the game has a relatively low severity. It gets a little harder to use motion controllers, you make more mistakes. It becomes somewhat more fun in that game."

Participant 8 said it like this:

"more party feeling and fun with motion controllers in Mario Kart but harder."

Participant 4 said this about the steering wheel in Mario Kart Wii:

"Positive is that you feel like you are holding a steering wheel, it's a positive feeling. One can imagine that it gives more depth. It gives a good connection between driving a car and that you are holding a steering wheel in reality, there's a good feeling in it."

The participant thinks that because there is a natural representation of a real world action in the game it is a positive feeling and that it gives more depth. Participant 9 do not agree with participant 4 and said like this when talking about the same game:

"I imagine that if someone is new and plays with a steering wheel it can feel natural, but for me it's just weird. I'm used to sit relaxed with the Gamecube control. With the steering wheel you have to sit focused and I had to strain myself more, but it's probably just getting used to..."

The main reason why it feels weird for participant 9 is because the participant are more used to a gamepad then motion controllers. But the participant express that it feels more like driving a car in real life. Participant 4 continue saying this about modifying the controller:

"It enhance the feeling a bit, when modifying the controller to a steering wheel or in Move to aim with the gun, rather than just having a controller in your hand. It makes it easier to get into the game."

Participant 4 is saying that if the controller feels or looks like the thing the avatar is holding it gets easier to connect to the task of the game.

Participant 9 described how the participant became immersed with Resident Evil 5:

"I felt more one with the avatar. Because it felt somehow that I could determine more about how to behave, I am accustomed to a gamepad and played with it a lot, now I had two controllers so it felt like I am this character much more in a way... ..I got the feeling that my left hand controlled the characters left hand."

The participant is expressing that since there was one controller in each hand the participant felt more connected in a physical manner to the avatar.

When asked if motion controllers enhance gameplay participant 6 responded:

"...it became a bit more immersive."

While participant 7 said it enhanced a bit in both games they tested.

Participant 3 said this when asked about its opinion on motion controllers after the game test:

"It lacks tactile feedback, so when I try to chop a zombie with my machete in Resident Evil 5. I do not notice if I hit or miss, even though my arm is out there and should chop Zombie, it's quite airy."

The participant is saying that because there is lacking feedback from the controllers one have a hard time to know what the outcome of the action performed were.

Participant 3 said like this about the effort by using motion controllers:

"The more effort for each input the feeling gets worse."

4.3.2 Movement

Participant 10 said this about natural movement before the gaming session:

"For certain types of games, they bring very much, as soon as you have a natural movement. It's no coincidence that sport games and that sort of games are very popular."

Later when reflecting on Resident evil participant 10 said:

"Some of the movements with the knife and when aiming with the gun felt more natural, it might feel even more natural if you used the index finger to shoot... ..with the motion control it was more natural to choose when you wanted to chop[with the knife]."

Participant 10 before the game session thought that motion controller is more for a certain type of games, and this is confirmed by himself after the game test. According to participant 10 Motion controller bring much to gameplay as long it is a natural movement in real life that is mapped to the game. Participant 5 said this when talking about the feeling when using motion controllers in Resident evil 5:

"It felt much more natural with motion controllers. Especially with that they had divided it. When using knife movements or break out when you have a zombie on you felt very natural to dismiss him using the controllers by waving rather than to sit and move around on a stick."

What the participant is explaining is that it feels more real because of the motion in real life represents itself well in the game world which is similar as what participant 10 express.

Participant 3 said this about Mario Kart Wii:

"The positive with the Wiimote was that when you throw in different directions to do tricks when you jump it felt more natural"

Later the participant stated this about Resident Evil 5:

"That you reload by waving frantically with the control is totally useless, for me to reload is a controlled substance which I usually do when I take it easy. It doesn't feel like a waving danger act anyway"

Participant 3 is saying that motion controller is positive when it feels more natural and is in the right context. Participant 7 said this when asked about motion controller in Resident Evil 5:

"It was a bit easier to aim and to control the character."

Both participants 4 and 9 said that it is a strain to keep up their arms when using motion controllers. Participant 4 stated it like this:

"There is little negative to hold up his arms all the time. You might get a little bit tired to keep up your arms, so I had my arms down on my knees, for it becomes a pain to keep them up."

Participant 9 agreed it by saying:

"With the wheel you have to sit focused and I had to strain myself more, but it's probably just getting used to."

4.3.3 Enjoyment

Before the gaming session were started participant 9 said what is fun with motion controller but also stated what is boring with motion controllers:

"It's fun, I think it's good, I mean "why not?"... ..When playing Soul Calibur with motion controllers, it was really boring because it was the same movement all the time."

The participant believes that a good concept can also go wrong if it is done poorly, such as this example then the movement is repeated too often.

Both the participant 7 and 10 said that they thought motion controller to the Mario Kart Wii were fun. Participant 8 and 9 thought that gamepads were more fun in Resident Evil 5. Participant 8 said this about motion controllers:

"Nothing was positive about this game. I can't think of anything positive. The negative was that it was too responsive. Move a little with your wrist and it was all over the screen when trying to aim"

4.4 Opinions regarding the concept of Motion Controllers

4.4.1 Genre

Participant 1 said before the gaming session that motion controllers only are a gimmick and expressed it like this:

"I personally see it more as a gimmick for casual gaming and party games. I do not think it fits so well in the competitive tour. They are not precise, they are not developed enough for them to work perfectly so far."

This were also said by both participant 6 and 7 before the gaming session. Participant 6 said this:

"It feels more like a fun thing than something you use when playing for real. It feels like a ploy."

While participant 7 said this:

"It feels like a gimmick. It's fun for a while, but it's more fun to play real games."

Participant 1, 6 and 7 said this before the game test and based this on previous experience. Participant 1 said this after the gaming session:

"Wii have showed that it's fun when you play, it feels more like a gimmick right now though. But all companies seems to invest on it now"

Participant 2 expressed that motion controller are tied to a specific genre but participant 10 said this about motion controllers being for a specific genre:

"I fail to see what you could win with having motion controllers for a strategy game for example, you might not lose anything though."

The same participant later said:

"as long as you can get by with the relatively limited set of buttons that you tend to have then I think they work well."

The participant continue later:

"...game that they fit, they have enhanced the gameplay tremendously, but then there are other cases where they try to tweak too much into the games as they are not designed for."

Participant 10 is saying that motion controller is for a specific genre if the game loses control in some certain game genres, but it does not have to be for a specific genre if the player do not lose precision. Participant 4 agrees with participant 2 and said like this:

"Motion controllers will of course exist, but then it will mostly be games targeted to have these controls, such as flight games have used joysticks a long time for that kind of game. It's so now and it will be so later at the controls will be specific games for them."

Participant 5 and 10 thought that motion controllers enhance the gameplay depending on the game genre. Participant 5 said like this:

"I don't think the serious players will not take it [motion controllers] so seriously. They will not dare to put down the money that it needs to actually test it. They are satisfied with a normal control. But of course, for casual gaming, I think it can stay a while."

The same participant later got a question why it only would suit casual gamers and the participant answered like this:

"It's that you're more familiar with the controls. As a player you have played since the beginning with gamepads, you are accustomed to having just that kind of controllers."

Participant 10 said this:

"...for certain types of games, they bring very much, as soon as you have a natural movement. It's no coincidence that sport games and that sort of games are very popular however, it is difficult if you want a lot of buttons."

and later said:

"I'm very much for strategy games where everything is better on a computer, better resolution, mouse and keyboard. When I play video games it tends to be a bit simpler games like Wii Sports and the likes in which the motion controllers work very well."

Both participants agree that motion controllers enhance the gameplay depending on the game genre. Participant 5 thinks that it is more a casual thing, because it attract new people that is not used to gamepads. Participant 10 thinks that it is depending more on the game if it has natural movement or if it needs many buttons.

Participant 1 thought that motion controllers are fun for the less demanding games:

"I personally think that it is a fun thing for less demanding games."

Participant 5 said this when asked why motion controllers only suited for casual players, and not hardcore:

"It's that you're more familiar with the controls. As a player you have played since the beginning with gamepads, you are accustomed to having just that kind of controllers. But as I said now I'm also accustomed to gamepads, but when I tried Move controllers I was surprised how well they had implemented it in Resident Evil."

Participant 5 believes that if a player is familiar and accustomed to a gamepad, perhaps the player feel no need to try motion controllers. This participant were positively surprised over how well implemented the motion controllers were in Resident Evil 5.

4.4.2 Implementation of Motion Controllers

Participant 4 said this prior to the gaming session:

"It's a great way to have controllers. So it's all up to how the game is. It's cool to see the game move with Kinect, but it doesn't mean anything if the game is bad, or if the software works. Meaning that the hardware is good but the game needs to implement it well to make a great game."

Meaning that the hardware is good but the game needs to implement it well to make a great game.

Participant 5 said this about the hardware in Nintendo Wii:

"As long as it's only the gyro controller it's all satisfactory. But when it comes to infrared detection when pointing to a screen and television, it's hard to keep stable"

The participant is declaring that the gyro function works good but the point function is too sensitive. While participant 7 said the opposite about the aim function when playing Resident Evil 5:

"It was a bit easier to aim and to control the character."

Participant 3 explains what the lack of tactile response means to games:

"I tried the new fencing game for the Wii and it becomes uninteresting after a while because it jumps around and it does not matter if the opponents parry because my character does not react, I just flapp further."

Later the participant confirm the earlier experience when commenting on Resident Evil:

"When I try to chop a zombie with my machete in Resident Evil 5. I do not notice if I hit or miss, even though my arm is out there and should chop Zombie, it's quite airy."

Participant 5 described the Wii Remote used in Mario Kart Wii like this:

"Maybe that was [positive] how the controller was shaped. There was less buttons to keep track of. It's only two buttons on the front and one button on the back. You figured what they were doing quite quickly."

When talking about Resident Evil 5 participant 5 said:

"It took a while to figure out the controls on this, because there are some buttons. It took a while until I knew that the center button was the one you used the most."

Participant 7 experience this when playing Resident Evil 5:

"I believe it can be negative with all the buttons in the beginning."

Participant 10 have a similar opinion on the matter:

"There's controllers with lots of buttons, you can get how much precision you want, but it tends to be too much after a while. It's an advantage that a part of all the controls has been transferred to how to hold the controller."

The participants likes that there is fewer buttons to keep track of and therefore the gaming is less complicated. Participant 2 feels otherwise, this is what the participant said about the Wii Remote:

"The downside is that you feel like you don't have access to as many buttons as easily."

Participant 1 said this about the precision of the motion controllers before the gaming session:

"They are not precise, they are not developed enough for them to work perfectly so far."

Later participant 1 confirmed his earlier statement when talking about the use of motion controllers in Resident Evil 5:

"Precision when aiming is still worse then when aiming with a gamepad"

The participants 5 and 8 said this about the sensitivity of the motion controllers in Mario kart Wii, Participant 5:

"I thought I didn't have enough control. If you turned too much you suddenly lose control, and if you twisted it just a little bit it didn't turn far enough. You didn't really have good sense on how far you could turn."

Participant 8:

"It was too responsive, it was difficult to make small turns to parry, it turned a lot."

While two others, participant 7 and 10 had the opposite opinion, participant 10 said this:

"It demanded much movement to react. It was necessary to move the wheel more than I thought it should have."

Participant 4 also had some problems with the sensitivity of the motion controller:

"Then I felt a bit that I had some problems with the motion of the wheel was either too much or too little so that it twisted to one side of the control of the car would go sideways, it became too much so that when you pull back a bit to compromise. It was not so very precise, it was not really specific as it was with the other controller."

Participants 6 and 8 said this about the sensitivity on Resident Evil 5: Participant 6 said:

"It was really hard to aim when I shoot zombies with motion controllers, it was a little fluttering."

and participant 8 said:

"The negative was that it was too responsive. Move a little with your wrist and it was all over the screen when trying to aim"

Many of the participants felt that the sensitivity is either too low or too high.

Participant 5 and 10 had opinions on the camera control with the motion controllers, participant 5 said:

"I also like the camera control a lot more with the motion controllers."

Participant 10 expressed it like this:

"I couldn't really control the camera with the motion controllers, it was easy with the gamepad... ..It followed very well but when you stood at a height, I could not look down"

Where participant 5 likes the camera movement at a whole, participant 10 likes some of its features but is not satisfied with it as a whole.

Participant 5 when asked about opinions on if motion controller enhance gameplay:

"Depending on the type of game and the narration and everything"

4.4.3 Personal thoughts

Participant 2 had already tested Nintendo Wii before the gaming session and thought it was impressive. Participant 8 did not have the same opinion and said that nothing had impressed so far, at least what the participant have seen.

Four participants (1,2,3,8) did not think there were anything positive with motion controllers compared with the gamepad in Resident Evil 5. Participant 1 said this:

"For me personally, not much more positive than a gamepad in that particular game."

Participant 2 said this:

"I didn't think it were anything positive with it. Main negative was that it felt so non-intuitive."

Participant 3 said this:

"Quite a lot negative, and nothing positive I think."

Seven of the ten participants (1,2,3,4,6,7,8,9) preferred gamepad over motion controllers. Participant 2 explain why gamepads are preferred instead of motion controllers:

"Gamepads because it can be used for everything, while the motion controls feel more limited."

Participant 8 said:

"Gamepads, I thought it was hard to sit with the motion controllers, I'm one of those who is playing longer than 10 minutes. I think that I would quickly get tired of flapping your arms and drive a car in the air.."

Participant 2 thought that motion controllers is hyped and said this:

"A little over hyped, but still a fun thing."

4.4.4 Future thoughts on motion controllers

Participant 1 believes that motion controllers has a positive future:

"... all companies seems invest on it now. Both Move and Kinect has cost much money, Wii developed Wii MotionPlus. There is no reason why it would go away when you've invested so much money on it. I also think that people appreciate it. Most people probably think it's fun."

Participant 1 is not the only one who believes that motion controllers are a thing of the future. Participant 2,4,5,7,8 believes that motion controller will be a thing in the future, but that it will be tied to a specific game genre and that it will not replace gamepads. Participant 2 answered like this when asked the question if motion controllers are here to stay:

"Yes, maybe. It's hard to say. I don't think they will replace all other controllers, I think it is more tied to specific game genre. I think they will continue to exist in various forms, but I do not think they will replace the gamepad."

Participant 4 said this when asked about the same question:

"I think that far in the future that it [Motion controllers] will be a secondary controller. Gamepad will continue to be the norm. Motion controllers will of course exist, but then it will mostly be games targeted to have these controls, such as flight games have used joysticks a long time for that kind of game. It's so now and it will be so later at the controls will be specific games for them. It will be something secondary than normal controls."

Participant 5 said this:

"I would say that they can find a niche market. I don't think the serious players will not take it so seriously. They will not dare to the money that it needed to actually test it. They are satisfied with a normal control. But of course, for casual gaming, I think it can stay a while."

Participant 8 said this:

"Music controllers and motion controllers will probably be a niche and gamepads will be a different niche. I do not know which ones will be dominant."

Participant 3 believes that motion controllers can replace gamepads:

"Not until they become extremely finely calibrated so it require no more effort to use one to control a camera, as it is to control a real physical controls."

Both participant 4 and 8 believe motion controllers are a thing of the future if they have good games that support motion controllers. Participant 4 says like this:

"I just want to say the actual step to motion control is to produce good games for them. Maybe let the creative indie game developers have developing to Kinect and Move. It would certainly be great way to get good games and gaming experience."

Participant 3 believes motion controllers are here to stay because it selling well:

"I think so because they sell so well. I think they are selling well because it's futuristic, and it looks cool."

Participant 2 is saying this about motion controller enhancing the gameplay:

"I think it could be done if it [motion controllers] was used in a better way."

The same participant were later asked how that could be achieved:

"It's a quite natural position. Playing a guy who runs around and it would be more natural to have a correct position."

Participant 9 believe that motion controller will evolve and become more advanced:

"I certainly think they will become more advanced."

Four participant (2, 4, 5, 9) said that they can imagine buying Motion controllers if it was not because of the high price. Participant 5 said like this:

"The problem is that Move is so expensive at the moment. But of course if they lowers the price and maybe make a bundle with a great game."

Participant 1 can imagine buying Motion controllers if they become more precise:

"...if they get better performance and make it more precise."

5. Analysis

5.1 Analysis and Discussion

5.1.1 Gameplay Experience

In this study the results differed between the two games. All of the participants were positive to the use of motion controllers with the casual game, while four of the participants were negative to the use of motion controllers with the hardcore game.

Three participants felt that motion controllers are more intuitive than gamepads. One of the three participants thought that games such as Wii Sports are more intuitive with motion controllers because of their low difficulty level and the natural movement in those kind of games. The more intuitive the controllers are the greater the chance is that the player will manage to reach the first level of immersion, Engagement. Even if some participants agree that motion controllers are more intuitive, one participant thinks differently and believed that it does not matter what sort of controller the player is using. Perhaps the participant places more responsibility on the player and that it is up to the player to remove the barriers.

One participant mentioned that the motion controllers in the game Resident Evil 5 felt weird and non-intuitive. If something feels unnatural or weird it can become harder for the player to master the controllers and therefore the player can not reach the Engagement level. One of the reasons why motion controllers felt weird was that the participant felt that there was a lack of control. The game did not behave according to the participant's expectation. If motion controllers do not reflect real life movement they start to feel weird and make it harder for the player to become immersed in the game. This makes it non-intuitive for the player. The gameplay experience in Resident Evil 5 did not live up to the expectation of natural movement for that participant. Four of the participants were negative to the use of motion controllers in Resident Evil 5, while the other six felt that it did not do any difference or that it became better. They all used the same technology, that shows that it is not all about the technology but also about the players. Brown and Cairns' study as we mentioned earlier concluded that to make a player immersed, both the player and the game need to remove barriers. Just like in their study, we also find that there is a responsibility from both the players and the technology. The difference between a player's expectation and the actual experience of a controller do we call the Expectation Gap. The Motion controllers' experience needs to live up to the player's expectation to enhance the gaming experience. If the player expects more from the controller than it can deliver it will result in a large expectation gap. The larger the gap is, the greater is the risk that the gaming experience will be below the player's acceptance and break the immersion.

When playing Mario Kart Wii three participants felt that it became harder with motion controllers, but also more fun. A casual game such as Mario Kart Wii compared to a hardcore game, such as Resident Evil 5, is less strict and demands less accuracy from the input device and therefore allowing the player to make more mistakes. One participant on the other hand felt that it was easier with a motion controller because there was more feeling in the controller. The difficulty can be based on previous experience with Mario Kart Wii. One participant believed that the more effort a player has to put down, the worse the feeling gets. The same participant says that it is a missing tactile response, such as force feedback, from the controller. The Wii controller has only sound feedback, while both PlayStation Move and Kinect are only input controllers and not hybrid controllers.

One way to make a player more immersed could be to form the controller to the object the player is

interacting with. Two participants felt that the steering wheel used with Mario Kart Wii gave more depth to the game because of the connection to a real car. The participant says that it enhances the feeling because the player is holding more than just a regular controller. Two participants felt that it was a negative feature because it became too much effort to hold up the controller. It is hard for players that want to play a long time if the motion controller demands the player to be active and put down much effort. A hardcore player are more willing to put down time on a game, but perhaps some hardcore players feel that they do not have the energy to be active for such a long time.

One participant stated that there were more connection between the player and the avatar in the game with motion controllers. Because of the connection the player felt more immersed with the game. As we mentioned earlier in the introduction, one of the gameplay experience factors is immersion. Another participant said that motion controllers have the power to increase the gameplay tremendously, but only if they are suited for the game, and not something that the developers put into the game as an afterthought. If players feel that the controllers are more intuitive, natural, realistic and more fun there is a chance the gameplay experience will be enhanced and perhaps make the player more immersed with the game.

Motion controllers has the ability to enhance the gameplay experience and make players more immersed, but there is also a risk that players feel less immersed. There is a responsibility on both the players and the developers. If the player do not want to or can not get immersed with motion controllers the effect will be the opposite and perhaps the player will lose all levels of immersion. Five of the ten participants were skeptical towards motion controllers for hardcore games even before the game session, and perhaps they did not try to get immersed. The other theory is that there exist a Expectation Gap between the players expectation and what they experience. Either way, there is a responsibility on the players to remove their own barriers. The player also have to lower the expectation on how accurate the motion controllers really are. If the player has high expectation, the player risk not getting immersed. As mentioned earlier the game developers have also a responsibility. When developing games that demand high accuracy from the motion controllers it is important for developers to know the limitation of the technology and players expectation.

5.1.2 Opinions regarding the concept of Motion Controllers

The main reason why the participants played games of two different genres was to see if motion controllers are more suitable for a specific genre. Six participants said that they thought motion controllers are more suited for casual games, party games or games of a specific genre. One participant thought otherwise and said that it does not matter what genre the game is, all that matter is how well motion controllers suits the specific game. The same participant gave the example of a strategy game and explained that one could think that this kind of games are suited for motion controllers. If the player do not lose any control in the game, the game could work with motion controllers. The same participant also said that the gameplay is increasing tremendously if the motion controller fits, but fails if the game is not designed for motion controllers.

All four hardcore participants were more negative towards motion controllers and stated that they belong more to a own genre, such as casual. One of the hardcore participants was surprised over how good motion controllers worked in Resident Evil 4 despite that also thought that motion controllers belonged to a certain genre. The same participant believed that the reason why hardcore players are more negative towards motion controllers is because they are more secure and used to gamepads compared to casual players.

The three participants that were defined as casual were more open minded towards motion controllers. Of the three participants that define themselves as somewhat between casual and hardcore

players there were two of them that agreed more with the hardcore players, while one of them agreed more with the casual players.

As we mentioned earlier, Nacke performed a study where he measured the brain activity. In his study he realized that hardcore players did not have to concentrate when they were playing with motion controllers. Perhaps hardcore player do not think that motion controllers are challenging enough and therefore see it as something negative, while casual players see it more as something positive. Perhaps hardcore players are expecting more from motion controllers and that they should be as accurate as gamepads, and this could lead to a large expectation gap.

In this study all participants got the question what they preferred, Motion controllers or gamepads. Out of the ten participants eight said that they preferred gamepads over motion controllers, while the rest said that it depends on the game. One of the reasons why gamepads were preferred over motion controllers can be that gamepads can be used for every genre and not only one. All of the participants were positive about motion controllers in some way, but overall the majority still prefer gamepads. Many participants claimed that motion controllers is not the standard controller because of how the motion controllers are implemented.

How well motion controllers are implemented can either enhance the gameplay or damage it. Many of the participants had something to say about the hardware and how it was used. One of the things were that there exist no sort of feedback from the controller to the player and therefore breaking the immersion. If the player is expecting to hit something in the game, it breaks the immersion when the player realize that there exist no sort of feedback, such as force-feedback. Neither PlayStation Move or Wii Remote have force-feedback, but the Wii Remote has sound feedback, which make it a hybrid controller. Some of the negative things that were mentioned by one participant could be a positive thing for another participant, such as the number of buttons and the sensitivity on the Wii remote. Some participant felt that the Wii Remote were to responsive, while other thought that they had to put down to much effort to register the movement. A player can set the sensitivity level for the Wii remote, but that was not done in this study.

One of the main questions in the gaming industry today is what makes a game successful. Perhaps that question is about to get answered with motion controllers. One of the participants believed that motion controllers has a role in the future because that the companies are spending a lot of money on developing them. All participants thinks that motion controllers will exist in some way in the future. Around half of the participants believed that motion controllers will be tied to a specific genre, like music controllers such as Guitar Hero. One participant believed that motion controllers can be the norm of controllers, but only if it becomes more advanced. Seven of the participants could imagine buying motion controllers, but some of the reasons why they do not buy it were because it was either to expensive and that they are not precise enough. The players are not sure about today's new technology and do not want to stake their money on it. Two participants believed that motion controllers needs a good game in order to continue to develop. This theory is also mentioned by Rollings and Adams [AR03].

5.2 Conclusion

Today there exist a new generation of motion controllers that is trying to get the player immersed into the game. In this study, we made ten interviews where we asked questions before the participants played two games with motion controllers and gamepads and more questions after. Among the first questions we asked were: "What is your feelings regarding motion controllers?". The same exact question was also included in the second part of the interview. With this question we could determine whether any participant had changed their mind about motion controllers. In the interview we also give the participants a chance to say what they thought was positive and negative about the motion controller and gamepads in both games.

All those who participated in the study had previously tested motion controllers in some sort of way. Even when many thought the same thing at the end of the interview as they did in the beginning, there were some who were positively surprised and had a change of heart.

This study used two games, a casual game: Mario Kart Wii and a hardcore game: Resident Evil 5. Today's motion controllers tends to be most compatible with the casual-oriented games. The results of this study indicates that today's motion controller is very advanced, but not enough to live up to players expectation. Motion Controllers suits casual games well because casual games often allow errors and does not have to be so precise. Motion controllers often works as we expects with casual games and therefore live up to our expectations and this leads to greater immersion. We also found out that motion controllers is not only tied to one game genre, only that it suits better to casual games. Motion controllers could fit for both casual and hardcore games, but it depends on how the game is using the controller.

In hardcore games, such as Resident Evil 5, where the player takes control of a human character, the player is expecting to control him like we control our own body, motion controller do not live up to our expectation and therefore break ours immersion. Hardcore games often require a person to play for quite a long time, but many people do not have the energy to play with motion controllers that long. It is important that motion controllers fits with the game and is not something that the developers add afterwards as afterthought. Motion controller works very well and fits when it reflects our movements. When the motion controller does not reflect our movements it has the opposite effect and breaks immersion. Motion controllers can also break the immersion for various other reasons, such as if there is no tactile feedback to the player. Neither Nintendo Wii Remote or PlayStation Move have force feedback.

There exist some sort of connection between gaming habit and opinions about motion controllers. Nackes research shows that hardcore player do not have to concentrate when playing with motion controllers, and it also shows in this study. All the hardcore players were more negative towards motion controllers then casual players. There are three explanations to this: The first explanation is that hardcore player feel there is no challenge when playing with motion controllers. If there is no challenge in the game it goes against Andrew Rolling and Ernest Adams definition of gameplay, which is "One or more casually linked series of challenges in a simulated environment" [AR03]. The second reason it that hardcore gamers are used to gamepads and that motion controllers feels unnatural for them. Hardcore gamers dedicate more time on games and it could feel unnatural to put down so much effort for a long time. The third explanation is that hardcore players expect motion controllers to have the same accuracy level as gamepads. If players have high expectations and the experience do not live up to that, the player risk to break their immersion. This explanation do we call the Expectation Gap.

Expectation Gap:

In this study we defined the term *Expectation Gap* (See figure 5.1), which is the gap between the player expectation and the player experience. Games with controller mapping that works as expected can live up to the player's expectation and increase their gaming experience. One of the reasons why casual games have become so popular for motion controllers is because they often involves simple movement, which the game technology can deliver. Hardcore games, such as Resident Evil 5, where the player is controlling a character the player is expecting the character to move exactly like a human. If the experience do not live up to the player's expectation and is below the player's acceptance there is a risk that the players immersion will break. The expectation and the experience varies for every player, which means that a player with low expectations has a greater chance of becoming immersed, but only if their gaming experience allow it.

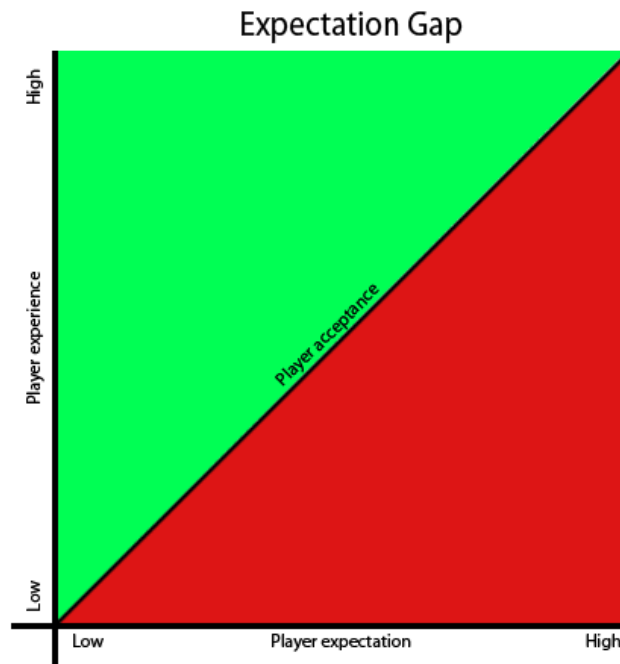


Figure 5.1: Expectation Gap

The Expectation Gap resembles Donald A Normans *Gulf of execution* and *Gulf of evaluation*. The Gulf of execution describes the gap between the users intentions and the allowable action. The Gulf of evaluation reflects the amount of effort the user exert to interpret the physical state of the system and to determine how well the expectations and intentions have been met. [Nor88] Just like the Gulf of execution and Gulf of evaluation, the Expectation Gap describes the gap between users and systems.

Participants were overall satisfied with motion controllers to the casual game, Mario Kart Wii. There were mixed opinions about motion controllers to the hardcore game, Resident Evil 5. Some participant felt that motion controllers were very suitable for Resident Evil 5, while others felt that it broke the immersion. This shows that it is not all about the controller, but also the player. One participant stated like this: “I like the idea but I do not think it has been fully developed yet, for my part...”. This participant say that motion controller has not lived up to the participants expectation. Four participants state that motion controllers are more suitable for a specific genre, one of the reason it because of the lack of buttons. Another participant disagree and thinks that motion controllers is suitable to all genres where the player do not lose any control. Motion controller today is not advanced enough to live up to all players expectation.

As we mentioned earlier, Nintendo focused on game mechanics and the game controllers when developing Nintendo Wii unlike Sony and Microsoft that focused on high definition graphic. Focus on sensory-input is more common in science research and it is considered to be more expensive. Nintendo took a risk when they developed the Wii, and it became a success. Perhaps because of the lack of high definition and realism players did not expect high accuracy with the motion controllers. Nintendo is focusing on casual games, which often allow lower accuracy. Because of that motion controllers have a greater chance to live up to the players expectation. Motion controllers today is not advanced enough to live up to all the players expectations.

The two core variables of this study are “Gameplay Experience” and “Opinions regarding the

concept of Motion Controllers”. They are connected through the player’s expectation and experience (See figure 5.2). With the “Gameplay Experience” variable, we examine if the participants became immersed and if motion controllers enhanced the gameplay. With the second variable, “Opinions regarding the concept of Motion Controllers”, we examine the participants opinions about motion controllers in general. A player can feel more immersed with motion controllers if the hardware and software are well developed and live up to the player’s expectation. Another player may feel that motion controllers feel unnatural and less accurate compared with a gamepad and this could break the players immersion. As we mentioned earlier, some players already have a opinion about motion controller before testing them, and that could lead to the player not getting immersed at all. The player’s expectation itself could break the immersion if it is too high.

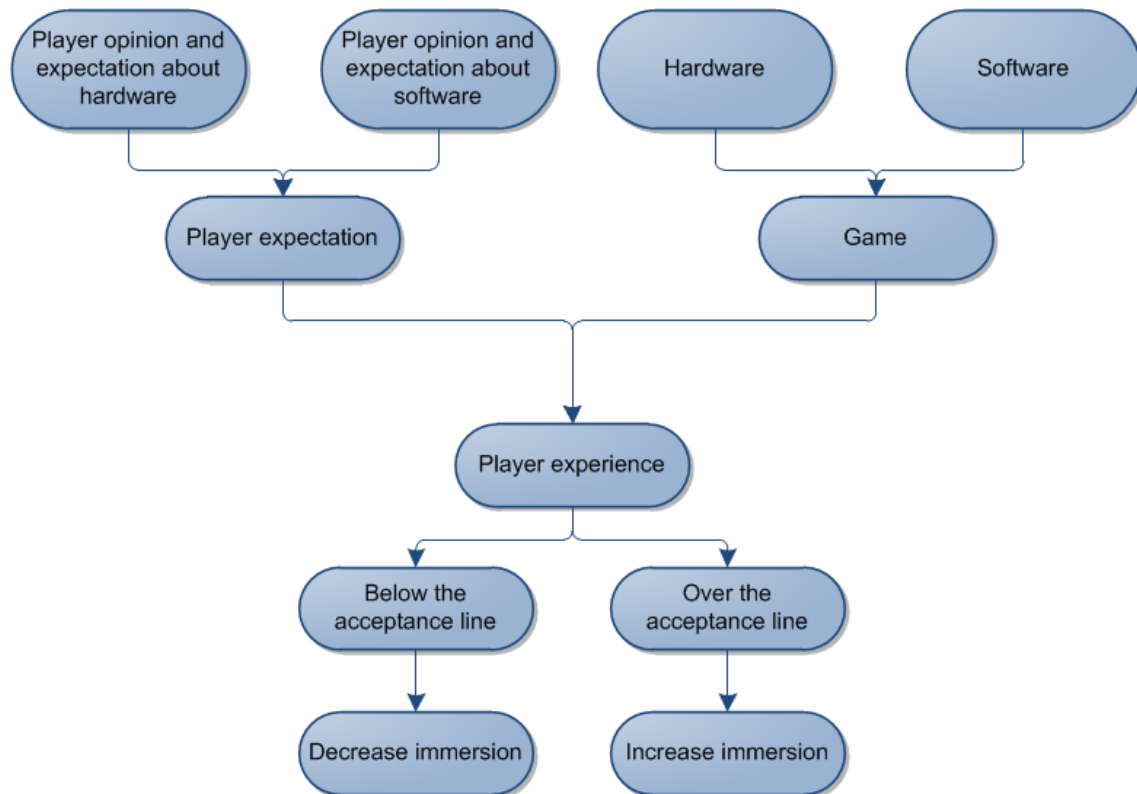


Figure 5.2: Expectation and Experience map

All of the participants in our study believed that motion controllers are here to stay and play a role in the future. Five of the participants believed that the motion controller will eventually find its own genre, much like Dance Dance Revolution. Motion controllers will over time become more and more precise and perhaps some day live up to our expectations and become a standard among all future consoles. This can be achieved in several ways.

With help of the data we collected we found four methods to improve motion controllers and their influence.

- Have a popular game that increases the gaming experience with the controller.
- Lower the price of the controllers or that they come with the purchase of the console.
- A wide variety of games that are compatible with motion controllers.
- Implement Force-Feedback into the controllers.

Back to our research question: Does motion controllers enhance the gameplay experience for players in games in comparison with gamepads? Yes and No, it all depends on how it is used and

implemented. As we mentioned earlier, gamepads only contribute the basic immersion. It is hard to say if motion controllers enhance the gameplay experience compared to gamepads, because the experience is individual. The Expectation gap could be small or large for every player. Motion controller can increase the gameplay experience when the game reflects real movement. Motion controller still seems to be very uneven in how skillfully they are implemented, when it is implemented well it enhance immersion much, but has the opposite effect when it is implemented poorly. Motion controllers has a greater chance to immerse players if motion controllers becomes more accurate and stable. Today motion controller works well for casual games and some hardcore games, but it all depends on the players expectations on the controllers precision and how they experience the precision.

Conclusion summary:

- Motion controllers can make player's more immersed if the players experience lives up to the players expectation.
- Today's motion controllers are more suited for casual games rather than hardcore games.
- Motion controllers will be a part of the future, but it is unclear if motion controllers will be tied to a specific genre or if they will find their own. Motion controllers could fit for every game genre, if the game implements them well.
- It is hard to determine if motion controllers enhance the gameplay more than gamepads, because the players experience is individual.

6. Concluding remarks

6.1 Critique

An error occurred when two questions were forgotten to be asked to the first participant. The participant read the transcribed interview and added the answers to these two questions. We have evaluated that the participants answers is still going to be in the report, since we allow changes and correction of all interviews after the transcription.

6.2 Future work

One of the most interesting contribution in this report is the Expectation Gap. This could be furthered studied and examine more thoroughly.

This study contribution could be expanded by a future study with another method that would measure the participants enjoyment or by observation of the participants to get more data than the opinions of the participants. To make the data more valid the method discriminant sampling should be used.

A future study would be greatly improved by including a game which used a kinesic mapping controller, this could not be done when we did this study because there was no game released that could be played both with gamepad and kinesic mapping controller.

We chose two games in our study, one casual and the other a hardcore game. This study could be made with other types of games, such as multiplayer games or other genres, to get a broader conclusion.

Ludography

Dance Dance Revolution(1998), Developer: Konami, Publisher: Konami

Mario Kart Wii(2008), Developer: Nintendo, Publisher: Nintendo

Metroid: Other M(2010), Developer: Project M, Publisher: Nintendo

Pump it up(1999), Developer: Nexcade, Publisher: Andamiro

Resident Evil 4(2005), Developer: Capcom, Publisher: Capcom

Resident Evil 5(2009), Developer: Capcom, Publisher: Capcom

Bibliography

- [Ada04] Ernest Adams. *Postmodernism and the Three Types of Immersion*. Gamesutra, 2004.
Available:http://designersnotebook.com/Columns/063_Postmodernism/063_postmodernism.htm [2011-05-02].
- [AR03] Ernest Adams and Andrew Rollings. *Andrew Rollings and Ernest Adams on Game Design*, pages 41–42, 58, 175, 199–201, 541–542. New Riders Publishing, 1st edition, 2003.
- [Bak02] Michael J Baker. *Judgement sample - Definition*. Westburn Publishers Ltd, 2002.
Available:<http://www.westburnpublishers.com/marketing-dictionary/j/judgement-sample.aspx> [2011-05-28].
- [BC04] Emily Brown and Paul Cairns. *A Grounded Investigation of Game Immersion*. University College London Interaction Centre, 2004.
Available:<http://portal.acm.org/citation.cfm?id=986048> [2011-05-04].
- [BKea10] Michael Brown, Aidan Kehoe, and et al. *Beyond the Gamepad: HCI and Game Controller Design and Evaluation*. SpringerLink. 2010.
Available:<http://www.springerlink.com/content/w66124g24k817075/> [2011-04-08].
- [Bry01] Alan Bryman. *Samhällsvetenskaplig metoder*, pages 122–123,301–302, 373–383. Liber, 1st edition, 2001.
- [Car06] Simon Carless. *Breaking: Nintendo Announces New Revolution Name*. 2006.
Available:http://www.gamasutra.com/php-bin/news_index.php?story=9075 [2011-02-18].
- [Cas05] Edward Castronova. *Synthetic Worlds - The business and culture of online games*, pages 4–5, 285–294. The university of Chicago press, 1st edition, 2005.
- [Cum07] Alastair H. Cummings. *The Evolution of Game Controllers and Control Schemes and their Effect on their Games*. University of Southampto, 2007.
Available:<http://users.ecs.soton.ac.uk/ahc08r/mms.pdf> [2011-04-08].
- [Ejv09] Rolf Ejvegård. *Vetenskaplig metod*, pages 52–53. Studentlitteratur AB, 4th edition, 2009.
- [EM05] Laura Ermi and Frans Mäyra. *Fundamental Components of the Gameplay Experience: Analysing Immersion*. 2005.
Available:<http://www.digra.org/dl/db/06276.41516.pdf> [2011-05-02].
- [Gil05] Bill Gillham. *Research Interviewing the range of techniques*, pages 39–44, 124. Open University Press, 1st edition, 2005.
- [Har06] Craig Harris. *Top 10 Tuesday: Worst Game Controllers*. IGN, 2006.
Available:<http://xbox360.ign.com/articles/690/690449p1.html> [2011-02-18].
- [IG06] B. Josphe Pine II and James H. Gilmore. *Welcome to the experience Economy*. Harvard Business Review, 2006.
Available:<http://www.hospitality.ucf.edu/faculty/raywang/documents/HFT6938/Experiential%20Consumtion/WelcomeToExperienceEconomy.pdf> [2011-05-29].

- [JCea08] Charlene Jennett, Anna L. Cox, and et al. *Measuring and Defining the Experience of Immersion in Games*. 2008.
Available:<http://portal.acm.org/citation.cfm?id=1393920> [2011-05-05].
- [Lar02] François Dominic Laramée. *Game design perspectives*, page 145. Pearson, 2002.
- [LO02] Paul D Leedy and Jeanne Ellis Ormrod. *Practical Research - Planning and design*, page 61. Charles River Media, Inc., 8th edition, 2002.
- [McE10] Griffin McElroy. *Sony: PlayStation Move reaches 4.1 million in worldwide sales*. Joystiq, 2010.
Available:<http://www.joystiq.com/2010/11/30/sony-playstation-move-reaches-4-1-million-in-worldwide-sales/> [2011-02-25].
- [Nac10] Lennart Nacke. *Wimote vs. Controller: Electroencephalographic Measurement of Affective Gameplay*. 2010.
Available:<http://portal.acm.org/citation.cfm?id=1920801> [2011-05-05].
- [New07] Ben Newbon. *Virtual Reality : Immersion Through Input, University of Southhampton*. 2007.
Available:<http://mms.ecs.soton.ac.uk/2007/papers/10.doc> [2011-02-19].
- [NL08] Lennart Nack and Craig A. Lindley. *Affective Ludology, Flow and Immersion in a FirstPerson Shooter: Measurement of Player Experience*. 2008.
Available:<http://arxiv.org/ftp/arxiv/papers/1004/1004.0248.pdf> [2011-02-19].
- [Nor88] Donald A. Norman. *The Design of Everyday things*, pages 49–53. Basic Book, 1988.
- [OSM06] Daniel G. Oliver, Julianne M. Serovich, and Tina L. Mason. *Constraints and Opportunities with Interview Transcription: Towards Reflection in Qualitative Research*. Ohio State University, 2006.
Available:<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1400594/> [2011-05-23].
- [Pha04] Alex Pham. *EyeToy Springs From One Man's Vision*. Los Angeles Times, 2004.
Available:<http://articles.latimes.com/2004/jan/18/business/fi-eyetoy18> [2011-02-18].
- [Reu08] Boris Reuderink. *Games and Brain-Computer Interfaces: The State of the Art*. 2008.
Available:<http://doc.utwente.nl/67586/> [2011-05-03].
- [Sin10] Brendan Sinclair. *Sony reveals what makes PlayStation Move tick*. Gamespot, 2010.
Available:<http://gdc.gamespot.com/story/6253435/sony-reveals-what-makes-playstation-move-tick> [2011-02-18].
- [SLea07] Paul Skalski, Ryan Lange, and et al. *Mapping the Road to Fun: Natural Video Game Controllers, Presence, and Game Enjoyment*. 2007.
Available:http://www.allacademic.com/meta/p_mla_apa_research_citation/1/7/2/7/0/pages172703/p172703-1.php [2011-02-18].

- [SZ04] Katie Salen and Eric Zimmerman. *Rules of Play*. Massachusetts Institute of Technology, 2004.
- [Tak09] Dean Takahashi. *How many vendors does it take to make Microsoft's Project Natal game control system?* VentureBeat, 2009.
Available:<http://venturebeat.com/2009/09/05/how-many-vendors-does-it-take-to-make-microsofts-project-natal-game-control-system> [2011-02-25].
- [Tho11] Tor Thorseni. *Xbox 360 sells 50 million, Kinect ships 8 million*. Gamespot, 2011.
Available:http://ces.gamespot.com/story/6285921/xbox-360-sells-50-million-kinect-8-million?tag=top_stories;title;2 [2011-02-25].
- [Van10] Ashlee Vance. *With Kinect, Microsoft Aims for a Game Changer*. The New York Times, 2010.
Available:http://www.nytimes.com/2010/10/24/business/24kinect.html?_r=1&pagewanted=all [2011-02-16].
- [Woy08] Steve Woyach. *Immersion Through Video Games*. 2008.
Available:<http://illuminate.usc.edu/article.php?articleID=103> [2011-05-02].

Appendix A

Interview English

Question asked before playing the games::

1. Gender
2. Age
3. What is your gaming habit?
4. How often and how much time do you spend playing computer games/video games/mobile games in average?
5. Does it exist a video game console in your household?
6. Have you ever test any sort of motion controllers before?
7. Do you own any kind of motion controllers?
8. What is your feelings regarding motion controllers?

Question asked after playing the games:

9. What was positive and negative about the motion controllers in:
 - Mario Kart Wii?
 - Resident Evil 5?
10. Does motion controllers enhance the gaming experience?
11. Do you think that motion controllers are here to stay?
12. (If no question number 7) Will you buy motion controllers in the future?
13. What do you prefer: Motion controllers or regular controllers?
14. What is your feelings regarding motion controllers?
15. Do you have any opinions regarding the execution of this method?
16. Other opinions?

Appendix B

Message for applying to the interview - English

Topic:

Interview and testing of Motion controllers.

Message:

We carry out a study in which we compare games that can be played with a regular controller, but also with motion controllers. The purpose of the study is to determine if motion controllers enhances the gaming experience. In the study, you will have the opportunity to try out two games from different consoles with both regular controllers and motion controllers.

The interview will be recorded on tape and then documented. After the interview has been documented, the recording will be erased to ensure your anonymity. You will not be connected to the interview. Before the report is published, you will have the opportunity to read the documentation and make adjustments and corrections to your statements. You can at any time end the interview without any consequences.

We search 10 people regardless what kind of background or experience with games.

Time: 16 and 17 March

Place: DSV, Kista

Estimated interview length: 60 - 90 minutes

If you are interested mail: karl-dah@dsv.su.se Write in your mail which time and day that suits you best.