The Emotional Impact of Video Games

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Master thesis in Psychology… December 2016

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PSY-3900
Master Thesis in Psychology
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December 2016

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PSY 3900

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2016

Abstract

The thesis aimed to study the emotional impact of video games and how these emotions shape the experience of the gaming. Data are from a case study and comprise both automatic facial coding of emotional expression and qualitative interviews. The facially expressed emotions were analyzed by means of a computer program named FaceReader. The results indicate that video games elicit a wide and partly unpredictable range of emotions, with anger and surprise as the two most dominant emotions, but also those most dependent on the kind of game being played. Sadness, on the other hand, seems hardly to have been experienced at all. The participant also ignores physical pain in order to keep playing one of her favourite games. We also found that emotions may be secondary to the feeling of accomplishment when it comes to enjoying and replaying a video game.

Key terms

FaceReader, video games, cognitive psychology, emotions, flow, Self-determination theory

Forfatter: Jane Toreskaas
Tittel: Dataspills effekt på Emosjoner
PSY 3900
Master I Psykologi
2016

Sammendrag

Målet til denne avhandlingen er å studere dataspillenes effekt på emosjoner og hvordan disse emosjonene former opplevelsen av å spille dataspill. Dataene er i form av en case-studie og omfatter både automatisk ansiktskoding av emosjonelle utrykk og kvalitative intervjuer. Ansiktsuttrykkene ble analysert ved hjelp av et dataprogram kalt FaceReader. Resultatene tyder på at dataspill lokker fram et bredt og delvis uforutsigbart spekter av emosjoner, hvor Sinne og Overraskelse er dominerende, men er også mest avhengig av hvilket spill som spilles. På annen side ble Tristhet tilsynelatende ikke erfart i hele tatt. Deltageren ignorerer fysisk smerte for å fortsette å spille et av favorittspillene. Vi fant også ut at emosjoner er sekundære til følelsen av mestring når det gjelder å nyte og fortsette å spille et dataspill.

Nøkkelord

FaceReader, videospill, kognitiv psykologi, følelser, flyt, Selvbestemmelse teori

Acknowledgements:

I would like to thank my supervisor and everyone who helped me with FaceReader. I could never have managed without your patience and advice. I would also like to thank my family and friends for always believing in me, my classmates, and most of all thank you Mons and Luigi, you've been absolutely amazing.

Preface

When I first started on this Master thesis I got in touch with Joar Vittersø because I had decided I wanted to research and write about mindfulness. I got distracted by one particularly interesting phrase from positive psychology that somehow appealed even more. "Flow"; the state of mind where you are completely engulfed with one specific task. Further research confirmed that flow is very often achieved, even among those with minimal attention span, when playing video games.

I shifted all my attention to video games. I already knew it has a bad reputation for instigating aggression and violence, but now I had found research that supported the positive effect of video games. I decided to explore the emotional impact of video games.

At the same time several of my classmates were part of a project that involved some very interesting technology, namely FaceReader. This, combined with qualitative interviews would be my approach to exploring the emotional journey of someone who plays video games, and this way I can explore both the reputation for aggression and the potential for treatment.

I was promptly adopted into "DRIVKRAFT", a group of fellow-students working with FaceReader who showed me how to work with Apple. Despite having started out with a completely different theme for my thesis, Joar Vittersø was with me on my journey when exploring ideas for my thesis and he supported, explored and contributed to almost all of my ideas.

Ulefoss/Tromsø, 30.11.2016

Jane Toreskaas (Kandidat)   Joar Vittersø (Veileder)

Innhold

The Emotional Impact of Video Games

Introduction

Videogames have become one of the most prevalent ways of entertainment in recent years. Technology is making big advances and becoming more easily available for everyone every day. Videogames, computer games, apps for phones and other handheld devices are cheap, simple to use and accessible for almost everyone. In Norway 44% women and 50% men play videogames every week (Vaage, 2015). Videogames provide an easy, accessible way of being entertained. Early videogames were mostly puzzle-games, Tetris and the like. The first easily available computer games include classics like solitaire and minesweeper, games that are easy to understand and easy to master and available to everyone. With games surrounding us in increasingly various forms, it is more important than ever to study the various effects these games have on us. This study will focus on the emotional aspect of videogames, and the emotional impact they have on the person playing the games.

Specifically, this study does not intend to focus on the long-term effect on emotions when playing videogames, but rather intends to study the immediate effect videogames have on emotions while people are playing the games.

To do this we decided to have one single participant, and using this as a case study we will combine what the participant visually expresses when they play and what they can remember immediately after a gaming session. Further on we will have a follow up interview where we ask what the participant best remember and if they have, or would like to, play the game again. This is to fully understand not only the emotions the participant experience, but also how these emotions impact behavior and enjoyment of the games. Then we will study the emotions, compare and contrast the results in each method used and attempt to arrive at a conclusion and form a theory on what emotional importance video games hold.

Background

The increasing frequency and potential of video games call for a better scientific understanding of its intrinsic nature, particularly since its accessibility, while substantial right now, is only fairly recently expanding to include the general public. The games are also increasing in their variability and defining exactly how much, and which, emotions people can garner from them is the goal of this study.

One of the controversial emotional effects videogames is said to have on gamers is increased aggression (Anderson & Dill, 2000), but the positive phenomenon of "flow" has also been connected to the emotional state that sometimes occur when we play videogames (Murphy, Science, & Thorndike, 2010). Flow is the optimal emotional state of learning,

where we are completely focused and immersed in a task for optimal positive experience and learning (Csikszentmihalyi, 2007). Videogames have somehow perfected the intrinsic rewards that motivates flow perfectly. These are only two aspects of video games, but when considering emotions both are equally important.

There are many ways to measure an emotional state. Videogame research has also often concluded that several methods of research is required when videogames are involved (Hunicke, LeBlanc, & Zubek, 2004). How well do we remember emotions when we are busy solving puzzles and reacting to immediate prompts? Which emotions are most important when we are motivated to keep playing videogames? We constructed a combination of methods and decided to use a program that analyses the facial expressions as one plays the game then interview the participant.

In the following segments I will explore the negative impact video games are reputed to have on emotions and behavior. Secondly I will explore the potential benefits and potential of video games and which types of psychology have recently found an interest for them. Thirdly, we consider all this research and explore several methods that have previously been used when researching videogames, and then explain how our chosen method was developed.

Last we will describe the approach we will use and our focus when exploring video game emotions.

Negative emotions and behaviors of video gaming. The reputation of video games as aggressive started very early, even before recent technical progress allowed for realistic violence. Some researchers describe almost all games, even Pacman, a circle with a mouth chasing ghosts, as inherently violent (Griffiths, 1999). Newer games are less subtle in their perceived violent nature and involve the brutal killing of realistic human characters, often involving blood and gore.

The reputation of video games has been explored extensively in popular media, the link between aggression and videogames has also received a lot of attention. Several real-life events have been connected to specific videogames or video game playing. Recently, Norwegian terrorist Breivik confessed to having used video games to "practice" shooting (Grøttum et al., 2012). Norwegian media was influenced by this to further investigate dangers of videogames, which lead to a meta-analysis by Norwegian researchers that concluded that the media panic are largely unfounded and massively focused on violent aspects. Their conclusion was that Video games become one of the easier targets used to

explain real-world aggressiveness, despite conflicting reports that this is actually the case (Karlsen & Jørgensen, 2014).

How much weight does this reputation of video games as increasing aggressiveness really hold? Violence in media may indeed have an effect on society (Anderson & Bushman, 2002). Simply observing behavior influence what we consider the norm. Research from Iowa state University suggests that videogames increase aggressive thought patterns and decrease pro-social behavior (Anderson & Bushman, 2001). However, when comparing the effect on aggression between videogames and other media, games seem to be less influential than movies (Cunningham, 2011).

Several studies indicate that violent video games have an increased effect on aggressive behaviors, but even reviews of such reports state that further research is required (Dill & Dill, 1998). Video games and their relation to aggression have inconclusive results, but Videogames with particularly violent nature may render us less likely to react to real life violence, and have been shown to be desensitizing to certain emotions (Carnagey, Anderson, & Bushman, 2007; Funk, Baldacci, Pasold, & Baumgardner, 2004).

Aggression has been linked to video game environment and gaming culture in general as well. The Online community has opened up a whole new culture of gamers. Women have found this environment to be particularly toxic (Svendsen, n.d.). This online environment has also resulted in a fairly current phenomenon of "gamergate". This is an online group of gamers who mainly target women with increasingly aggressive threats and behaviors(Wingfield, 2014).

 Part of this aggression may be centered around the conflict in general between men and women, precarious manhood and its link to aggression (Bosson & Vandello, 2011), but regardless of this particular phenomenon several studies have shown that men and boys are more susceptible to aggression than women as a consequence of playing videogames (Anderson & Dill, 2000; Bartholow & Anderson, 2002; Lucas & Sherry, 2004; Mazur, Susman, & Edelbrock, 1997).

Video games also have some connections to depression and low self-esteem, but most such studies conclude that cause and effect is harder to establish (Dominick, 1984; Johnson, Jones, Scholes, & Carras, 2013).

One study compared three studies where one of them was controlled for other factors such as family that could influence aggressive behaviors, but found that in none of the three studies they could find any conclusive results that proved videogames had and influence on aggressive behaviors or reduced empathy (Ferguson et al., 2015). Despite early focus on

aggression in videogame research, current and newer research has focused more on either disproving those connections and proving the positive effects of videogames. The aggressive effects may have been exaggerated (Ferguson, 2010), using almost exclusively one method of research (Dondlinger, 2007) or not controlling for other factors that could influence susceptibility of aggression (Ferguson et al., 2015).

For this study we will consider emotions in general, but the negative emotions and what might influence them might receive extra attention seeing as how they are so closely connected to research on Video Games. We will explore not only if the participant felt and/or expressed anger, but also consider why they might have felt this.

Positive emotions and behaviors of video gaming. The cognitive enjoyment of videogames is in some ways simple to understand. People have enjoyed puzzles and games for thousands of years. The cognitive beneficial effect and the inherent entertainment value of solving puzzles and challenging oneself is not a new concept. Games and play has existed for thousands of years, and not only in human beings. Already in 1938, Johan Huizinga wrote about the many ways in which humans do play. He also mentioned that animals play, but what seems to be restricted to humans is play without immediate visible benefits. A dog might play fight and catch a stick for fun, but this can easily be explained by the nature the dog that would hunt and capture food. However, a human sitting quietly in a room putting cards in a certain pattern, or pushing buttons to make a plumber jump on mushroom, is harder to explain.

Six studies inspired by the Self-determination theory showed that the main motivator for enjoying and playing videogames was the feeling of competence and autonomy, even among those participants with an aggressive nature who preferred seemingly violent games (Ryan, Rigby, & Przybylski, 2006). Playing provide humans with some reward, some benefit that inspires us to not only play games, but develop them into extremely complex and increasingly challenging situations, despite the lack of any obvious material benefit. In many ways video games are work in its own right, extreme mental labor that somehow still manages to be fun (Yee, 2006).

Our minds and cognition have been proven to benefit from playing games. One of these specific cognitive benefits of videogames is improved decision-making. (Green, Pouget, & Bavelier, 2010). This is also one of the cognitive functions that emotions help improve. Quicker feedback results in quicker reactions. Gamers are honed to react as quickly as possible with immediate feedback from the game. Some videogames do not allow for slow

thinking, you have to see your options quickly and take them. Others allow you to pause and spend as much time as you want, but it is always you who set the pace, you who decide the speed of the game. This is ideal in learning situations (Murphy et al., 2010). We learn an astonishing amount of information from certain videogames, and while we may not benefit directly from what we learn about controllers and the games story, our ability to learn the things we learn is being honed by the video games.

For elderly, using your mind in almost any kind of exercise is beneficial when fighting dementia. Leisure activity of any kind are often related to lesser risk of developing dementia (Hall et al., 2003). Videogames specifically have been used to improve several cognitive functions in elderly (Basak, Boot, Voss, & Kramer, 2008).

Excergames, games that are made to react to physical movements in the form of exercise, are also a fairly recent phenomenon with potentially immense positive effects on mental and physical health (Staiano & Calvert, 2011).

But the benefits of video games have also been explored beyond the effect they have on our thinking. Cognitive therapy has long been efficient in treating various psychological ailments, and video games have recently been included in this sort of therapy. Smaller and more accessible devices have led to an increase of these simpler games designed for quick access and less time needed for immersion. These games are instant relief from boredom, designed to be easily accessible and easily mastered. These types of games have successfully used in treatment of pain and reducing intrusive trauma in the field of cognitive psychology (Merry et al., 2012; James et al., 2015).

There is also current experimental use of videogames as treatment for depression. One example of this is Jane McGonagall's research on depression and her online game constructed as a life game. Her game is based on creating increased intrinsic rewards by way of creating your own tasks, making them manageable and then rewarding yourself accordingly (Mcgonigal, n.d.). This game has as of yet not become a huge commercial success, and her games lack certain psychological necessary aspects, but some of her theories have a solid basis in therapy and might indeed be beneficial once perfected (Ji, 2014).

Emotions are vital to human existence—they shape people's identities and contribute to their subjective wellbeing (Damasio, 1994; Keltner, Oatley, & Jenkins, 2014; Singer & Salovey, 1993). Everything we do is affected by emotions, so how our emotions are affected is very important. Emotions have an influence on what we do and why we do it.

In recent studies on positive psychology the most beneficial and productive emotional state is what Mihaly Csikszentmihalyi calls "flow". This is a state where your emotions are

used for full focus on whatever you are doing without allowing yourself to be distracted. It is an activity that is a reward in itself and fully benefits from intrinsic motivation (Csikszentmihalyi, 2007). Though intellectual benefits might be a side-effect there is little doubt that the complete focus and intrinsic rewards are a big part of what draws us to videogames (Cowley, Charles, Black, & Ireland, 2008).

Some who work with video game designing share remarkable similarities in their theories to Flow. The combination of accomplishment and challenge in particular. One online company headed by Nicole Lazzero has published research where they categorized the different types of videogame fun to four types of fun (Lazzaro, 2004). The introduction mentions that gamers fail 80% of the time, yet good games somehow push them onward. Their report tries to define this type of fun that allows gamers to accept so much failing. We will not go too deeply into all their theories, but must mention one of the emotions Lazerro and her team designed according to participant feedback.; "Fiero", what they describe as the ultimate gaming emotion. This is the feeling of accomplishment, victory, and overcoming obstacles. It is one emotion that can has to be activated by overcoming obstacles, it can in other words not come too easily.

Aside from the cognitive aspect, there is also the social aspect. Playing games together is a good way to improve social behavior and is a good way for people to bond (Hromek & Roffey, 2009).

In all, video games may have a very positive effect on our emotional well-being. This study will pay very close attention to how much fun the participant is having, and which emotions and circumstances may have the potential to induce flow in video games.

Why a case study? Previous research on aggression and video games seems basically to have focused on what we absorb and learn from games and then express after we have played games. This study will not focus on any potential violent or aggressive consequence from playing video games, but rather focus mainly on what the gamer experiences when they play the game and which of these experiences most influence the likelihood of enjoying the game. We will also focus somewhat on what emotions a gamer experience that can further be linked to their desire to play the game in the future and whether or not they do so.

To do this we will record the participant playing a variety of games and try to find a pattern in expressed and internal emotions. Our chosen method requires recording for close examination, and qualitative interviews for a close examination of the participant's inner workings.

Designing comprehensive studies on videogames has proven difficult. In 1999 a review of literature concluded that research prior had indeed concluded with aggression increase, but they had all used approximately the same method to their study; that of observing young children after gameplay (Griffiths, 1999).

A relatively new method of measuring instant emotional experience is FaceReader. A computer program designed to measure emotional expressions in real time. One study has already used this to measure fun, and though it concluded that FaceReader is useful, it still needs an additional method to be fully useful. This study suggested observation, which we have included as well (Zaman & Shrimpton-Smith, 2006).

When choosing a method for the present study, I wanted to focus mostly on the range of emotions that videogames could influence. This meant more games, but also, due to time restrictions, meant less participants. The range of methods used, observation, Face Reader and interviews and lack of previous similar research methods meant I decided to use a case study. One participant, playing several games.

Summary

The starting point for this study is the emotional impact of video games. Generally, all emotional feedback through interviews and FaceReader will be considered and compared.

Due to the reputation of video games' connection with aggression and violence we will pay particular close attention to any instigators of annoyance or anger.

We will also consider how video games have been used in cognitive psychology and pay close attention to what makes the gaming fun and what makes gamers want to keep playing.

We will use FaceReader as a tool to examine our participants' external expressions, but we will also pay close attention to what our participant themselves report to experience. Our participant will also be allowed to view the recording of herself in order to directly study FaceReaders direct ability to pick up expressions.

Method

We used three methods to study the emotional impact of videogames: Observation, FaceReader and qualitative interviews. These methods required interviews, gameplay and recordings of interviews and gameplay.

The participant, hereby called Mons, volunteered. Once she knew exactly what the experiment entailed she was informed of her rights and was told she could withdraw at any time apart from and during the proceedings. She was encouraged to voice any concerns immediately should she feel uncomfortable.

I recorded five interviews with Mons face to face and had three phone conversations. In addition we had some short conversations concerning choice of games, timing for various stages for the study and whether she felt comfortable. I also sent her various updates about the progress of the study throughout my research and documentation.

Participant.

We recruited the participant by word of mouth. She is not an immediate acquaintance, but a friend of a friend.

Mons is a white Norwegian woman in her mid-twenties. She has experience with videogames and made recommendations for which games could be included in this study. Mons agreed to play almost any game the study required, but asked not to be alone for all of them. She also mentioned some specific horror games she did not want to play, including one specific Horror game called "Slender", which she deemed too scary. She refers to this game several times during the interviews.

Mons is considered the sole participant for this study, but since she did not want to play alone for all the games, another player in the same demographic, hereby called Luigi, was present for two of the gaming sessions. When playing Flappy Bird, Luigi is in another room but able to communicate with Mons. When playing Mario Kart, Luigi is an active co-player with whom Mons talks to frequently. Mons mentions Luigi throughout the interviews as a frequent gaming partner, but her reactions are not considered part of the study, nor are they used in any way in FaceReaders analyses.

The setting and the content of the games.

Mons played all four games in a location she has visited several times and is familiar with. Flappy Bird was played on a computer and recorded by the computers camera. The three other games were played on a 40-inch wide screen television connected to whichever gaming device each game required.

Flappy Bird

Flappy Bird is a skill-game designed to keep a bird floating by pressing spacebar or with a mouse click. The bird not only needs to fly but avoid obstacles. There are no additional controls. It requires quick reflexes, but little knowledge and experience to play.

This is the first game intended for use in the study and the first game Mons played. To test the equipment Luigi and I also played a couple of minutes each. We only used the recording of Mons in this study, but Mons was present for the recording of Luigi and myself. Mons was alone in a room when playing Flappy Bird but the door to another room was open and Luigi and I was there, having a conversation. This conversation is faintly audible in the recording but not used in any way in the study and its content and identification of those involved is impossible to discern from the recording. Gameplay ran for less than 5 minutes.

Doom 3

This is an action/adventure/horror game with elements of survival. This version of the game ran on a computer with the display connected to the TV-screen. You control a character on a space station who, after being introduced to the station, encounters monsters that needs to be destroyed. During the gameplay you encounter puzzles to further the plot and you need to collect weapons and ammunition to destroy the enemies. It is a violent game that requires quick reflexes and occasional puzzle solving between bouts of violence.

We left Mons alone with the game for one full hour while she was recorded her using a Samsung Galaxy s5. The gameplay was recorded with an online program.

Mons had full access to her mobile phone and food and drink and the researcher was available by phone throughout the session. Mons took some breaks throughout the gaming session where she paused the game. Fully edited to exclude the longer pauses the gaming experience ran 39 minutes.

Mario Kart

This is a competition game played on a console where each player drives a car trying to get first to the finish line. You can either create your own character or play as a character from the Mario-merchandise (Mario, Luigi, princess Peach, etc.) If you hit a certain cube during the gameplay, you get random items that can either hinder your opponents or secure your victory. It is a game that requires some skill and quick reactions to drive the car/kart successfully, but is also hugely dependent on luck in regards to which items you are allowed to use. Mario Kart is designed for one specific console and has its own controls which were connected to the 40-inch TV.

This particular game was played with Luigi and with other online gamers. Mons talked to Luigi, who were sat beside her in the same room, but the additional players were not able to communicate with Mons nor was she able to communicate with them. It would be completely impossible to identify these other players from the recording.

Mons and Luigi both appear in the recording but none of Luigis reactions have been analyzed nor used in this study. They were left alone for somewhere between 1-2 hours. Since the gameplay was recorded with numerous others around the world though the internet there were some longer pauses between gameplay. Fully edited to exclude longer pauses the complete gaming footage ran 20 minutes.

Guitar Hero

This is a skill-game where the game simulates guitar playing on a control shaped as a guitar. You can chose to play as a rising musician either in a band with other players or alone and follow a story about his/her/their rise to fame, or you can simply start playing choosing only difficulty of gameplay without a story. The buttons you are supposed to hit appears on the screen and you have to push them in order for the song to be completed. Depending on the difficulty you push between 3-5 buttons. Guitar hero has been released on several consoles and requires its own controller shaped as a guitar. In this study we used a Playstation 3.

Mons was left alone for 20 minutes and was already playing the game when the recording started. Some of the gameplay continued after the researcher entered the room as well. This was included in the recording but not used in the study other than when Mons was asked if the interruption decreased her concentration. The recording was done with a Samsung phone with no interruptions. Mons had no breaks throughout this run and the video needed no editing.

Observation.

I wrote short descriptions of my subjective perception of Mons' behavior during the gameplay, in the recording, and the immediate interviews. Mons has approved these descriptions and they are used as an introduction when we present the results for each game. These descriptions are not intended to be read as "true" emotions or even a significant part of the study, but rather as a description of how I, the researcher, perceived Mons behavior.

I also closely watched the recordings multiple times in order to see if I could observe any particular expression that did not seem to fit with FaceReaders analysis. I presented these instances to Mons without comment for her to make her own conclusion about FaceReaders

analysis and her own expressions. These comments have been included in the result section detailing Mons reactions to Facereader

FaceReader.

FaceReader is a computer program designed to detect emotional expressions. FaceReader creates a 3 dimensional model based on about 25 images of the participants face per second and then detects any slight changes between images that indicate when the expression is neutral or when the expression resembles the following six basic emotions; Anger, Happy, Sad, Disgust, and Fear. The program is able to detect intensity of emotion and when/if more than one of these emotions are combined and expressed at once. The version used in this project was FaceReader v5.0 (Noldus Information Technology, 2014; Uyl & Kuilenburg, 2005)

The graphs used in this paper are average emotional expression per minute, but a more detailed analysis in the form of a FaceReader printout is included as attachment which details expressions per second. A detailed analysis is also included to show peak intensity and average intensity of emotions in the results section.

Interviews.

We used semi-structured interviews with a few set questions in the beginning, but allowed for Mons to steer the conversation and focus on what she felt was the most important aspects of her emotional experience and expression. The leading questions after each recording session was very simply "How was that?" followed by encouraging clarifications of any statement involving a description of any kind of emotion. Subsequent interviews concerning each game was always a continuation of her initial interview combined with what FaceReader detected, with each emotion mentioned compared to the facereader results to calculate importance and contradiction or agreement. When FaceReader detected incidents that deviated particularly strongly from the norm, hereby called "peaks" of whichever emotion is detected, this would be included in the later interviews by showing Mons the recording of herself and asked if Facereaders evaluation of this incident seemed correct.

We recorded the participant playing four different videogames. Immediately after each session we asked her to describe her emotions while playing the games with no aid to remember her experience other than her immediate recollection. We then took the recordings, studied them closely, and then ran them through the FaceReader analysis program. Once we

had the results we asked Mons what she thought FaceReader would reveal and after she gave her guesses we presented the actual results to her. She then contributed her own interpretation and evaluation of what FaceReader detected. All the interviews were transcribed and specific expressions of emotions that needed clarification in further interviews were noted. We also revisited the recording together and Mons was given the opportunity to explain specific incidents of emotions and expressions. We used a qualitative method of coding and had a follow up interview via phone.

Timeline for collection of data

<div align="center">2014</div>

December: Mons volunteered as a participant and provided recordings of Doom 3 and Goat simulator.

<div align="center">2015</div>

January: Mons was informed of her rights and Flappy Bird, Doom 3 and Mario Kart was recorded along with short interviews.

January-February: Recordings of Doom 3 and Mario Kart were ran through FaceReader and analyzed. Goat Simulator and the initial recording of Doom 3 was deemed impossible to analyze due to technical difficulties and discarded.

February: One interview over the phone where Mons was informed of results for Doom and Mario Kart. We also decided that the recording of Goat simulator would not be included in this study other than when Mons referred to it. This interview was not recorded properly due to technical difficulties and only written notes were used in the results.

March: Mons and I watched the recordings of Doom 3 and Mario Kart together and Mons explained and "judged" the results.

March: Mons and I agreed to add another game and allowed Flappy Bird to be part of the main study. We also decided to play Guitar Hero and had an immediate interview after this recording.

April: Mons is informed of the results from the recordings of Flappy bird and Guitar Hero by FaceReader and Observer and she is asked about her experience.

April: Follow up interview where Mons has seen the recordings herself and is asked about their significance. Mons is also specifically asked if she felt comfortable playing Doom.

Throughout Fall: Mons is given updates about the writing of the results throughout fall.

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March: Mons is asked about her lasting memories of each game and allowed access to the recordings. We watch parts of them together and Mons considers how her opinions have, or haven't, changed about them. She considers which games she'd like to play again and tells about which games she *has* played again.

June: All identifiable recordings stored at equipment used in this project was deleted. The only identifiable recordings that still exist is the one Mons herself was allowed to do with as she pleased.

Ethical considerations.

This study focuses very specifically on videogames and requires little to no personal information and is rather about the participant's reaction to videogames than her own personal life. The reaction is also restricted as much as possible to Mons general reactions that does not tie to any personal experiences.

NSD, Norsk senter for Forskningsdata, previously known as Norsk Samfunnsvitenskaplig Datatjeneste, approved the project. The recordings used in this study were stored on appropriate safe equipment and deleted by June 1st 2016. The results of the anonymized recordings and transcripts of interviews with no identifiable data is also kept stored on appropriate equipment. NSD allowed for one copy of the gameplay to be given to the participant to do with as she pleases.

Mons had initially volunteered two recordings; one of Doom 3 and one with Goat Simulator, before she was informed of her rights, but none of these recordings were used in the study, though they are referred to in some of the interviews. Doom 3 is used in the study in a second playthrough. She was familiar with all the games we eventually chose to include.

One comment in the second recording of Doom 3 indicated that it was a scarier game than she had thought. Considering her reluctance to play scary games, Mons was debriefed and asked if she felt uncomfortable, wanted to stop, or needed any other appropriate follow-up for her experience. Mons concluded she was perfectly fine, and her experience was included in the results of the study with her permission.

Mons was informed that she could withdraw at any time and she need not play any of the games if they made her feel uncomfortable. I was available through all the playthrough either by phone or by presence. Mons was told she did not need to volunteer any information she did not wish to be made public.

Mons was kept up to date during the entire process and was sent drafts of the results throughout the study. This is not only for her own benefit ethically, but also keeping in terms with the method used in this study where her recollection of the experience and analysis of emotion is the focus and hers is the final word when analyzing them.

Results

Flappy Bird

Observation. Mons is left in front of a computer for five minutes. There is one incident where there is a bit of technical issues with the game but this is fixed within seconds and should not have any significant effect on the readings. I interrupt the recording once five minutes have passed.

Luigi and myself are in an adjoined room with the door open and can be heard very faintly on the recording itself. Mons' eyes do not leave the screen when playing. She occasionally yells out her results for Luigi and myself to hear and other times shout exclamations of joy and anger. She makes some very intense grimacing faces towards the end of the recording.

FaceReader. FaceReader reveals mostly Surprised, Happy and Neutral. There is a barely noticeable rise in Scared at the three-minute point. The peak of surprise which leads to a very sharp rise of Happy after the 4-minute point coincides with the technical difficulties but do not recede even after these difficulties are fixed.
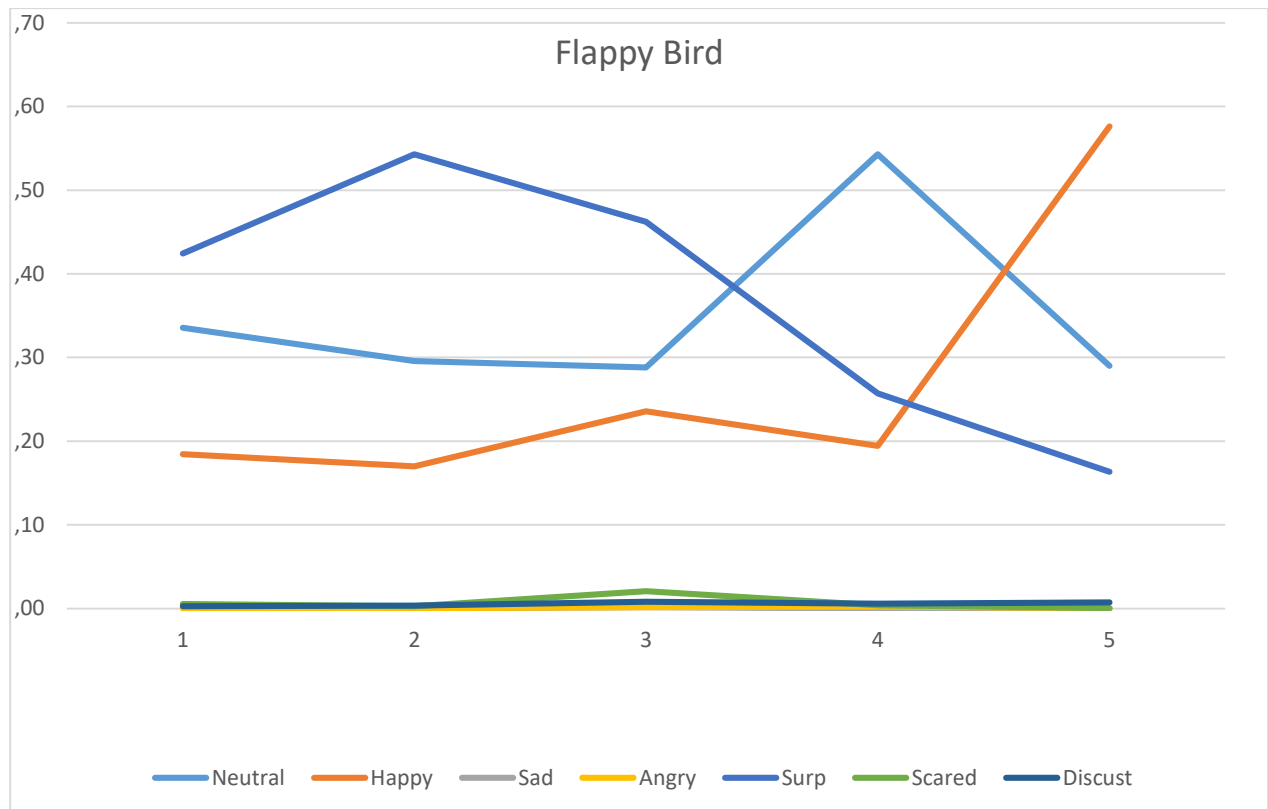
Figure 1. The minute-by minute average intensity of facially-expressed emotions during Flappy Bird. The Y-axis reflects emotional intensity, the X-axis is the timeline in minutes, and the colour-coded graph-lines represent the emotions as explained in the figure legends.

Table 1

The minimum, maximum and average intensity of the facially expressed emotions for the Flappy Bird videogame

	Minimum	Maximum	Mean intensity
Angry	.00	.18	.00
Disgusted	.00	.32	.00
Happy	.00	1.00	.22
Neutral	.00	1.00	.36
Sad	.00	.11	.01
Scared	.00	.84	.01
Surprised	.00	1.00	.41

"Surprised" is the most dominating of all emotions with a mean at .41, with "neutral" at second place and "Happy" at third with .22. None of the other emotions average higher than .01, though at maximum expression Mons shows at least one fairly intense moment of

"Scared" with a maximum intensity of .84. The mean indicates this is a very short time, as it also does with "Angry" and "Disgusted". Sad is noted with an average of .01, but never higher than .11, the least of all emotions in intensity. All emotions have a minimum of .00 so there is no guaranteed emotion throughout the gaming session.

Interview at T1. Mons is calm and occasionally grinning and giggling when asked about Flappy Bird.

> *"It was fun the first ten minutes you play then it becomes kind of frustrating (laughing). I don't have patience to check how far I got… there are so many who play this game until they reach 102 and 142 and 300 and stuff but I don't have the patience for that."*

This is the only game Mons reported immediately that she did not particularly want to play again. When trying to describe her emotions she has some difficulty defining them.

> *"At least a few seconds of joy and mostly frustration and… or irritation maybe. "*
> *"Yes happy, a little. At least those times I got a little far, then it should, I don't know…"*

Mons falters somewhat in her further guesses.

> *"Happy and angry? Maybe? Disgusted? No… don't know. Yes there should be some happy and angry. Mostly angry."*

At this point I intervene since I suspect Mons is trying to answer according to what she thinks and knows FaceReader is able to detect rather than her own emotions so I suggest frustration since it was the word she herself first used to describe negative emotions.

> *"Interviewer: Frustrated is a completely valid response as well*
> *Mons: Yes. Frustrated."*

Once Mons sees the FaceReader results she is not surprised. Mons' first words had been "Frustration" and "Joy", which fits "happy", and is not surprised by the result even if she had not mentioned "surprise" specifically.

"Surprised right. Yes, that makes sense."

Mostly she agrees with the visual analysis of her expressions after she has seen the recording. She admitted she had not even heard what Luigi and myself had talked about until she had.

"Interviewer: about that game… Did you hear me and Luigi (…)?
Mons: No (laughing) No, I didn't see that until later (laughing)"

Interview at T2. Mons's view on Flappy Bird had not changed in any way since her first interviews. However, she did admit to having played it on her own. She still maintained her original complaints about it, and she still did not care much for it.

"Interviewer: Why would you want to play more?
Mons: Yes, I don't think… I've tried Flappy Bird several times both alone and with others to kind of like make time fly but I can't be bothered… I'd rather do something else. Much better. It's so random I don't know what's happening, that's very entertaining…"

She had found the recording of herself very amusing and even shown it to one of her friends. We also talked more about why "surprise" and "neutral" was not unexpected for her when she first saw the recording and she now backs up facereader with a more detailed description of her experience.

Mons: Yes, those neutral things are maybe while you concentrate a lot, because you get really focused. And… happy and surprised I understand very well (why this was part of the results) because you manage one it's gets kind of intense? So… and then you get so happy when you have a new record and get further. A new record. And you try and try and try and try again and again and (…) and then you get so happy when you finally manage."

Mons also specifically mentions "surprise".

"Yes because I feel like it's kind of like in a way just luck because there isn't that much… control over… like you probably get more into it the more you play but… but I think a lot of it was luck. And then you get surprised because I don't expect to get any further in a way so… and then I do and then there's anew and then even further and then it's kind of…"

Mons herself also at one point ties her positive emotions directly to accomplishments. Her final word is that this is the only positive thing she can say about Flappy Bird.

"I don't think I have anything positive about Flappy Bird. Maybe that feeling of accomplishment when you get a little far maybe. Amazing feeling right then and there."
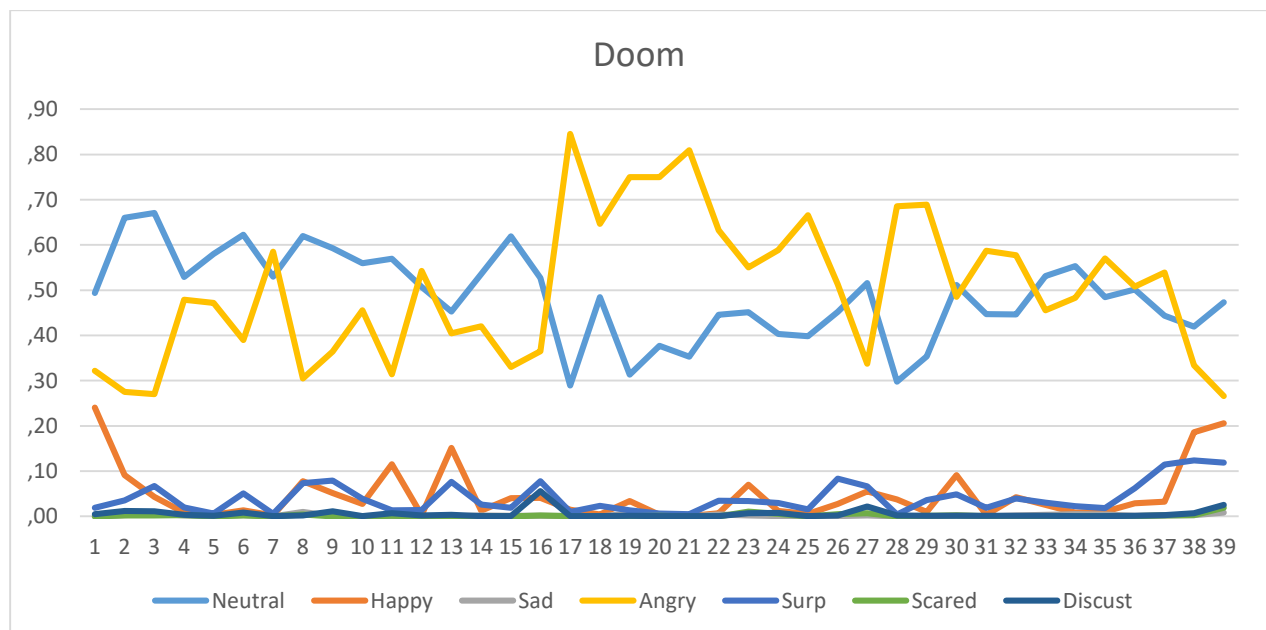
Doom

Observation. Mons was asked to play for one hour. She paid attention to the clock and sent a message by phone as soon as she had played the entire hour. Once the message had been sent, as shown on the recording, she continued playing until the researcher arrived for the interview.

The recording shows her talking throughout the game, sometimes loud exclamations, sometimes imitating the characters. She yells loudly several times, and she complains when she does not know what the game wants her to do. She swears excessively throughout the entire session. She complains at the beginning of the game that she cannot skip through the parts she has played before. She appears to be startled at several times in the game, sometimes this is followed by laughter. There are several short breaks throughout the session where she either checks her phone or eats snacks, but when playing she never looks away from the screen for too long with only one exception. There is one incident where the light in the apartment flickers in real life and Mons looks away from the game and around the room. At one point she asks how long she's supposed to sit alone, and at another point later in the session she sarcastically implies that the game is scarier than expected. Early on she notes that some of the characters meant to guide her are not very friendly, and she sarcastically comment on their non-friendliness. She spends several minutes commenting and "cooing" at one of the friendly robots meant to guide her.

FaceReader. In a minute to minute average emotion graph, "Anger" and "Neutral" has a consistently high rating throughout the game. After 15 to 16 minutes of play, there is a noticeable increase in "Anger" which coincides with Mons meeting and fighting the first monster. She continues to fight monsters through the remainder of the game. The increase in "Angry" seem to last until about 21 minutes, at which point it starts tapering off despite no major change in the gameplay. This also coincides with a slight decrease in "Surprised".

There is a large concentrated quantity of "Surprised" at the very end though, which coincides with a particularly difficult monster. "Happy" does not seem to be evenly distributed and is rather concentrated when it occurs. At 07:30 where she encounters a "cute" helper, that will be described in further detail in the interview. Otherwise "Happy" is often in connection with Mons laughing when she is startled or when her character is dying and failing to kill monsters. There is also one particular expression often connected to "Happy" that is neither connected to laughter or any kind of success which I took note of and decided to question Mons about in the interview.

Figure 2. The minute-by minute average intensity of facially-expressed emotions during Doom 3. The Y-axis reflects emotional intensity, the X-axis is the timeline in minutes, and the colour-coded graph-lines represent the emotions as explained in the figure legends.

Table 2

The minimum, maximum and average intensity of the facially expressed emotions for the Doom 3 videogame.

Emotion	Minimum	Maximum	Mean intensity
Angry	.00	.99	.51
Disgusted	.00	.74	.00
Happy	.00	.99	.04
Neutral	.01	.99	.48
Sad	.00	.27	.00
Scared	.00	.66	.00
Surprised	.00	.98	.04

The intensity of emotion confirms that though "Scared" was present, it was never recorded as intense or over a long period of time. The Maximum intensity at .66 suggest Mons was never terrified. "Surprise" and "Happy" is more intense. For "Surprised" nor "Scared" or "Happy" the mean intensity of emotion suggest that these emotions were not a big part of the experience.

"Angry" is extremely intense throughout all instances with a mean of .55, suggesting that at almost half the time Mons felt somewhat angry.

"Sad" occurs rare enough to score a mean of .00, but since there is a maximum of .27 we decided to examine closer and found one moment in Mons' appreciation of her cute helper where "Sad" makes an unexpected appearance.
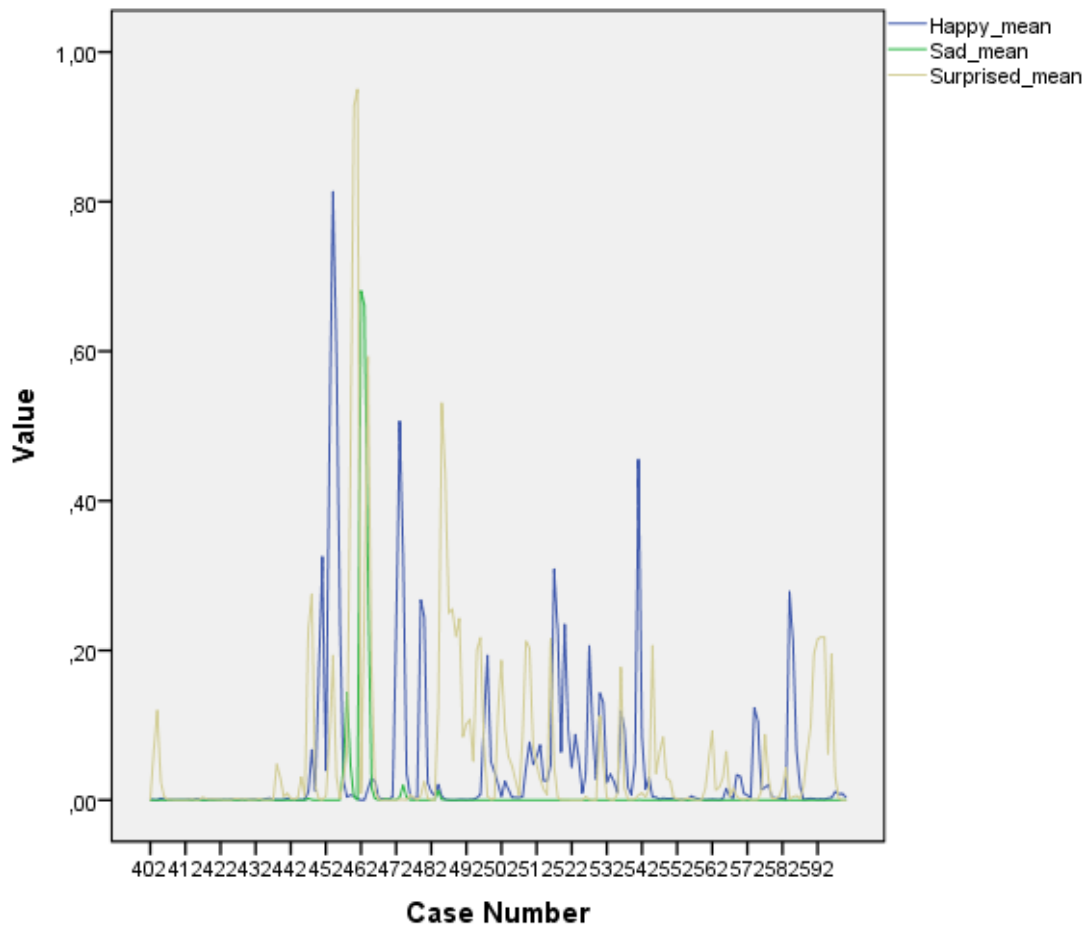
Figure 3. A second-by-second average intensity of facially-expressed happiness, sadness and surprise during 3 minutes of playing Doom 3(appearing between the 7th and 10th minute of the play). The Y-axis reflects emotional intensity, the X-axis is the timeline in minutes, and the colour-coded graph-lines represent the emotions as explained in the figure legends.

The emotions fluctuate wildly between "Happy", "Sad" and "Surprised"."Sad" is only present in one clear spike follofing "Surprised" and is almost immediately followed by a spike in "Happy".

Interview at T1. Mons was calm and smiling when answering questions about Doom 3.

"If I had time to immerse myself I might get hooked on Doom"

Mons appeared calm when answering questions about Doom. Her initial response when asked about the game was that it was scary, she had some trouble getting familiar with

the game, and she would play it again. When asked directly whether it was fun she answered that it was. The responses were not overly positive, and she quickly mentioned some issues with the gameplay.

"It was scary and… I'm very bad at familiarizing myself or understanding things immediately so I was confused and messed around and died and… died and died. (Laughing)"

"And then I died at the same spot three times so I got a little… tired of it. So there was a little snapchat and things like that in-between. But I was startled, all three times!"

"Interviewer: But was it fun?"
"Mons: Yes. It was fun."
"Interviewer: (…) Would you like to play more of this game?"
"Mons: Yes, I would. Just on a less difficult setting because (…) I couldn't get any further."

The main critique of the game was related to difficulty and her own accomplishment. She did mention that the game was scary at times and she expected facereader to detect this. As seen above, she specifically mentions being startled. She also mentioned that this game was a game best played alone, and she would have changed her behaviour if others had observed her.

"I: Do you think it would be different this time from when someone else was here? M: yes, when I was alone? Yes, I had… but. Yes, I'd behave differently if you sat behind me and looked. It would be completely different and I'd be more quiet maybe and… not spoken so much (laughter) Thought about if you were bored and things like that. It's… better to sit alone.
I: Do you think it's a game best played alone or with others?
M: Alone"

When shown the results, Mons was surprised that there was hardly any fear recorded by facereader, but when told about the amount of "Angry" she quickly offered an explanation

that fit some of her initial issues with the game. She explained how impatient she got, particularly in the beginning of the game where she could not skip scenes she had seen before. However, she was still surprised by the almost complete lack of fear.

> *"There was a lot of scary things there. It was dark and there were zombies… I hadn't thought "Angry" would be the one there was most of"*

When questioned further I asked Mons to compare this game to the kinds of scary games she had not wanted to play at all for this study. Mons would initially have a hard time describing the specific difference of her emotional experience, but she defined Doom as more of an action game rather than Horror. Her description of her own behaviour showed very clear differences between Horror-games and Doom 3. While she had played throughout the entire hour gaming session with Doom she had not been able to complete the Horror-game and eventually given away the keyboard.

> *"Interviewer: Thinking of Doom, can you compare it to the scariest game you've played?*
>
> *Mons: No… because... I haven't played that many scary games but the scariest game I've played that's… the new Slender-game that Luigi showed me. That's definitively the worst game I've ever played. It was like… horror from the very first second. I've never been so frightened my entire life I think. But… so Doom was more… it wasn't like that it was more… I don't know like shooting game. More action than horror.*
>
> *Interviewer: If we had done Slender with facereader do you think….*
> *Mons: (INTERRUPTS) There would've been a lot of… is there anything called "scared"?*
> *Interviewer: Yes*
> *Mons: There would've been a lot of it. I was so scared I had to give away my keyboard and everything. "*

At a later date she also supplements one of her initial responses about being filmed and said that when there was dialog in the game she would be more aware of the camera and get annoyed to a larger degree than when she played on her own. Especially at those points when there was a "plot" or when she got stuck she would feel an additional need to perform.

She compared it to another game where she had not been aware of the camera at all, except when it was turned on or off.

> *"Yes …I said that I didn't notice it. Eh… at least when playing Mario Kart (mumbling) I think it was… But err… But there I was so focused I forgot about it. I only though about it when we checked (the camera). But when playing Doom and I sat there alone… I knew it was there and… and that might've had something to do with me getting a little impatient maybe… that I had half an hour and… I don't know."*

Once Mons had watched the recording with the researcher she would again confirm that she did indeed *look* angry at times, exclaiming unprompted that that "this is anger", and even without the gameplay-video she was reminded of the source of her anger. The first time the tape was studied Mons was also asked if she swears a lot in everyday life to which she replied that she did, yet once she had seen the recording herself she said she had no idea she had sworn that much.

When I personally had looked through the recording I had prior to the interview noted one specific expression that to me did not appear to be "Happy". I asked Mons to provide an explanation and her own interpretation of her expression every time facereader had concentrated spikes of "Happy". Mons agreed some of these did not represent "Happy".

> *"Mons: It's that expression there. Oh, no there isn't a lot of happy there. (Mons laughs)*
> *Interviewer: Here as well*
> *(Mons laughs)*
> *Interviewer: Here something is supposed to happen… no…*
> *Mons:(the game is) Boring"*

Further on she continues to use the single word "exasperated" when this one particular facial expression was shown. Several instances facereader recorded as "Happy" was often discarded as being this specific expression. The one clear exception where "Happy" indicated confirmed happiness was when Mons had a helper in the game. In the game she comments on the cuteness of the helper and "coos" at it. Mons needed some prompting before she could remember this creature, and the transcription of the game playing video was helpful, however

when she did recollect the incident she could remember her feelings and the creature quite well.

> *"Mons: Yes it was one of those little spider-things, I don't know why I thought it was cute really. But I, it was this little… creature that was, yes that was going to take me to a place that came out of the wall and I was going to follow it and then go further into the wall when it was there and like. A tiny one… Really cute little err… service robot thing*
> *Interviewer: Were you happy when you saw it?*
> *Mons: Yes I was, in all the misery"*

> *"It might be compassion with such cute things, I usually do that."*

Mons spends almost one whole minute of the recording finding this robot cute. It is also notably one of the moments where FaceReader picks up a very rare spike of "Sad".

Further on we examine other occurrences of "Happy", where very often Mons is laughing and making a lot of noise.

> *"Mons: I think I was startled, and then I laughed at that maybe because I screamed. Loudly.*
> *Interviewer: Why do you think you got that, why do you think you laughed?*
> *Mons: I think I laughed at myself because I screamed, because I was startled. Maybe because I was afraid they were going to hear me or something (laughs)"*

At other times happiness was recorded when Mons character dies. Mons describes this behaviour as laughing at herself.

> *"Probably because I… got… er… maybe exasperated at myself, and then a little, yes. I feel like... sometimes yes I get annoyed and like if, but that's if I can't do anything or don't understand, if I die… it's like I'm startled oh god, like, and then we just continue."*

Interview at T2. Several months later when Mons was asked about her memories of the game she seemed to remember the negative experiences better than her positive ones. She

remembers specifically the last monster and technical difficulties from her first experience with the game, which was not included in this study.

> *"Interviewer: Ok, then I'd like to ask you about the games we played. Do you remember any of the characters?*
> *Mons: No, I only remember the guy I was with in the office and I remember some of those monsters. And I remember the game crashed and I was (...) out. But that wasn't then, it was another time I played? When we tried?*
> *Interviewer: Yes, the first time?*
> *Mons: Yes the first time yes. That's what I remember best when it crashed."*

She remembers very little of her positive experiences, only with prompting from the interviewer does she remember the "cute robot" but even she herself specifies that she had not remembered it if she had not been reminded of it. She hardly remembers any of the characters or situations on her own aside from the last scary monster.

Her stance towards the enjoyment of the game has also changed somewhat, and she focuses even more on her own performance, which she had mentioned earlier as well.

> *"Interviewer: Would you want to play it again?*
> *Mons: From that one experience I had there then… no. But it was negative it was err… I didn't get very far, I didn't understand, it was lagging (...)*
> *"Interviewedr: So, but can you say anything positive… experiences, emotions, what you liked about Doom?*
> *Mons: (laughing)*
> *Interviewer: Oh dear*
> *Mons: Uhm, there was the controls…*
> *Interviewer: And the bad?*
> *Mons: Yes, it wasn't the games fault, but it was like I didn't get into it, it was, got a little annoyed and I didn't understand everything I didn't get it and I messed around for…"*

She is also better at defining her fearful emotions and compares the intense last monster encounter as very similar to her experience with the scary game.

"Mons: Those monsters. I can't remember what they looked like but the last one. It was pretty creepy. When I'm not familiar with the game and don't know what's happening then I'm… I'm very fearful when it comes to scary games like those. Afraid of nothing. A bit chicken. So instead of trying to play I just mess about and… being afraid of (laughing) mess."

Mario Kart

Observation. Mons and Luigi played for somewhat more than one hour. They handled the recording device and time management themselves, but I was available in the same house and checked in on them after one hour had passed. Mons smiles several times throughout the game and "whoops" occasionally. She hardly looks away from the screen at all during the play-sessions. She and Luigi talk to each other throughout the game, but all conversation is restricted to what happens in the game. At the beginning they mention being on a team against the others. Mons has several exclamations of anger, surprise and joy. She laughs several times. She swears some, but not as excessively as in Doom. At times she and Luigi talk about specific characters and what they do in the game. Throughout the gameplay Mons can be seen to lean heavily to one side, towards Luigi.

FaceReader. More than half of the recording showed "neutral" as the dominating state. The dominating emotion is "Happy". "Disgusted" is also noticeable.

When considering all of the emotions, "Neutral" and "Happy" are fairly evenly distributed, while "Angry" and "Surprised" are present only at certain points. "Disgusted" is also fairly even, but with some instances where it fades away, often corresponding to "Surprise", especially between 09:00 and 12:00 minutes. Unlike all the other games Mario Kart has very clear and definite spikes of emotions that correlates directly to specific situations that are not necessarily repeated. For example; The "Angry" pocket at around 04:00 to 06:00 corresponds to an incident where Mons is beaten by another player. Other than this specific incident, "Anger" is hardly present at all except at the very end. The "Surprised" pocket at 09:00 to 12:00 corresponds to Mons finishing one round with very good results.
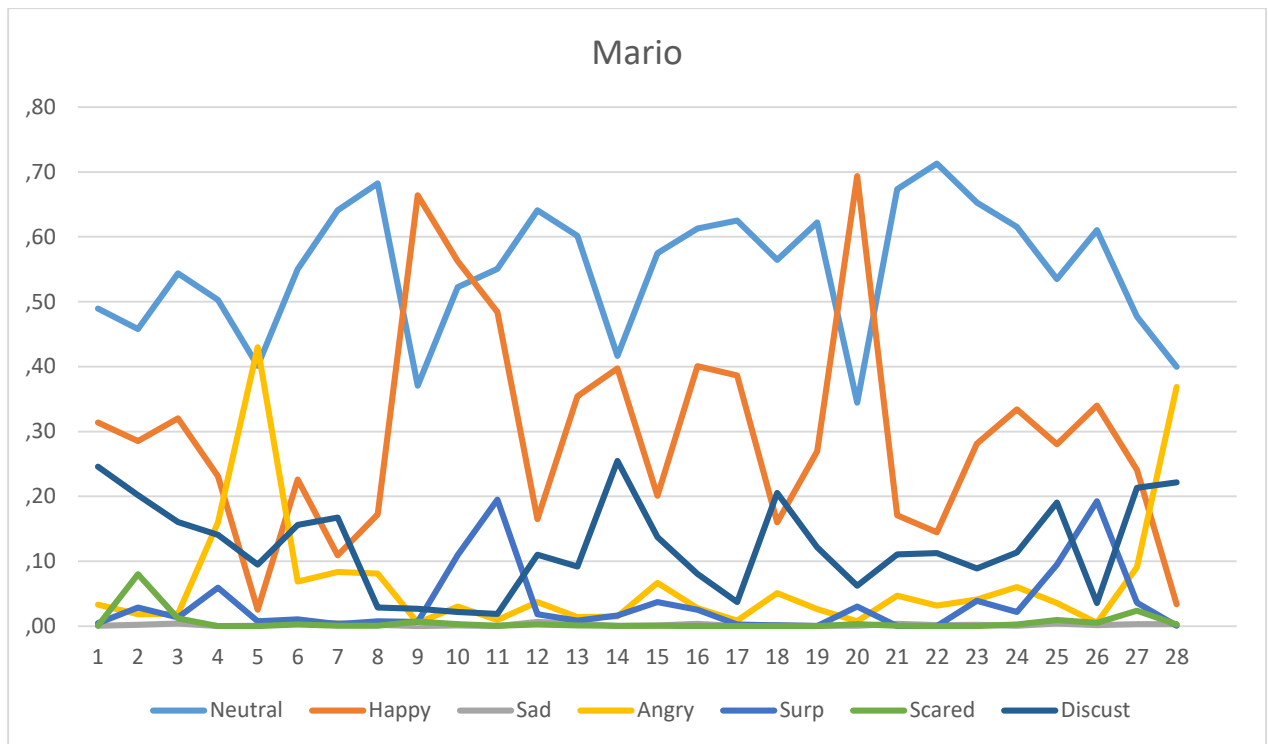
Figure 4. The minute-by minute average intensity of facially-expressed emotions during Mario Kart. The Y-axis reflects emotional intensity, the X-axis is the timeline in minutes, and the colour-coded graph-lines represent the emotions as explained in the figure legends.

Table 3

The minimum, maximum and average intensity of the facially expressed emotions for the Mario Kart videogame.

	Minimum	Maximum	Mean intensity
Angry	.00	.98	.07
Disgusted	.00	.96	.12
Happy	.00	1.00	.29
Neutral	.00	.98	.55
Sad	.00	.26	.00
Scared	.00	.97	.01
Surprised	.00	.98	.03

When considering intensity of emotion, it is notable that her mean happiness is at .29. Happy is the most intense regularly occurring emotion in this game. Despite being noted by facereader almost throughout the game, "Disgust" is rarely expressed strongly and has a mean

rating at .12. The mean of "Sad" is .00, but there must be at least one incident that scores high enough on the maximum to reach .26. Closer examination of the results show that this incident occurs between 5 and 6 minutes in, this is a moment where Luigi scores extremely low and Mons throws her a look.

Interview at T1. When asked about Mario Kart, Mons delivered by far the most enthusiastic response in a less serious manner than the other games. When asked if she enjoyed the game she answered "yes!" in a type of sing-song voice and she smiled throughout the entire initial response-interview. She could see herself playing this game for a long time.

> *"Interviewer: So how was this?*
> *Mons: Fun! Yay!*
> *Interviewer: Ok, was this game better to play with or without other people*
> *Mons: It was… both. It's very fun to play with Luigi since we hype each other up*
> *and… we play together and… so it's probably best with."*

Part of her enthusiasm is strengthened by her enjoying the company of Luigi. When asked about specific feelings she felt in the game she did not seem quite sure which one would be most notable. She felt all of them.

> *"Many things at once, (laughing) but er… frustration and… suddenly very happy*
> *and… you go from first to twelfth place in no time and then back to fourth and then*
> *down to nine and then… you win!"*

She had nothing negative to say about the game in the initial interview. Though she did not deny negative emotions. In fact, as the above quote shows, frustration was included as part of why Mario kart was fun. She makes a reference to another "fun" game that was not included in this study, as being fun in a different way, but still a game she imagines would get boring after a while, unlike this one.

> *"Interviewer: Which game has been most…fun so far?*
> *Mons:I suppose it's Mario Kart… because, well you want to win and something new is*
> *happening on every field and it's a lot of fun to play. I could play forever which I*
> *couldn't have done with Goat Simulator because… because it gets too monotonous."*

Her description of feeling all emotions is the main draw towards this game. Her initial rapport was all emotions at once, so she was not surprised at any of the facereader results when they were presented to her. When viewing the recording she also explained "Disgust" easily.

> *"Interviewer: Can you explain disgust?*
> *Mons: Yes. At everyone else who was driving (laughing)"*

I asked Mons about other contributing factors to her "Happy", especially considering the waiting period and what could potentially have been an element of frustration, but Mons did not remember this as important.

> *"Mons: No, it's like you said, we were on a team and there was a bit of waiting but then we chatted and it wasn't such a big deal."*

Interview at T2. Mons fondness for the game had not dilated months after her session despite not having played it since.

> *"The positive? Yes, it's like I mentioned the entire atmosphere of the game. It is… It's frustrating to lose, but I kinda think it's fun anyway. Many playing fields, a lot of different things… laughter and fun and falling and explosions and…"*

She also remembered clearly which characters she preferred and which she disliked. She remembered specifically the goal of beating Mario. As an in-joke she mentions "(profanity) Mario" throughout the recording, and this is repeated several times in the interview as well once she starts remembering the characters.

> *"Interviewer: Did you have a favourite character?*
> *Mons: I played with her a lot, so it had to be her because she made funny noises and is so cute and… yes it's the princess. (Laughing) (profanity) Mario! (both laughing)*
> *Interviewer: Yes that was my next question your (least favourite)*
> *Mons: Right! Mario! "*

Guitar Hero

Observation. Mons was left alone for about half an hour. I was in the same house and easily available at all time. Mons started playing the game as soon as she was given the controller. This was before the camera was set up and tested. Her eyes do not leave the screen during the most intense parts of the game. Throughout the game there are very few exclamations and very little talking. Sometimes in between songs she shakes her wrist as if in pain, which is later confirmed as being exactly this in response to intense gameplay. She asked the me to watch the time for her, but when the researcher returns Mons keeps playing for several more minutes until the song is finished. Mons barely acknowledges my return and I choose to not interfere until Mons has finished the song.

FaceReader. There are noticeable gaps in the latter part of the recording, and reviewing the video shows that at times FaceReader mistook a blank white wall in the background for Mons face at times. This was taken into consideration when Mons was presented with the results.

"Angry" is most prevalent with "Surprised" and "Scared" being noticeable. There is a slight increase in "Happy" around 05:00 minutes, when Mons has finished picking out the songs she wants to play and is starting to play them. This coincides with a slow increase of "Surprised". There are some instances where "Happy" is increased where she is shown the results for her performance. "Scared" has several peaks throughout the recording, as do "Surprised". Sad occurs every now and then, but it is hard to connect the emotion with specific occurrences in the game.

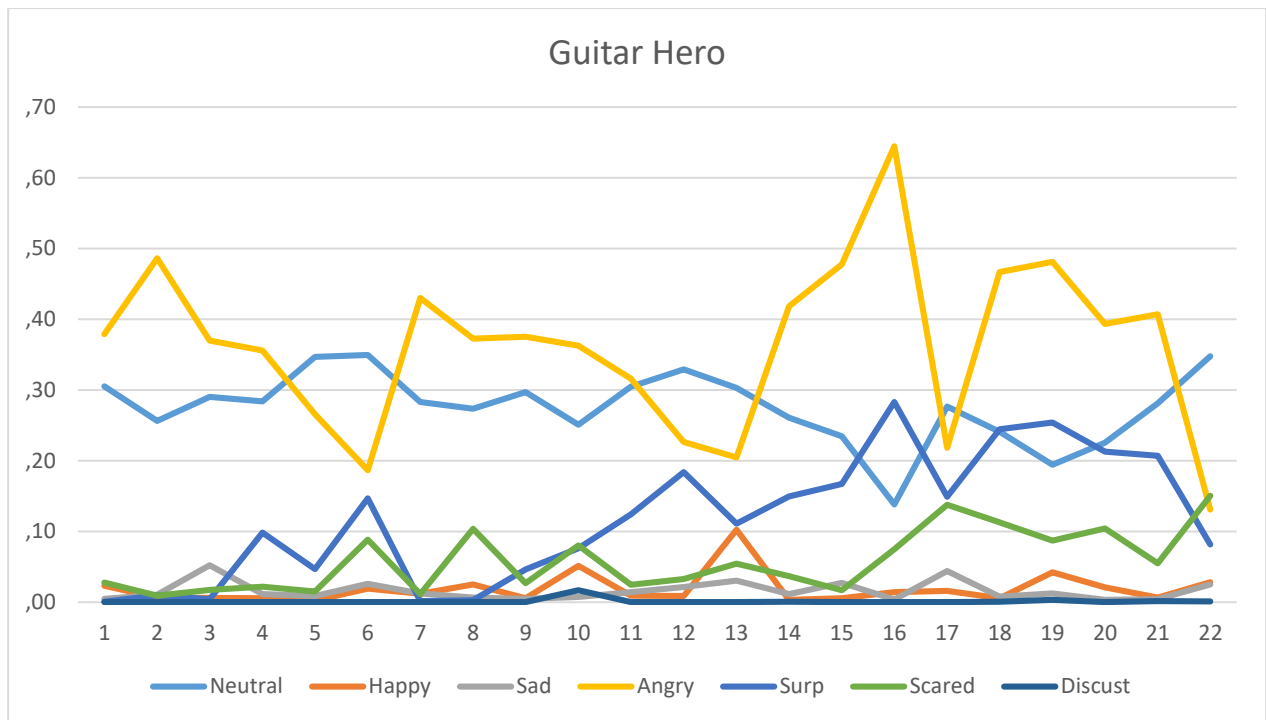Disgust is one single very short grimace ten minutes in.

Figure 5. The minute-by minute average intensity of facially-expressed emotions during Guitar Hero. The Y-axis reflects emotional intensity, the X-axis is the timeline in minutes, and the colour-coded graph-lines represent the emotions as explained in the figure legends.

Table 4

The minimum, maximum and average intensity of the facially expressed emotions for the Guitar Hero videogame

	Minimum	Maximum	Mean
Angry	.00	.98	.34
Disgusted	.00	.92	.00
Happy	.00	.83	.02
Neutral	.00	.89	.30
Sad	.00	.63	.02
Scared	.00	.99	.05
Surprised	.00	.99	.06

"Angry" is decidedly the most prevalent emotion, in maximum expression and mean intensity. While "Surprised and "Scared" both have noticeable spikes on the main readout, and have a maximum of .99 intensity, their means are at .05 and .06, respectively, indicating that neither were noticeable except at very specific moments. "Sad" and "Happy" makes the

occasional appearance, but its average is low and neither have higher than .90 maximum intensity.

Interview at T1. Mons was smiling and relaxed when answering questions about Guitar Hero.

"Guitar hero is always fun"

Before playing the game, Mons reported her history with this game and described it as one she always enjoyed playing. She had played it alone and her skill was such that finding comparative fellow players is hard.

Despite enjoying the game Mons has a hard time explaining her emotions other than "fun" when playing the game. When asked what she thought the facereader results would be she would also have some difficulty trying to define her emotions. She settles on neutral, or rather the absence of emotion, instead of predicting any specific ones.

"Interviewer: What should facereader have picked up?

Mons: Probably a lot neutral. Because I'm very focused. Err… and there's a bit of waiting so I don't know. A lot of neutral. Err… I can't imagine there being much of anything else really. Maybe if I manage something really well… (…) or something I was a little bit happy. (…) At least I think so. So I should…. As far as I can remember there isn't much more than neutral."

When shown the results she questions almost all of them, but when shown specific emotions she also tries to provide some tentative explanations.

"Mons: (looking at the prevalence of "Angry") Really? (very surprised) That must have been all the waiting!

Interviewer: Possibly, at the beginning you had to do all the technical stuff. (choosing songs). There was also a lot of neutral.

Mons: Yes.

Interviewer: In addition there was also surprised and scared.

Mons: Scared? (laughs) Ok… well… probably scared of… maybe not making it."

When asked about her positive emotions she would seem to have a hard time pinpointing her exact feelings. Sometimes she would even discuss her own feelings with herself. She mentions that joy is connected with performance, and that she masters it fairly well.

> *"Interviewer: What (in Guitar Hero) gives you most positive emotions?*
> *Mons: Just playing really? Especially if I hit 100% and yes. But yes. Just the playing to me is really… I can play until I can't, until I can't feel my hand anymore."*

> *"Mons: Err… not like extreme joy really. Err, really heh... neutral, I know what's coming and I know fairly well how I'll do but yes I like to play it but it's not kind of like happy-happy feeling. It's because it's a fun game I kind of master it fairly well. I won't sit there grinning when I'm playing, maybe if it's a really good song."*

> *(When asked which emotions are easiest to remember:)*
> *"Mons: Ok. And I haven't talked about GH? There is… can I say joy, like, it's… it's nice to play! (Laughter) But I feel it's… (Mumbling) not angry and I'm not frustrated and I'm not hap… happy in a way… It's hard to explain. (Louder) It's hard! (Laughing) Yes, it's fun to play at least. Fun."*

Once Mons has seen the recording she acknowledges that she looks angry at times, but not all the time As mentioned, she did not expect facereader to pick up on this joy at all, but she had not expected to look angry either. She would say she looked focused, but when trying to define her negative emotions she would again have a hard time explaining them

> *(Asked about frustration while watching clip)*
> *"Mons: Err… maybe some frustration when I can't hit the buttons, like earlier it was very important for me to, or… when I had the one game I played the same songs over and over and I got so good I did really well and it became sort of a thing that I was going to hit every note, I had to have 100%, and then… and I kinda always had that err… so when I don't (hit every note)… I look very focused there, but everyone probably does. When they play GH."*

Interview at T2. Months later Mons would still have difficulties describing her emotions, and had very little to add. However when we tried to pinpoint positive emotions she did mention that her enjoyment of the game often overrode actual physical pain.

"Interviewer: And… Guitar Hero? What gives you the most positive emotions?
Mons: Just playing really? Especially if I can manage 100% and yes. But, yes. Just the playing itself for me is really… I can play until I cant, until I can't feel my hand any longer."

Mons would go on to confirm that the shaking observed in the recording was indeed one of pain. She stopped playing once to shake her hand intensively only once in the recording, but kept on playing not long after this.

Summaries of the four games

All games revealed strong emotions according to FaceReader and Mons herself. To understand and analyse the results we will summarize the results for each of the games and try to focus on their main components.
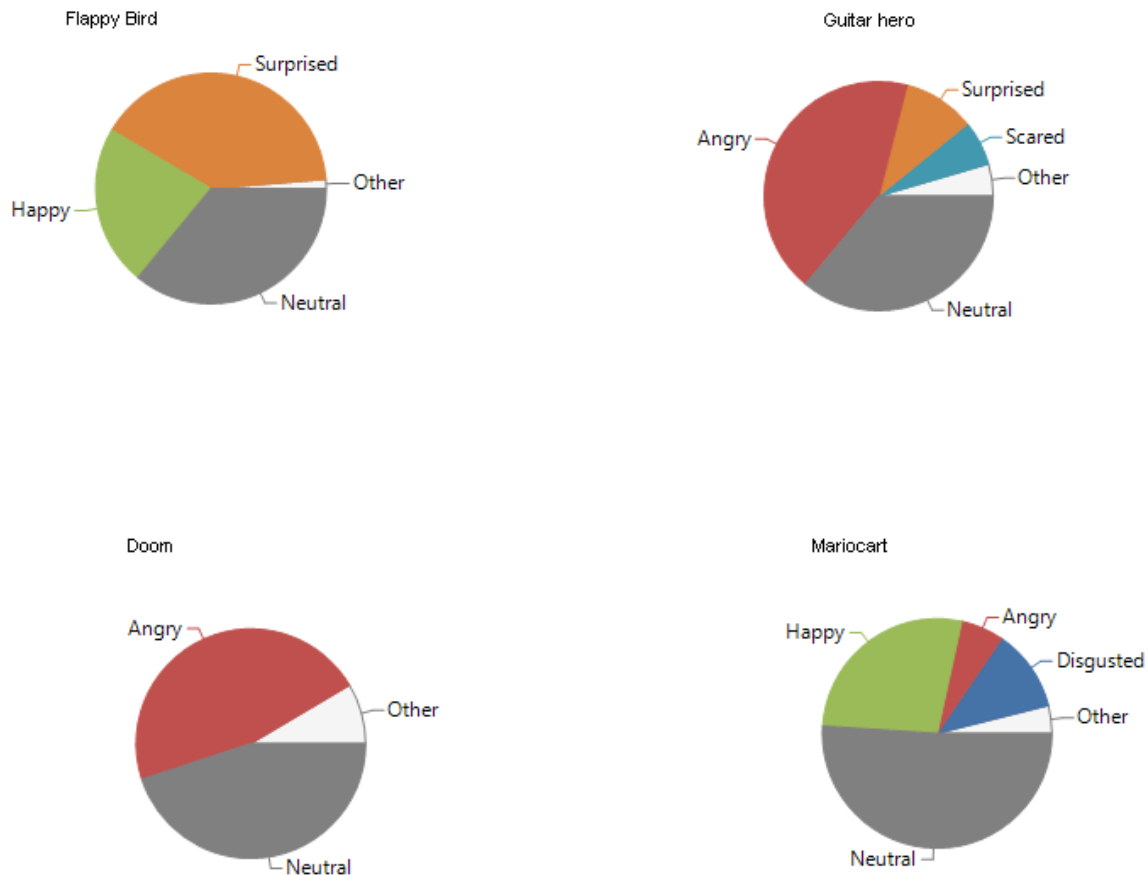
Figure 6. Proportions (%) of facially expressed emotions during the four video games.

Flappy Bird. FaceReader recorded several emotions, mostly positive. In the recording she is shown to grimace and move her head energetically when she fails. "Happy" and "Surprise" was very prominent. Mons did not dispute these results and would explain each of them in terms of how she experienced the game.

Mons did not care much for the game and did not wish to play it again. She had initially expected anger and happiness to be prominent in the FaceReader results. Despite not liking the game she admitted to having played it again during the months between the recording and the final interview. Her final word on what was positive about Flappy Bird was an occasional very strong and positive feeling of accomplishment when she did well.

Doom 3. FaceReader recorded mainly anger and some surprise. "Surprise" coincides well with the times Mons was startled. "Happy" was also noted at times during the game, but when reviewing the recording Mons did not always accept her expression as being one of happiness and instead described it as exasperation. The few exceptions being when her

character was killed or attacked and she laughed at herself, and one instance where she had a "cute" helper. Closer analysis show that this interaction with the helper also included one of the very rare spikes of "Sad". She might want to play the game again but on an easier setting.

In-between the immediate and final interview Mons had not played the game again and in the final interview she revealed she did not wish to, again commenting on the difficulty.

Mario Kart. FaceReader picked up on Happy and Surprised. But several other emotions were present as well. This is the only game that featured "Disgust" this noticeably.

Mons thoroughly enjoyed playing the game. She attributes this to the game itself but also to the presence of the other player with whom she conversed throughout the entire game. Though full of in-jokes and quips, the content of these conversations were restricted to the game and what was taking place there. She expected all emotions to be present in FaceReader analysis.

Mons did not argue with any of the results, but found it slightly perplexing that neutral was shown as much as it had been.

Between interviews she had not played again, but her recollection of the game was still very positive and she remembered specific characters, incidents and in-jokes.

Guitar Hero. According to FaceReader "Angry" was a prominent emotion. FaceReader also picked up a minute increase in "Happy" once Mons started playing songs. This is the only game that had a noticeable reading of "Scared".

Mons did not quite agree with FaceReaders large reading of "Anger" and could not reconcile the results with her actual emotions, thought she could not entirely pinpoint them herself. Mons had a hard time describing her emotions when playing the game throughout the entire interview process.

In the recording she is shown shaking her hand in pain several times, once she even paused the game due to pain in her wrist but still kept on playing. This is not an unusual occurrence and Mons explained that she usually enjoyed playing Guitar Hero so much she keeps playing until the pain in her hand stops her.

Mons mentions in the final interview that she will play this game until she can't feel her hand.

Combining the emotions and comparing the games

Mons' enthusiasm and emotional expressions come across as very different for each separate game. With Flappy Bird and Mario Kart she is smiling and laughing very often. With Doom her expression changes less, but she talks every now and then. With Guitar Hero she hardly speaks at all. She is more serious when playing Doom and Guitar Hero. This variation of emotion is also reflected in both FaceReader and interviews.

To fully organize the results, we need to not only consider them as they appear for each game alone, but also compare them against each other. To do this we will first compare FaceReaders results, then compare Mons's interviews and finally try to combine FaceReader with interviews in order to find out if any of the results could be wrong or contradict each other.

FaceReader. To fully understand the difference in emotional expression according to FaceReader we compared all four games and their mean emotion.
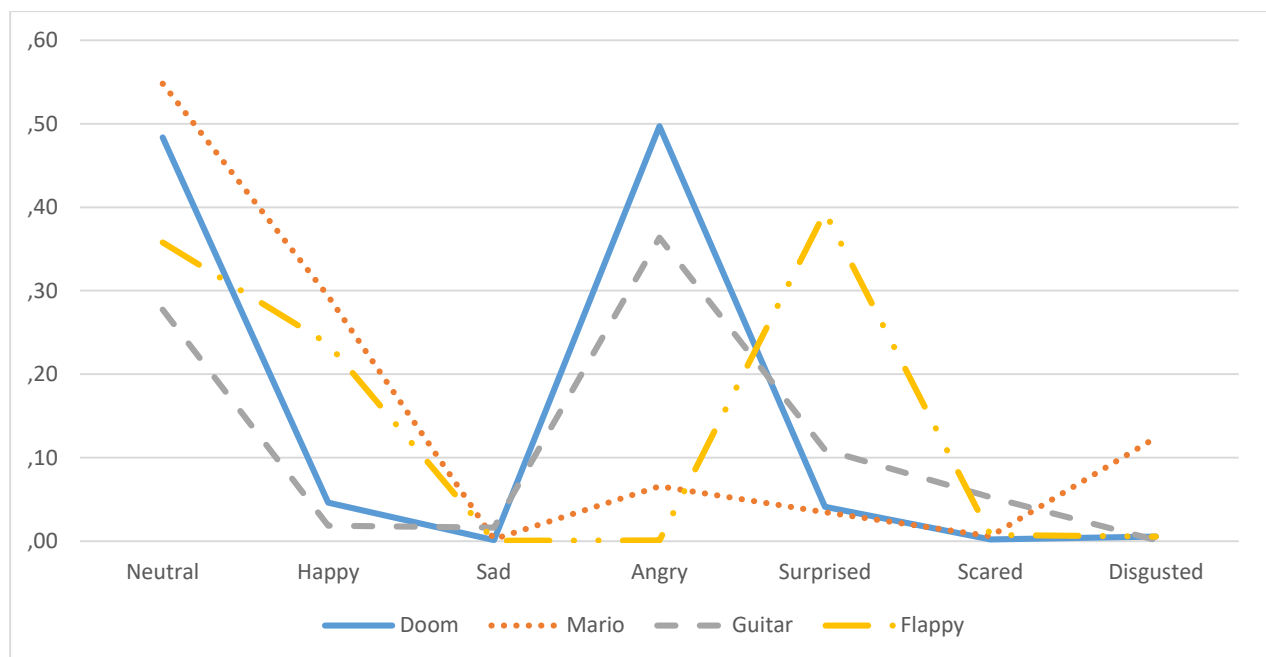

Figure 7. This is the mean average intensity of emotions across all four games, X-axis shows emotion and Y-axis represent the intensity of emotion. The lines represent the different games as described in the figure.

"Anger" seems very well represented in two games, yet its average is not even noticeable in a third game and very low in the forth. Neutral was prevalent in all the games, but the remaining emotional expressions are not very predictable concerning games in

general. This figure indicates that Videogames can induce a large range of emotional expressions, but they are extremely varied according to which game is played.

However, two emotions are noticeably similar across all four games, not for their intensity but for their absence. "Sad" and "Scared" are hardly noticeable in all four games.

While closer examination of the FaceReader results do show some incidents where "Sad" and "Scared" appears these incidents are few and not very intense. The average does not fluctuate intensely between them. Guitar Hero is the exception for both emotions, but neither is very strongly represented.

Of the emotions that are very strongly represented, though they are only present for individual games and not across all four games "Anger" is clearly dominant in two of the games, while the other emotions fluctuate. Since the occurrence of emotion indicates that videogames do indeed have emotional impact, the specific emotions are fluctuating according to each game. Specific games may influence specific emotions. To quantify the influence of game playing on emotional expression we estimated the intra-class correlation (ICC) across the four games. The ICC expresses the ratio of between-group variance over total variance, which in the present case should be interpreted as the amount of variance accounted for by the situation (i.e., the video games). Inversely, the amount of variance explained by the stable emotional disposition in the participant (i.e., Mons) is calculated as $1 - ICC$.
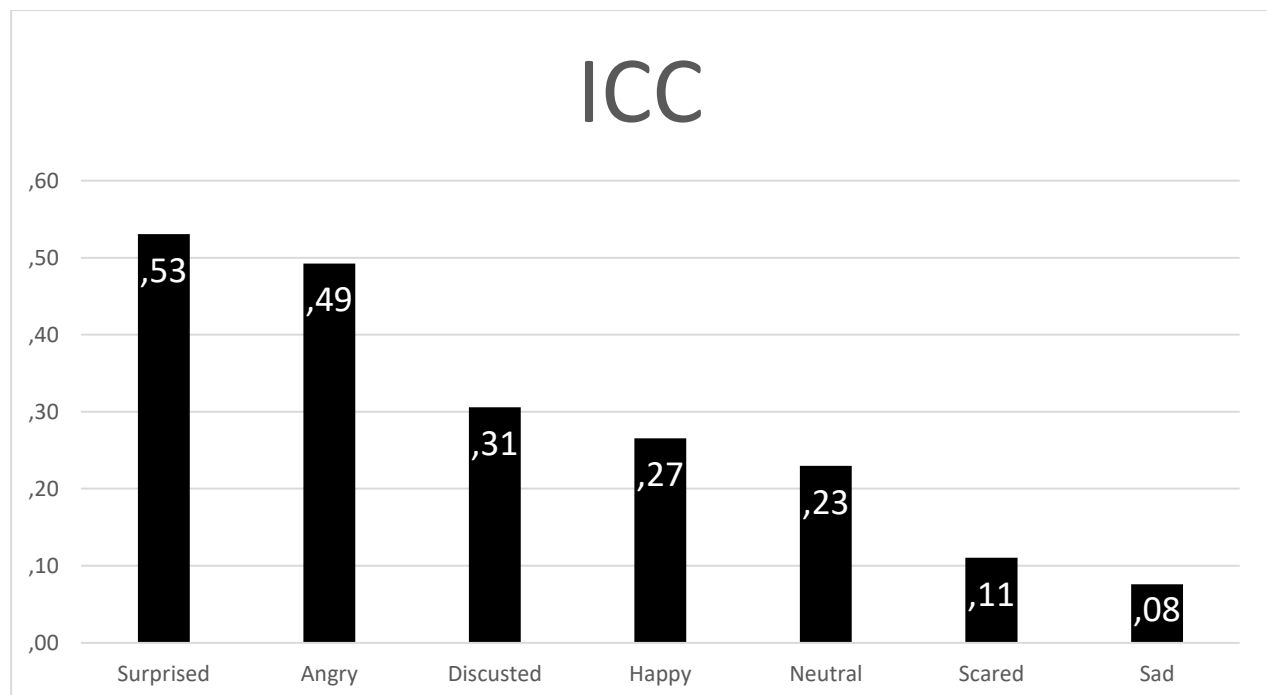

Figure 7. The bars represent the ICC for each emotion across the four video games.

Going by these results combined with the average dominating emotion from each game, one could say that the video games are doing a good job of making Mons angry; almost half of her expressed anger (49%) can be attributed to gaming. The other half (51%) comes from Mons' stable tendency to express anger—at least in the context of playing (these) video games. By contrast, only 8% of the sadness expressed in Mons' face come from gaming whereas the remaining 92% comes from her stable emotional disposition. The expression of happiness is somewhere in between, the videogames account for 27% and stability for 73% of the variance observed in happiness. It goes without saying that these numbers are very fragile, and that they need not say much about Mons' emotional disposition. One cannot trust ICC calculations based only on four games to provide reliable estimates, although they might suggest that if these results replicate over new studies and more participants, emotions such as surprise and anger could be driven more by the situation than emotions such as fear and sadness, at least when it comes to video games.

Despite the fact that Mons reported frustration and annoyance when playing Flappy Bird she did not express this at all externally. Mons expressed emotions are overall very positive, and as shown in her lack of acknowledgement of the background conversation in the recording, she was completely focused on the game.

Interviews. In short terms in the immediate interviews Mons described the games as follows:

Flappy Bird: Fun and frustrating.

Doom: Scary, difficult and startling. Somewhat fun, but too difficult.

Mario Kart: Fun, all emotions.

Guitar Hero: Fun. Very focused, but hard to explain. Predicting some "Happy" and mostly "neutral" from FaceReader.

Overall Mons considered the entire experience to be fun and interesting.

Discussion

The starting point for this study is the emotional impact of video games. We firstly wanted to explore the range of emotions that video games can induce. We also wanted to explore the reputation of video games' connection with aggression and would pay particular close attention to any instigators of annoyance or anger. We also wanted to explore how video

games have been used in cognitive psychology and pay close attention to what makes the gaming fun and what makes gamers want to keep playing.

In general, we found that there is no definite expressed or experienced emotion that is guaranteed to be felt when playing video games. Throughout FaceReaders results and Mons' interviews almost all emotions were represented, and often fluctuating immensely not only between different games but in one specific game alone. There is no emotion that can be found in both FaceReader and interviews that we can for certain expect when playing video games in general.

However, for certain games certain emotions may come to be expected. "Anger" and "surprise" as recorded by FaceReader was very much dependent on the game being played. Mons also reported frustration and some anger in some of the games. None of them were constant across all four games, neither in FaceReader nor Mons' reports, but certain games may be very effective in inducing "Anger".

Mons mentioned fun in the immediate interviews after all the games. With three of the games, Flappy Bird, Mario Kart and Guitar Hero she would mention happiness in response to specific accomplishments, but not for Doom where her description of fun almost seems to be a more of a possibility rather than her actual experience, and specifically mentions a need for lower difficulty. Fun is only mentioned when asked about Doom after the interviewer asks specifically if it was fun.

Mons did not report anything specifically positive about Flappy Bird other than a very intense feeling of accomplishment, but did not praise the game. She did praise Doom for its controls, and initially described it as a game with potential to get her "hooked on", but also mentioned frustration and it needed a different difficulty setting. However, after one year had passed, she admitted to having played Flappy Bird and had not, nor did she want to, play Doom again.

Considering the main positive critique she gave for Flappy Bird being a feeling of accomplishment, and her insistence on needing Doom to be set on an easier setting, it might suggest that the feeling of accomplishment is the main reason people continue playing. Even if the overall accomplishment is almost unreachable, even small doses of accomplishment in a, subjectively, very bad game is preferable to a game the player feels is too difficult.

The emotional impact is decidedly different for each game, both according to FaceReader and Mons herself. But after one year, the games she reported to still wanting to play, or having played, all had in common Mons feeling of accomplishment. While the one

game she initially had deemed as one she could get hooked on with a lower difficulty setting, she did not want to play again.

With Flappy Bird this feeling of accomplishment is described specifically as the only draw towards the game. With Mario Kart Mons mentions the joy she gets from beating Luigi who is a very good player, and with Guitar Hero she described her skills with pride. With Doom Mons did not report any feeling of accomplishment, and her direct praise was restricted to a possibility of being "hooked on" the game if it was more suitable to her abilities. The controls and design of the game were well done, but possibility of accomplishment was more important.

In the following segments we will explore the varied responses from both FaceReader and interviews by combining results and hopefully further understanding of them and perhaps comment on the accuracy of FaceReader. Further we will investigate the importance of "Angry", the importance of "sad", and the importance of accomplishment.

Combining FaceReader with Interviews

Overall, Mons thought facereader did a good job with three of the games, and even though she had mentioned fear as her main emotion in Doom which FaceReader did not pick up on, she did not dispute FaceReaders results. With Mario Kart and Flappy Bird she did not have any specific expectations, and was not particularly surprised by the results.

She was not as satisfied with FaceReaders analysis of Guitar Hero, but she had a hard time describing her feelings herself as well and could not pinpoint precise wrongdoings.

A large amount of neutral expressions was not very surprising, all games require focus and focus can easily be translated to neutral. Mons was surprised by the lack of neutral in Guitar Hero, she had thought that would be the dominating reading considering she had a hard time pinpointing her own emotions. She was also surprised by its frequency in Mario Kart, initially explained by her as the waiting between courses that were edited out before FaceReader. When one considers the potential occurrence of flow this is not very surprising.

Almost all the instances of "Happy" in Doom 3 was explained rather as exasperation and laughing at her own failures rather than Mons actually being happy, however her expression has some similarities with a smile. The distinction between smiles and laughter is an important one (e.g., Keltner, 2009), and we do not yet know how this distinction is captured in computer based analyses of emotional expressions.

Mons agreed with facereader that Happy would be present in both Flappy Bird and particularly Mario Kart. Both of these were games she performed well. It is also important to note that Mons was not alone for those two games.

Throughout all the interviews Mons would never mention sadness. The incidents Facereader picked up were described more as sympathy, the two major incidents being when she saw the cute robot and sympathy when Luigi did not do as well as Mons when playing Mario Kart. Both of these also coincides with Happiness. This might also be a fault in facereaders inability to pick up more complex emotions such as precisely sympathy.

Mons described various degrees of frustration and difficulty with all games. Most of all Doom. It is important to note that while she did describe frustration, her immediate feedback to Doom was that it was scary. Fear was almost non-existent in facereaders results, but Anger was definitively well represented.

Mons does not disregard any of the instances of "Surprise" She felt it fit right in with Flappy Bird, and in Doom she mentions being startled several times, which coincides with "Surprise" rather than "Scared".

"Scared" is hardly present at in facereaders results with the exception of Guitar Hero. Guitar Hero was again hard for her to explain, but suggested she might be afraid of not performing well. Mons definitively mentions experiencing some fear when playing Doom, and in the later interview what she remembers best is one particular monster that inspired a massive amount of fear, comparable to the kind of fear she felt in the game she did not want to play. However she mentions being startled in the immediate interview, and this is the only specific kind of fear she mentions. "Surprised" may have been the emotion FaceReader picked up when Mons described her fear and being startled.

"Disgust" was only noticeably present in Mario Kart. This is also the game where anger is hardly there. Mons immediately explains the facereaders reading of disgust as that of the other players. This is also the only game where Mons plays against other gamers, which may explain why she does not experience "Disgust" in the other games.

The importance of "Anger"

However, as shown by the analyses of ICC, the emotions more likely to be influenced by video games are "Surprise" and "Anger", and they are also the emotions Mons expressed very often. Considering the prevalence of scientific research and divide on the aggression and violent repercussions of playing video games we will pay special attention to the emotion of

Anger, and in the case of Doom, we might also consider its connection to surprise and why Mons had not remembered being angry while remembering being scared very clearly.

According to FaceReader, Mons experienced Anger in three of the games. Mons did not deny this, though she had at times a hard time remembering anger specifically. The fact that Mons had a hard time remembering anger may be one of the reasons scientific research is so divided on this particular topic. The nature of Anger as an emotion is also perhaps part of this confusion. Why do we experience anger? According to most emotional theories, anger is a response generated when an active plan is obstructed (Keltner, et al., 2014), and as such it can sometimes be observed as part of the fight response in the so-called "fight or flight mechanism". Mons remembered being afraid throughout a lot of Doom, yet FaceReader hardly ever picked up on fear, but there is a rise in angry as soon as she encounters a scary situation and the first monster she needs to fight.

The intense situation and needing to be constantly alert could be the fight or flight reaction deciding fight needs to be the natural response, inciting an Angry look even though this is not what Mons really felt. The game Mons refused to play is designed to induce the flight-response, when asked, Mons suggested that this game was more likely to show more fear. For future research it might be interesting to find out if non-violent scary games show significant difference in emotional expression and experience from violent scary games.

The other reason Mons shows so much "anger" might also be her frustration when being "stuck in the game". Her insistence on a lower difficulty for potential future play could indicate this. As mentioned there is a rise in "Anger" once the first monster appears and any potential "fight or flight" response kicks in, but there is definitively some "Anger" before this too.

Mons initially reported to have enjoyed playing Doom but changed her mind in later interviews. She said the game had been scary and hard, she complained she had gotten stuck at the very end. Her initial expectation from FaceReader would be that fear would be prominent, despite describing several difficult and frustrating situations. When anger instead was the prominent emotion Mons accepted it and repeated her frustrations with more detail and intensity. However, she still maintained that fear had been a very big part of her experience, and this was also what she remembered best in the last interview.

But aggression, anger and fear is not what defines Mons' video game experience. Nor did it in any way decide whether she liked the game or not. On the contrary, she had fun playing all the other games, and did not like Doom. Something other than "Angry" counts as the most important part of the gaming experience.

The importance of "Sad"

There is one emotion that could be said to be constant throughout both FaceReaders analysis and Mons' interviews, but it is not constant with appearance, but rather constant with its lack of appearance.

Neither FaceReader nor Mons can find strong sadness in any part of her gaming, according to FaceReader "Fear" is as rare as "sad", but Mons describes her experience with Doom as scary, while she never ever mentions "sad" in any of the interviews. "Disgust" usually has a very low mean intensity throughout all four games, the exception being .12 for Mario Kart. but it's maximum intensity is always higher than "Sad" which has the lowest maximum intensity across the board, even when the average is higher than "Disgust".

The ICC analysis showed that the lowest situational impact of games on emotions was for "sad". However, this may be due to the high number of observation in which sadness was completely absent (i.e., scored as 0). The few observation of intense sadness available makes the ICC estimate even more instable than it is for the more frequently observed emotions.

There are two noticeable spikes in sadness and they can only be found when directly connected to Mons feeling sympathetic to other players or game-characters in Doom and Mario Kart. There is a very slight "sad" throughout Guitar Hero, but that is the game Mons is most comfortable with and one of her favorite games of all. Though her description of emotion is at its most vague when playing Guitar Hero, none of her descriptions can be connected to any feeling of sadness. On the contrary she describes Guitar Hero as "always fun".

This lack of sad supports studies within cognitive therapy that suggest videogame might be used for therapy. One other noticeable occurrence that further strengthens video games as therapy is that Mons is able to ignore the pain in her hand in order to keep playing the game. When Mons plays Guitar Hero, all negative emotions are unimportant to her, what she remembers is only the fun. How can we define the "fun" Mons found when playing video games as an emotion?

There are two games Mons greatly enjoyed, and one she did not like, but somehow found herself playing again nonetheless.

The importance of accomplishment

Mons had nothing negative to say about two of the games, and while Mons reportedly did not like Flappy Bird, she did replay it at a later date and described one positive emotion as an intense sense of accomplishment. She had not played Flappy Bird a lot between the

interviews, and she specifies that she would rather be doing something else. Flappy Bird is much more easily accessible than all the other games as well and she mentions it being simply being a way to pass time. But despite all her misgivings about the game she had not allowed her evaluation of Flappy Bird as a bad game stop her from playing it, yet after some time Doom had lost all its appeal. Something drew her to it that Doom lacked.

The one game she did not show any interest in was Doom, which she at first felt needed a lower difficulty setting, and then later on discarded completely. One study on violent video games show that violence is not a requisite for enjoyment, but rather competence and autonomy were the most important factors for enjoyment (Przybylski, Ryan, & Rigby, 2009).

Positive emotions may be present and influence the enjoyment of a game though, Mons performed admirably when playing Mario Kart considering she is fairly new to the game and even won at one time, but in the interview she makes it very clear that part of her enjoyment lies in the social aspect. Mons performed well, but when she didn't do well her companionship still made her smile. Other positive emotions, regardless of they come from actual gaming or the company of others, might make gameplay more fun, but if there is a feeling of accomplishment, then it matters very little what other emotions are present. Even if they are almost only frustration and even physical pain, Mons will try the game again if she feels somewhat accomplished.

She might have lacked the companionship when playing Guitar Hero and Flappy Bird, but he one unifying emotional impact that all these three games had on Mons that explained their appeal was the feeling of accomplishment. Mons also describes her abilities when playing Guitar Hero with something akin to pride, mentioning it easy for her to master. The description of when she does well when playing Flappy Bird and when she managed to outperform the other players in Mario Kart is very similar, perhaps reminiscent of what Lazzero calls "Fiero- the ultimate game emotion" (Lazzaro, 2004), though her actual appreciation of these two games is wildly different. This might prove to be the essential emotion of motivation to play video games. It is the sole motivator for her to play Flappy Bird, and despite her dislike of this game, she did play it again.

Throughout the experience however Mons would often have a hard time defining her emotions. This could confirm what we have seen in educational theory, video games are intellectual stimuli that have perfected learning techniques. Of the four games Mons remembers, and talks most, about her emotions when playing Doom. It is perhaps no coincident that Doom is the only game that is not time-based in its puzzle solving.

Both Mario Kart and Flappy Bird require constant and vigilant focus. Guitar Hero required Mons to choose which songs she would play, and she had as much time she wanted to do this, but once game play starts she also need to focus completely on the task. Emotions become secondary to the focus. Csikszentmihalyi's "Flow" theory in action mentions this specifically, it is not emotions that motivate those in the flow, but the complete and utter focus on the task (Cowley et al., 2008; Csikszentmihalyi, 1975).

Limitations

The very nature of this study is exploratory, it will not support any specific theory or deny it. The goal is to explore a variation of emotion and form there compare expression and experience to see how videogames influence these differences. FaceReader was chosen as a tool to do this to have as objective description of emotion as possible, but seeing as FaceReader is not 100% correct, thus we cannot trust its results completely.

But despite FaceReaders failings, Mons might allow herself to be influenced by FaceReaders results. I noted in the results section one specific incidence where I myself noticed this taking place and Mons quickly considered this and used her original description of her emotion rather than try to make her experience fit FaceReader. I chose to allow Mons to see the FaceReader results as I expected that it would be hard for her to remember specific emotions, but this unfortunately allows for her to be influenced by them too.

I may also be influenced by FaceReaders calculations and when interviewing Mons I might have at times focused more on what fit or didn't fit with FaceReaders results.

Two of the games were played with other people present, one of which is her friend. Mario Kart and Flappy Birds lack of "Anger" and surplus "Happy" expressions might be a direct result of other people's company. We have considered this as a variable to a lesser degree, but it is not deeply researched for this particular study as companionship with other gamers is inherent in some games.

There were some technical difficulties in some of the recordings. FaceReader had some moments notably in Flappy Bird due to Mons' movements, and in Guitar Hero for reasons unknown, where it focused on other things than Mons' face.

There is also a danger of bias in both Mons and myself when researching video games seeing as we are both very fond of them.

Conclusion and implications for further studies

There is no definite emotion we can expect when we play video games in general, but some specific games might influence "Anger" more than even the gamer themselves is aware of. Particularly if the other emotions the participant experienced are intense in other ways. For future studies of gaming this should be taken into consideration should the chosen method be of a qualitative nature. Anger was not an emotion Mons reported immediately after the gameplay, what she remembered best was feeling scared and secondary frustrated.

Our study somewhat supports cognitive theory in that video games offer a very good distraction from sadness and physical pain seeing as FaceReader picked up minimal "Sad" and our participant reported no sadness and willfully ignored physical pain in order to keep playing one of the games.

Our participant was drawn to the games she performed well in, even when she did not particularly like these games. The feeling of accomplishment might have been her strongest motivator to keep playing a game.

Our participant found FaceReader to be quite good but its presence in future research should definitively be further developed, perhaps to include combinations of base emotions to include others.

References

Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological science*, *12*(5), 353-359.

Anderson, C. A., & Bushman, B. J. (2002). The effects of media violence on society. *Science*, *295*(5564), 2377-2379. http://doi.org/10.1037//O022-3514.78.4.772

Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of personality and social psychology*, *78*(4), 772.

Bartholow, B. D., & Anderson, C. a. (2002). Effects of violent video games on aggressive behavior: potential sex differences. *Journal of Experimental Social Psychology*, *38*(3), 283–290. http://doi.org/10.1006/jesp.2001.1502

Basak, C., Boot, W. R., Voss, M. W., & Kramer, A. F. (2008). Can Training in a Real-Time Strategy Video Game Attenuate Cognitive Decline in Older Adults? *Psychology & Aging*, *23*(4), 765–777. http://doi.org/10.1037/a0013494

Bosson, J. K., & Vandello, J. a. (2011). Precarious manhood and its links to action and aggression. *Current Directions in Psychological Science*, *20*(2), 82–86. http://doi.org/10.1177/0963721411402669

Carnagey, N. L., Anderson, C. A., & Bushman, B. J. (2007). The effect of video game violence on physiological desensitization to real-life violence. *Journal of Experimental Social Psychology*, *43*(3), 489–496. http://doi.org/10.1016/j.jesp.2006.05.003

Cowley, B., Charles, D., Black, M., & Hickey, R. (2008). Toward an understanding of flow in video games. *Computers in Entertainment (CIE)*, *6*(2), 20.

Csikszentmihalyi, M. (1975). Beyond Boredom and Anxiety: Experiencing Flow in Work and Play. *The Jossey-Bass Behavioral Science Series*, 231. http://doi.org/10.2307/2065805

Csikszentmihalyi, M. (2007). Finding flow. *Psychology Today*, 1–7.

Damasio, A. R., & Sutherland, S. (1994). Descartes' Error: Emotion, Reason and the Human Brain. *Nature*, *372*(6503), 287-287.

Cunningham, S. (2011). Understanding the effects of violent video games on violent crime. *Zentrum Für Europäische Wirtschaftsforschung*, *27*(3), 1–41.

Dill, K. E., & Dill, J. C. (1999). Video game violence: A review of the empirical literature. *Aggression and violent behavior*, *3*(4), 407-428.

Dominick, J. R. (1984). Videogames, television violence, and aggression in teenagers. *Journal of Communication*, *34*(13), 136–147. http://doi.org/10.1111/j.1460-2466.1984.tb02165.x

Dondlinger, M. J. (2007). Educational video game design: A review of the literature. *Journal of applied educational technology*, *4*(1), 21-31.

Ferguson, C. J. (2010). Blazing angels or resident evil? Can violent video games be a force for good? *Review of General Psychology*, *14*(2), 68–81. http://doi.org/10.1037/a0018941

Ferguson, C. J., Barr, H., Figueroa, G., Foley, K., Gallimore, A., Laquea, R., … Garza, A. (2015). Digital poison? Three studies examining the influence of violent video games on youth. *Computers in Human Behavior*, *50*, 399–410. http://doi.org/10.1016/j.chb.2015.04.021

Funk, J. B., Baldacci, H. B., Pasold, T., & Baumgardner, J. (2004). Violence exposure in real-life, video games, television, movies, and the internet: Is there desensitization? *Journal of Adolescence*, *27*(1), 23–39. http://doi.org/10.1016/j.adolescence.2003.10.005

Green, C. S., Pouget, A., & Bavelier, D. (2010). Improved probabilistic inference as a general learning mechanism with action video games. *Current Biology*, *20*(17), 1573–1579. http://doi.org/10.1016/j.cub.2010.07.040

Griffiths, M. (1999). Violent video games and aggression: A review of the literature. *Aggression and violent behavior*, *4*(2), 203-212. http://doi.org/10.1016/S1359-1789(97)00055-4

Grøttum, E. T., Vikås, M., Svendsen, S. H., Hopperstad, M. S., Ravndal, D., & Grivi brenna, J. (2012). Breivik: Brukte skytespill som siktetrening. *VG.* Retrieved from http://www.vg.no/nyheter/innenriks/terrorangrepet-22-juli-rettssaken/breivik-brukte-skytespill-som-siktetrening/a/10065433/

Hall, C. B., Ph, D., Derby, C. A., Kuslansky, G., Ambrose, A. F., Sliwinski, M., & Buschke, H. (2003). Leisure Activities and Risk of Dementia in the Elderly, 2508–2516.

Hromek, R., & Roffey, S. (2009). Promoting Social and Emotional Learning With Games: "It's Fun and We Learn Things." *Simulation & Gaming*, *40*(5), 626–644. http://doi.org/10.1177/1046878109333793

Hunicke, R., LeBlanc, M., & Zubek, R. (2004). MDA: A Formal Approach to Game Design and Game Research. *Workshop on Challenges in Game AI*, 1–4. http://doi.org/10.1.1.79.4561

James, E. L., Bonsall, M. B., Hoppitt, L., Tunbridge, E. M., Geddes, J. R., Milton, A. L., & Holmes, E. A. (2015). Computer game play reduces intrusive memories of experimental trauma via reconsolidation-update mechanisms. *Psychological Science*, 1–15. http://doi.org/10.1177/0956797615583071

Johnson, D., Jones, C. M., Scholes, L., & Colder Carras, M. (2013). Videogames and wellbeing: A comprehensive review.

Karlsen, F., & Jørgensen, K. (2014). Mediepanikk eller medieskepsis? – En analyse av dataspilldebatten etter 22. juli. *Norsk Medietidsskrift*, (1), 42–62.

Keltner, D., Oatley, K., & Jenkins, J. M. (2014). *Understanding emotions* (Third ed.). Hoboken, NJ: Wiley.

Keltner, D. (2009). *Born to be good: the science of meaningful life.* New York: Norton.

Keltner, D., Oatley, K., & Jenkins, J. M. (2014). *Understanding emotions* (Third ed.). Hoboken, NJ: Wiley.

Lazzaro, N. (2004). Why We Play Games: Four Keys to More Emotion Without Story. *Game Developer Conference (GDC)*, 1–8. http://doi.org/10.1111/j.1464-410X.2004.04896.x

Lucas, K., & Sherry, J. L. (2004). Sex Differences in Video Game Play. *Communication Research*, *31*(5), 499–523. http://doi.org/10.1177/0093650204267930

Mazur, A., Susman, E. J., & Edelbrock, S. (1997). Sex difference in testosterone response to a video game contest. *Evolution and Human*

Mazur, A., Susman, E. J., & Edelbrock, S. (1997). Sex difference in testosterone response to a video game contest. *Evolution and Human Behavior*, *18*(5), 317–326. http://doi.org/10.1016/S1090-5138(97)00013-5

Mcgonigal, J. (n.d.). Superbetter. Retrieved from https://www.superbetter.com

Merry, S. N., Stasiak, K., Shepherd, M., Frampton, C., Fleming, T., & Lucassen, M. F. (2012). The effectiveness of SPARX, a computerised self help intervention for adolescents seeking help for depression: randomised controlled non-inferiority trial. *Bmj*, *344*, e2598. http://doi.org/10.1136/bmj.e2598

Murphy, C. (2011). Why games work and the science of learning. In *Interservice, Interagency Training, Simulations, and Education Conference* (pp. 260-272).

Noldus Information Technology. (2014). Reference Manual Version 6.

Przybylski, A. K., Ryan, R. M., & Rigby, C. S. (2009). The motivating role of violence in video games. *Personality and Social Psychology Bulletin*, *35*(2), 243–259. http://doi.org/10.1177/0146167208327216

Ji, Q. (2014). Game for Better Life: A Review of Jane McGonigal's Reality is Broken. *Journal of Games Criticism*, *1*(1), 1-4.

Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion*, *30*(4), 347–363. http://doi.org/10.1007/s11031-006-9051-8

Staiano, A. E., & Calvert, S. L. (2011). Exergames for Physical Education Courses: Physical, Social, and Cognitive Benefits. *Child Development Perspectives*, *5*(2), 93–98. http://doi.org/10.1111/j.1750-8606.2011.00162.x

Svendsen, S. H. B. (n.d.). " Bug or feature ? " Seksuell trakassering i online dataspill. Retrieved December 1.2016 from http://pdfsr.com/pdf/bug-or-feature-rapport-om-seksuell-trakassering-i-online-dataspill

Singer, J. A., & Salovey, P. (1993). *The remembered self: Emotion and memory in personality*. New York, NY: Free Press.

Uyl, M. J. Den, & Kuilenburg, H. Van. (2005). The FaceReader : Online facial expression recognition. *Psychology*, *2005*(September), 589–590.

Vaage, O. F. (2015). Fritidsaktiviteter 1997-2014: Barn og voksnes idrettsaktiviteter, friluftsliv og kulturaktiviteter. *Resultater fra Levekårsundersøkelsene*.

Wingfield, N. (2014). Feminist Critics of Video Games Facing Threats in "GamerGate" Campaign. *New York Times.* Retrieved December 1, 2016, from http://www.nytimes.com/2014/10/16/technology/gamergate-women-video-game-threats-anita-sarkeesian.html?_r=0

Yee, N. (2006). The Labor of Fun: How Video Games Blur the Boundaries of Work and Play. *Games and Culture*, *1*(1), 68–71. http://doi.org/10.1177/1555412005281819

Zaman, B., & Shrimpton-Smith, T. (2006). The FaceReader: Measuring instant fun of use. *NordiCHI*, *189*(October), 457–460. http://doi.org/10.1145/1182475.1182536

APPENDIX 1

Formal Consent form

Forespørsel om deltakelse i forskningsprosjektet
”Emosjonelle responser på dataspill. En casestudie som kombinerer et kvalitativt intervju med en computerbasert måling av ansiktsuttrykk”

Bakgrunn og formål
Hensikten er å analysere emosjonelle reaksjoner mens man spiller et dataspill. Slik ønsker vi å få mer detaljert kunnskap om sammenhengen mellom en pågående aktivitet og de emosjonene som genereres fortløpende av aktiviteten. Dette skal måles i en casestudie (N = 1) der forsøkspersonen filmes mens vedkommende spiller et dataspill av ca. 2 x 30 minutters varighet. De filmede ansiktsuttrykkene analyseres ved hjelp av et dataprogram som registrerer intensiteten til 6 ulike emosjonssuttrykk. Dette programmet heter "FaceReader" og er produsert av selskapet Noldus i Nederland. I tillegg skal forsøkspersonen intervjues etter at dataspillet er over, og beskrive sine egne følelser verbalt mens vedkommende ser på filmen av seg selv som spiller dataspillet.

Hva innebærer deltakelse i studien?
Studien innebærer å bli filmet mens man spiller et dataspill. Deretter innebærer studien et kvalitativt intervju med selvrapporterte beskrivelser av hvilke følelser som ble opplevet mens man spilte spillet Spørsmålene vil være av typen «Hva følte du der» og «Hvorfor tror du du følte på den måten». Intervjuet tas opp på lydbånd, som slettes når det er transkribert (dvs. skrevet ned i en elektronisk tekstbehandler, f.eks. Mocrosoft word*).* Du vil ikke bli spurt om å delta mer enn du selv ønsker å gjøre og er komfortabel med å gjøre.

Hva skjer med informasjonen om deg?
Alle personopplysninger vil bli behandlet konfidensielt. Det betyr at filmen med ansiktsuttrykk og lydopptak lagres på en minnepinne som er nedlåst på et laboratorium tilhørende UiT. Når analysene er gjort slettes både lyd og filmopptak og det vil ikke lenger være mulig for noen å spore de dataene vi har samlet inn til deg.

Prosjektet skal etter planen avsluttes i april 2015. All personidentifiserbar informasjon vil da bli permanent slettet.

Frivillig deltakelse
Det er frivillig å delta i studien, og du kan når som helst trekke ditt samtykke uten å oppgi noen grunn. Dersom du trekker deg, vil alle opplysninger om deg bli anonymisert.

Dersom du ønsker å delta eller har spørsmål til studien, ta kontakt med mastergradsstudent ved UiT Jane Toreskaas (jto007@post.uit.no) eller hennes veileder, professor Joar Vittersø (joar.vitterso@uit.no).

Studien er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste AS.

Samtykke til deltakelse i studien

Jeg har mottatt informasjon om studien, og er villig til å delta

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(Signert av prosjektdeltaker, dato)

APPENDIX 2

Interview guide

Intervjuguide for prosjektet *"Emosjonelle responser på dataspill. En casestudie som kombinerer et kvalitativt intervju med en computerbasert måling av ansiktsuttrykk"*

Første samtale og dataspill
Første samtale vil gå ut på å forklare oppgaven og gjøre klart at forsøkspersonen (FP) skal være komfortabel med situasjonen. FP vil også bli informert om «let's play» videoer. Det vil bli valgt spill som skal spilles og det skal organiseres filming. FP vil også bli spurt om tidligere erfaring med dataspill.

Her er spørsmålene til første samtale:
- Har du spilt mye dataspill før?

- Hvordan syntes du det var å spille?

- Hvor mye spiller du nå?

Så spilles dataspillet mens forsøkspersonen filmes slik at ansiktsuttrykkene blir tydelig med på filmen. FP kommentarer under spillets gang blir tatt opp samtidig med at det filmes.

Andre samtale
Andre samtale vil foregå rett etter endt spillsesjon. FP vil bli forklart at det er meningen å fange opp egen opplevelse av sinnstilstand og egen tolkning av spillopplevelsen. Det vil også bli spurt om FP er komfortabel med å fortsette. Her er spørsmålene til andre samtale. Det kommer til å bli en åpen samtale om dette med mulige oppfølgingsspørsmål som:

- Hvordan syntes du dette var?

- Kunne du tenke deg å fortsette?

- I hvilken grad var du bevisst kameraet og opptak?

- I hvilken grad lot du kamera påvirke atferd?

- Var det noen situasjoner som gjorde spesielt inntrykk på deg?

- Var det noen spesielt positive opplevelser du husker?

- Var det noen spesielt negative opplevelser du husker?

- Hvordan tror du resultatene på av ansiktsanalysene kommer til å bli?

- Hvordan var fokuset?

- Hadde du behov for pauser utover det du tok selv?

Tredje samtale

Etter opptak vil filmen bli analysert av programpakken FaceReader og opptakene av samtale 1 og 2 vi bli transkribert. Så vil det bli laget enn redigert versjon av filmen som FP inviteres til å se sammen med forskningsassistenten (dvs. mastergradsstudent Jane Toreskaas). FP vil så bli bedt om å kommentere det vedkommende ser og sine egen opplevelser knyttet til dette.
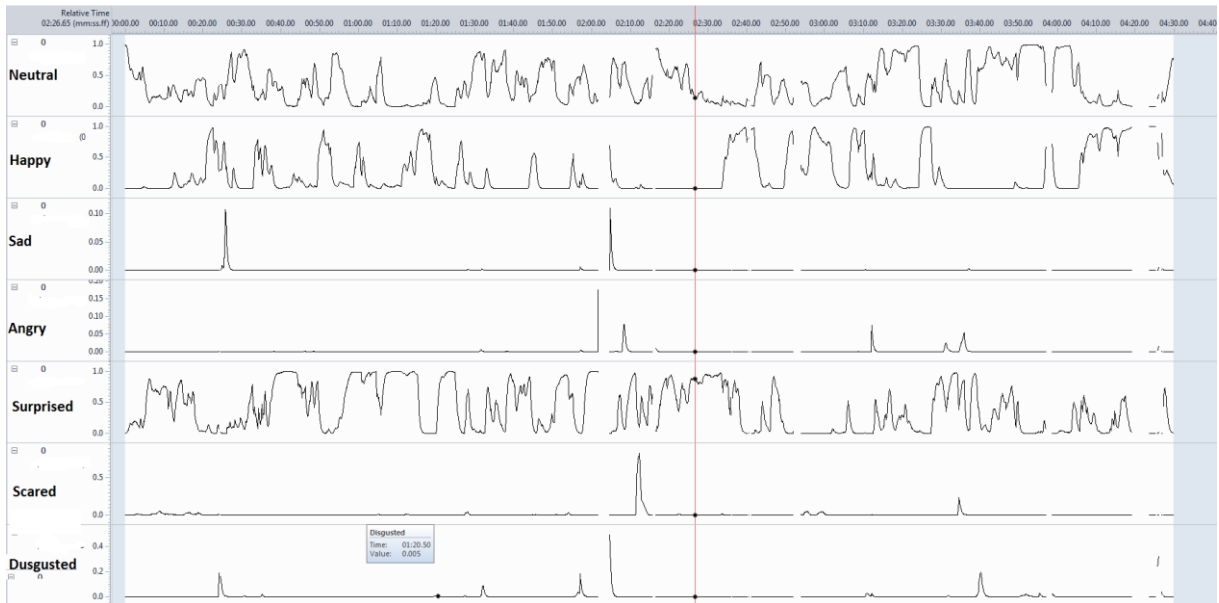
Eksempler på mulige oppfølgingsspørsmål:
- Husker du hva som skjedde her?
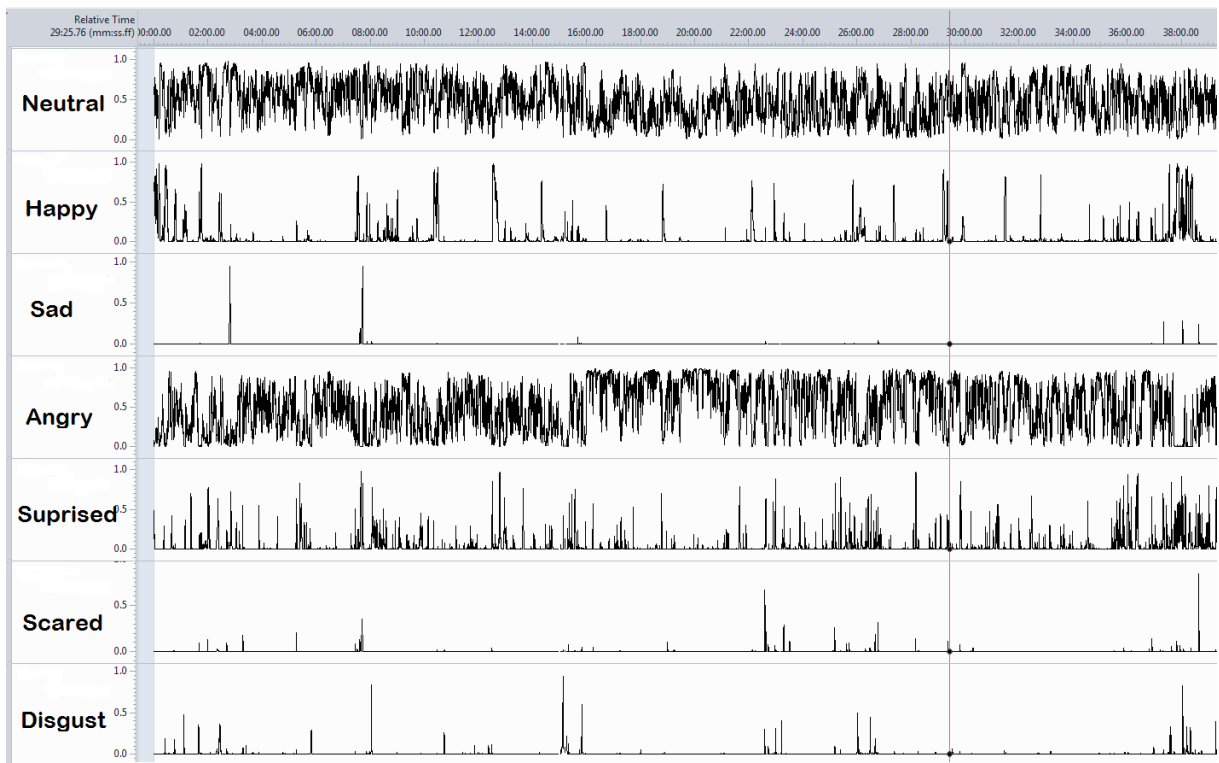
- Hvor oppslukt var du av spillet her?
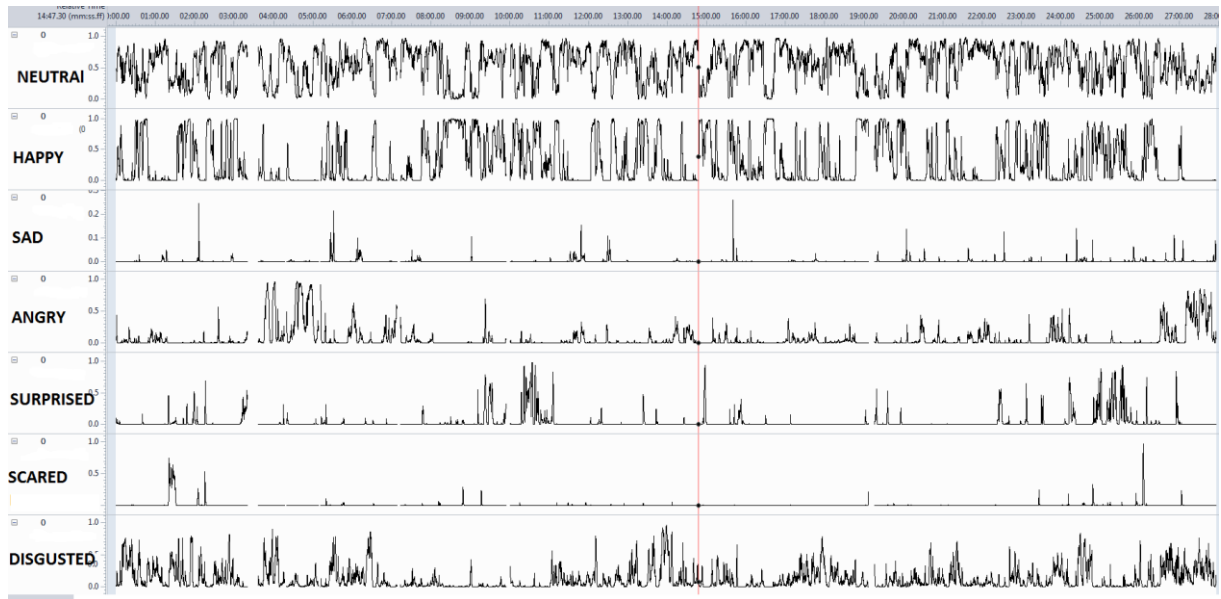
APPENDIX 3

Original FaceReader printouts

Flappy Bird

Doom

Mario kart

Guitar Hero