Bridging the immersion gap between Tabletop RPGs and Online RPGs

By

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I. Abstract

The improvement of online tools has led to a resurgence in Tabletop Role-Playing Games. With new tools for tele-play such as Roll20 and Fantasy Grounds, old-fashioned pen-and-paper games are being pushed into the new age of interconnectivity and digital interactions. Previous work in board-game and video-game research states that co-located games are ranked far more enjoyable than their digital counterparts, discovering an existing gap between the experiences.

We explored the possibility of improving the rank of digital games, by creating a more immersive experience. Is it possible to close the current experience gap between online and offline versions of TRPGs? In this study, we explore an augmented digital approach, using real-time responsive technology. By combining the efforts of previous research, we attempt to bring the benefits of digital avatar communication, into the world of online Tabletop Role-Playing Games. We maintain the benefits of non-verbal video communication, by implementing real-time face recognition avatars that react live to players' emotions and facial expressions during gameplay.

The results were far different from the expected. Leveraging previous game experience research tools and data visualization, we discovered the importance of player agency as the most important factor of immersion and enjoyment. Data shows that immersion is not necessary always a positive outcome as negative feelings can be increased by higher immersion as well. Finally, we found that players' satisfaction in-game is determined not by the level of immersion, but by the user's ability to impact the world.

II. Acknowledgments

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Gerardo M. Escandón Q.

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Chapter 1 Introduction

As outdated uncertainties and prejudices about Tabletop Role Playing Games decline, popular games like *Dungeons and Dragons* and *Pathfinder* have had a renaissance (Balko, 2016). These games' popularity has increased consistently in the past few years, and with it, an interest in furthering the available tools to support them (Charlie Hall, 2015). The popularity of the games led to a new home in the online streaming community. The newfound resurgence has the support of a passionate and technologically adept community. With new tools for tele-play such as *Roll20* and *Fantasy Grounds*, old-fashioned pen-and-paper games are being pushed into the new age of interconnectivity, digital interactions, and even augmented reality. In this study, we attempt to improve the experience of online Tabletop Role-Playing Games, by adding a layer of real-time face recognition avatars during gameplay, and this way, close the existing experience gap between physical co-located game experiences and online game experiences.

Previous work in board-game and video-game research, have found the co-located activity of playing games far more enjoyable than its digital counterpart (Gajadhar, De Kort, & IJsselsteijn, 2008). Some of the discussion points into the direction of physical presence and the instant processing of non-verbal communication between players. Other research defines the improvement of avatar interaction over video communication, the added anonymity creates a perceived safe-space, and this way, increasing the participants' self-disclosure and communication (Bailenson, Yee, Merget, & Schroeder, 2006). By combining the efforts of previous research, we attempt to bring the benefits of digital avatar communication, into the world of online Tabletop Role-Playing Games. We maintain the benefits of non-verbal video communication, by implementing real-time face recognition avatars that react live to players' emotions and facial expressions. We attempt to increase the immersion by replacing the players image with the one of the character they are currently impersonating; This way players see each other's fantasy personas, instead of their peers.

1.1 Overview and Motivation

Tabletop Role-Playing Games (TRPGs) began as co-located experiences, where players are expected to physically show up to a scheduled session and enjoy a session while seated around a table, rolling dice and sharing snacks. TRPGs share the characteristic of co-located presence like that of board-games, but the possibilities in TRPGs are not bound by physical rule-manuals, or boards, or tokens. Imagination is the processing power and limit of a TRPG, and it possesses an infinitely vast possibility of interactions, narratives and outcomes. It is this limitless possibility which makes it difficult to bundle in a digital tool. But the rise of new adaptable technology such as artificial intelligence, machine learning, and real-time facial recognition, makes the possibility to implement these tools as enhancers of TRPGs a real possibility.

1.2 Research Question

We discuss the possibility of enhancing online versions of TRPGs by using immersive digital tools. We are interested in discovering, if by creating a more immersive experience, is it possible to close the current experience gap between online and offline versions of TRPGs? With this objective in mind, we designed and ran an experiment based on the augmentation of digital avatars, we used real-time facial recognition technology and two groups of participants in a blind study and tested their results in an RPG session via online communication. We then analyzed the results using a validated survey tool for measuring game experiences.

1.3 Contribution

Because of an anomaly during the execution of the study, the direction of our research shifted slightly. Initially we attempted to implement video-interactions as our control group. However, we instead evaluated audio-interactions as our dependent variable against live-avatars, our independent variable. As we

attempted to increase the level of enjoyment by the implementation of immersive digital tools, the results were far different from the expected:

- We discovered the importance of player agency as the most important factor of immersion and enjoyment. Game mechanics play a more important role in game experience than visual representation or graphics.
- We discovered that immersion is not an equivalent of enjoyment, and while impressive visuals increase the overall power of the experience, this is not necessary always a positive outcome as negative feelings can be increased by higher immersion as well.
- The overall results suggest the level of satisfaction in-game is determined not by the level of immersion, but by the user's ability to impact the world.

We hope future game design and development will utilize this information to empower their players, instead of focusing on fancy graphics. It is important to support player agency throughout an experience. More immersive experiences may strengthen the immersive feeling, but they are no replacement for player empowerment.

1.4 Outline of Thesis

To explore the impact of enhancing tools on role-playing experiences, in Chapter 2 we first define the main concepts of our research. We look at what makes the TRPGs different from other game media, and all the concepts it involves. We explore the nature of emotions and their role in game research. We also examine studies on immersion, since this concept is our principal means of game-experience measurement. We review previous tools for game experience measurement and evaluation.

In 2.4 we develop a theoretical framework for our study. By examining the previous literature on TRPGs and their coverage in the field of Human Computer Interaction (HCI). We discover the links between RPGs and psychology studies of media for collaboration, and we learn the power of player presence and its effect on player communication. We explore avatars as the basis for a possible intervention in TRPG tele-communication as previous studies support an increase in user self-disclosure, without the minimum loss of non-verbal communication. With the information gathered, we design an approach that will allow us to test, measure, and examine probable means of improving the online TRPG experience.

In Chapter 5 we present our hypothesis, describing our intent to improve online Tabletop Role-Playing Games through digital intervention, we then describe the design for our within-subjects blind study, creating a control group for video communication and an experimental group for our augmented avatar intervention. We explain the recruitment process, the participants' descriptive statistics and the development of the study.

In Chapter 6 we introduce the irregularity that caused the directional-shift during the study. We present our data, we comment on the low statistical significance in our results. We then present data visualizations, using several distribution plots to view the general spread of our data, followed by boxplots of each category presented in the Game Experience Questionnaire (W.a. IJsselsteijn, de Kort, & Poels, 2013). These visualizations allow us to better understand the interaction between the data, and to establish the basis for our discussion.

In Chapter 7 we develop an interpretation of our results. We believe the explanation lies in the Activity Theory explored in the literature section. Our results not only confirm similar results by other researchers, but they expand on the field of social interaction, presence and perception. This combines the approaches

of other separated concepts and unifies them to improve understanding of player experience in Tabletop Role-Playing Games.

Finally, in Chapter 8 we summarize our thoughts on the experiment, we discuss the pitfalls, and we state our recommendations for future work. We believe a larger sample size, with a within subjects' design with additional conditions can create a more rounded evaluation of the experience, and better define the gap between the game interactions.

Throughout this thesis, the term "We" refers to the author, Gerardo Manuel Escandon Quintanilla, working with the advice of the thesis supervisors.

Chapter 2 Background

To better understand the scope of this project and its contributions, we now discuss the concepts this study involves. The aim of this project is to understand the impact of improved avatar interactions, and their influence during online play of a TRPG as well as the role that immersion has on TRPGs. We expect to use this information to advance the enjoyment of online TRPG experiences, and reduce the gap between online tele-play and offline co-local play. We examine the established concepts of avatars, Immersion, RPG interactions and Game-UX measuring tools.

First, we describe the origins and implications of Tabletop Role-Playing Games, and their differences from other type of games, such as board-games or video-games. Then we review the actual state of the technology used to enhance TRPGs. We define the concept of immersion as our main metric, and discuss using immersion for measuring levels of enjoyment in the game.

2.1 Tabletop Role-Playing Games

First introduced in 1974, with the publication of the very first Dungeons & Dragons book by Gygax & Arneson in 1974, Tabletop Role-Playing Games (TRPG), also referred to as Pen-and-Paper games, are social games of make-believe, in which a small group of players gather together physically for several hours at a time around a table, to imagine and assume the roles of heroic alter-egos and participate in a narrative experience mediated by a moderator and the roll of the dice.

In a TRPG session, the players are presented with challenging scenarios by the Game Master (GM). Players must adjudicate on behalf of their player characters (PCs), the protagonists in this interactive narrative, and explain their proposed actions to the GM, and then roll the dice. TRPGs are dice games and as such, the

dice rolls determine the successfulness of their actions. A player uses dice when attempting to perform an activity that has the potential of success or failure, and once cast, the GM deliberates, determines and explains the outcome of those actions to the players.

> **Player 01**: *I want to jump over to the other rooftop.*
>
> **GM**: *Roll for athletics*
>
> **Player 01**: *I rolled a 5*.
>
> **GM**: "*Thordak takes a few steps back to get a head start, as he attempts to jump 10 feet onto the other rooftop, but as he approaches the edge he slips and falls two stories onto the ground*"
>
> **GM**: (*Rolls dice*)
>
> **GM**: *Thordak takes 6 points of damage from the fall*.

It is the job of the GM to populate this fictional world with both friendly and hostile Non-Player Characters (NPCs), for the PCs to interact with. Through the action of their own fictional personas, the PCs can interact with NPCs as well as the environment. By interacting with the world, the players can impact the story, permanently affect their environment, and change the course of the narrative. A noteworthy characteristic between TRPGs and other type of games, is the infinite resource of interactions and outcomes that players can have with a story. The entirety of the game is maintained, updated and synchronized via verbal-audio communication between its participants. By contrast, in multiplayer digital games "the game state is processed by the computer, and the role played by verbal language in such game sessions is less obvious" (Drachen & Smith, 2008). In TRPGs it is up to both the GM and the players to collaborate and determine the course of the narrative. This potential of infinite streams is what makes the medium so interesting,

because no single player is responsible of the story. And no initial planning survives contact with the PCs. This creates a highly volatile experience, with a very strong element of unpredictability and mystery (Han, 2011).

TRPGs are played mostly in the imagination, and there are no required game-boards or pieces. Players imagine the narrative and aesthetics of the world. They are responsible for placing the described atmosphere and scenarios in their mind, using their imagination as glue. And while most of the game is in each individual's imagination, there is a second element to TRPGs other than collaborative narrative: the strategic combat.

TRPGs are at their core, games. Structured by complex rules and mechanics, the game creates a strategic challenge, one that attracts many players into playing the game. This facet of the experience is more cerebral and competitive. Players treat their games as exercises in strategic planning and tactical execution "like an expanded game of chess" (Han, 2011). The process of situational challenge, whether this is a social challenge with an NPC, or a tactical combat surrounded by enemies, is the core process at the heart of TRPGs. This process repeats itself cyclically, changing and evolving both the world and the narrative over and over again. As players make choices, they endure the repercussions, in a repeated series of interactions, until finally, they succeed or they fail.

The reason for playing these TRPGs however, varies from player to player. Since the setting, goals and complexity vary between game systems, the reason for each player to interact in them could be very different. Popular games like *Dungeons & Dragons* or *Pathfinder* focus on the banding of a stereotypical group of mythological archetypes, such as a wizard, ranger, fighter and cleric, and revolve around these PCs doing heroic deeds. However other systems exist just to explore quite the opposite, in game systems

such as *Vampire the Masquerade*, the players have to fight against their darkest fears, not only with monsters in the dark, but the demons inside every character. These games emphasize the moral struggle of human nature (Claudia Hall, 2015). This appeals to some players because of its ability to explore some aspects of humanity, that in the real world, could be considered unethical, or even illegal.

TRPGs are an exercise in collaborative imaginary world building, but the use of arbitrary miniature pieces is commonplace. Players use miniatures particularly during combat scenarios. They also use tiles, grids, tokens, or placeholders, to strategically represent their characters on the battlefield. Over the years, and with the power of interconnectivity, telepresence, and higher bandwidth, TRPGs have evolved into the digital era. With this transition, a new set of digital tools has emerged to support tele-play between participants. These tools focus on the simulation of board spaces and rule management, but none of them attempt to improve the perception of other players, or the augmentation of non-verbal communication.

Combining the power for simulation engines with the rise of virtual reality, *Tabletop Simulator* (Figure 2) (Berserk-Games, n.d.) is one of the tools that focuses on the creation of an immersive collective space of gathering around a table and placing miniatures on a board. It allows for an extensive multitude of board scenarios and game pieces, not restricted to TRPGs. This tool offers a collection of almost any type of popular board game including chess, backgammon, checkers, etc.

Figure 2 Tabletop Simulator (Berserk-Games, n.d.) showing a D&D session. Showcasing the tool's ability to construct and run complex board game scenarios.

Figure 1 TaleSpire, (Bouncyrock Entertainment, 2016) attempts to capture the aesthetics of tabletop experiences in the digital world, by creating detailed miniatures and tiles.

Another solution for board game environment and dungeon simulation is *TaleSpire* (Figure 1) (Bouncyrock Entertainment, 2016), a work in progress digital tool that attempts to bring the aesthetics of tabletop miniatures and tiles, and expand their potential through digital content management, endless board space, sound and environmental music, and changing weather.

Other solution for rules management, organizing notes, monsters, and character management, resources like Fantasy Grounds (Figure 4) (SmiteWorks, 2017) focus on improving content management for 20-sided dice game systems, such as *Dungeons & Dragons* and *Pathfinder*. As means of revenue, these detailed and developed tools, often have partnerships with content creators to sell indexed content and narratives to players. Apart from organizing content these tools offer a centralized text-based online chat system to allow player communication and dice rolling, map display and interactive tokens.

Free-to-play alternatives have surfaced as a response to a growing need to access online TRPGs tools to support tele-play and indexed content management. *Roll20* (Figure 3) (The ORR Group, n.d.) is an online platform that shares most of the features previously mentioned in the *Fantasy Grounds* tool. In addition, it maintains a community system dedicated to finding other players, advertising running campaigns and schedule game sessions between its members.

Figure 4 Fantasy Grounds (SmiteWorks, 2017) is a complex rule management system, with indexed content search, chat and dice rolling system, and 2D aerial view of the game map and tokens.

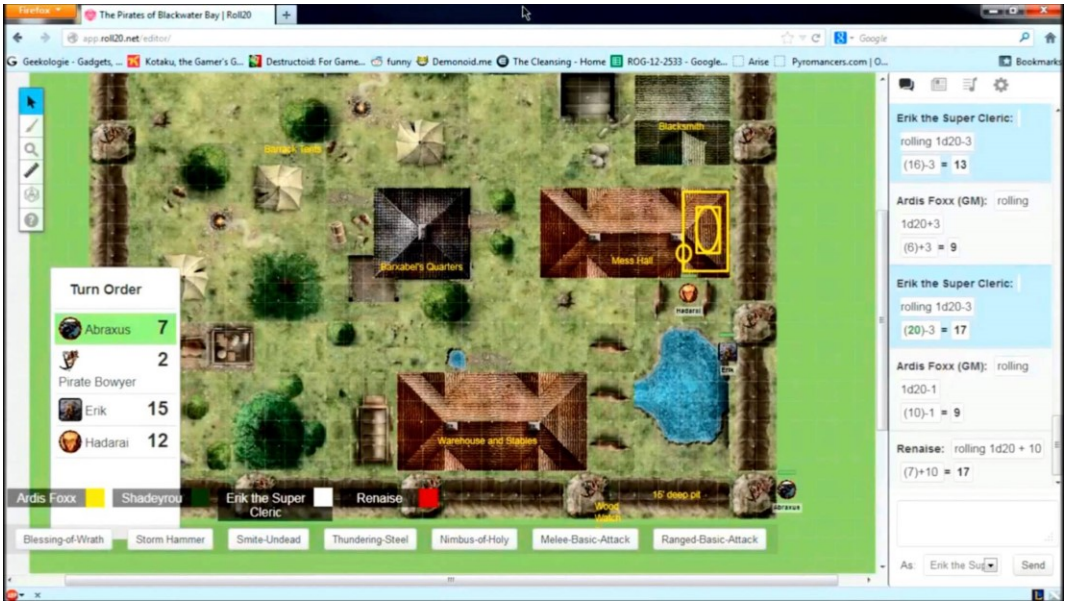

Figure 3 Roll 20 (The ORR Group, n.d.) Online Platform, a free-to-play solution, includes an audio and video communication options as well as many of the features in Fantasy Grounds.

These tools aim to assist with collaborative board space, communal chat and dice rolling, and rule management, but none of them address character presence and perception. They leave other means of communication to third party tools for tele-conferencing.

However, the first conversion of TRPGs into the digital environment dates back as early as the 1975s, with the popularization of *Colossal Cave Adventure*, a text based adventure game developed by Will Crowther for the PDP-10 mainframe. This later inspired similar Multi-User Dungeons (MUDs). This initial motivation to bring TRPGs into the digital world has grown and thrived during the years. Nowadays the most influential and popular icon in massive multiplayer online role-playing games (MMORPGs) is *World of Warcraft* (WoW) an online videogame developed by Blizzard Entertainment in 2004. WoW had a reported number of 5.6 million active players in August 2015. However, there are defined differences between these digital adaptations and the original pen-and-paper, mainly the limitations of world and narrative impact. As millions of players engage at the same time participating in the same quests, the actions of these players in the game world do not affect other players participating in the same quests (Pittman & Paul, 2008). Thus, the mentality of role-play in these digital versions of RPGs is different from the mentality of local TRPGs in which all actions have permanent and lasting effects on the overall story, narrative and world.

Role-play has a different source depending on its context, and it is not always defined by game narrative and choices. In accordance with the limitations of WoW regarding the mentality of role-play, we look at other games and compare the reasons for immersion. In games, such as Grand Theft Auto V (GTAV), the immersion is sustained by the expanding open-world. This “sandbox” category of games relies on powerful game engines, complex NPC algorithms, and world size as the main influencer of immersion. As opposed to our study, these types of games do not focus on avatars, personalization, or fantasy role-play.

2.2 Immersion as a measure of enjoyment

There are different definitions for immersion as the concept is described across multiple types of media. In game studies it can be simply referred to as feeling like "you are in the game" (Cairns, Cox, & Nordin, 2014). Back in their work of 2004, Brown & Cairns develop a grounded theory to describe and divide immersion into three levels. To further recognize the role of self-presence as the deepest layer of immersion, we look at the definition of immersion from the point of view of virtual reality, which states that immersion is "the extent to which a person's cognitive and perceptual systems are tricked into believing they are somewhere other than their physical location" (Brown & Cairns, 2004). However, this interpretation focuses on a geo-physical interpretation, unique only to the nature of virtual reality, which exposes a lack of definition of the concept, or at least a meaning that includes other media. Thus, Brown & Cairns later distinguish three divisions of immersion. The first one is defined as engagement. On this level the involvement is superficial and considers the time and effort invested in a game. The second level is engrossment, players invest emotionally in the game, and pay attention to finer details. Finally, the third level is total immersion: in which players declare a feeling of presence in the game world. These levels of immersion are usually regarded as a positive feature in a game. Brown and Cairn's proposal was to use these divisions to better focus tools and development of games and interactive software.

To continue our understanding of the importance of presence as a metric for immersion, we look more closely at Cairn et al.'s work in 2014. Immersion is not bound by the limit of the game media, it is a cognitive state, based on the "personality trait of absorption" that can be experienced in other sources such as films or books (Cairns et al., 2014), but a long trajectory of interactivity attributes this particular concept to the popularity of games. However, in an experiment designed by Cairnes et al. in 2014 to understand immersion, they uncovered some effects of perspective in games. Their study had participants play the same game in terms of mechanics, but viewed from different types of perspectives and with varying levels of immersive elements (music, time pressure). Their results were surprisingly similar between both conditions,

so they attribute part of their results to the crude methods of measurement. But they recognize the importance of this data as a counter-indicator that deeper immersion as indicator of presence is not enough to make or break an experience, and they suggest that other concepts should be considered when measuring game experiences.

In his work "Autonomous Identities Immersion" Pohjola reviews the three different schools of thought regarding character and immersion, and proposes an alternative nature of role-playing (Pohjola, 2004). Most schools of thought consider immersion as an act of pretending to be a character, but more specifically, pretending *to believe* to be a character, since it is impossible to actually be a fictional persona. It is this impossibility that makes role-playing appealing: the opportunity to act in extreme make believe knowing the reality cannot be affected. This action of pretending to believe to be a character generates a cycle, and the better a player gets at pretending to believe, the more he/she believes, and the more he/she believes, the better he/she gets at pretending.

This is not the first time the concept arises. McGonigal discusses the intricacies of performance in games in her journal, by citing the work of Performance theorist Richard Schechner, and the proposal exists that players can engage in two kinds of immersion, the first being "make believe" and secondly "make belief" (Mcgonigal, 2003). The distinction lies in the relationship between them and the boundaries of reality, "what is real and what is pretend". The first one distances itself from these boundaries, defining clearly that the pretend act is merely fictional. The second one attempts to blur the lines, where players "willfully forget, denying the performance and thereby enable themselves to believe for real."

Pohjola attributes the uniqueness of Live-Action Role Playing Games (LARPs), as opposed to other interactive media, as coming not from interaction but from inter-immersion with immediate perception of

the story as it is created by its collective authors, and states that this experience then can be improved by enhancing the immersion of its authors/players/characters. Anything has an opportunity to improve the "inter-immersion", where it be events, props, dialog, or cinematics. "Inter-immersion is the recursive cycle of immersion: staying in character helps the player to stay in character". An important aspect of "inter-immersion" is the *diegesis*, a storytelling style in which details about the world and the experiences of its characters are revealed through narrative. This means that other characters, acting and narrating their actions from their point of view, observing their diegetic reactions, experiencing the atmosphere, all help in improving the player's immersion (Pohjola, 2004). A player can enter a positive feedback loop, when he or she does everything he/she can to improve the believability of the diegetic frame, by adding immersive tools or acts, improves the diegesis, which in turn reinforces the identity of the character, and thus, help the player create better acts of diegetic narrative.

Somerdin (2016) bases the strengths of video-game narrative in the player's emotional immersion and suspension of disbelief. It claims video-games offer not only improved narrative features, but unique characteristics, because of video-games' player agency mixed with constant interaction between media and user. Somerdin believes video-games offer an exceptional ability to make players emotionally invested in their stories, as well as creating a profound state of "suspension of disbelief" in which players let themselves dive deep into the narrative. Somerdin claims video-games offer what he calls "Future Narrative genre" a characteristic in which players are able to experience a variety of different story trails and endings, in addition to the plot twists of traditional media (Somerdin, 2016). Without considering the potential of different story endings, a powerful tool almost exclusive to the game-medium, the quality of the experience is based on the ability to remove a player from reality and submerge him/her into a story, tools that focus on this characteristic such as VR, AR, and AI, when used properly, are bound to improve the user's perceived experience of a product in a way other mediums can't.

2.3 Measuring the Experience

The research of digital character presence in tabletop roleplaying games in HCI has not been explored much, due to its distance to digital or technological interaction. Many studies have focused on the impact of TRPGs as a collaborative experience (Innes & Booher, 1999) and many others have explored technological efforts to enhance social experience through tangible, intelligent, and responsive tables and boards, including but not limited to the old *Microsoft Surface* introduced in 2011.

Jennet et al. (2008) design three experiment with the focus of defining immersion as a quantifiable measure, despite the term not being fully defined. Their first experiment prompted participants to switch between immersive and non-immersive experiences. The second experiment observed participant eye-movement and recorded any changes during tasks considered high in immersion. Finally, they studied the effect on several different immersion concepts such as State Anxiety, Positive Affect, or Negative Affect when intervened by an external "pace of interaction". Not only did Jennet et al. determine that immersion is indeed a quantifiable value that can be obtained through surveying, they uncovered that the effect of immersion "is not only viewed as a positive experience: negative emotions and uneasiness (i.e. anxiety) also run high." (Jennett et al., 2008).

Perceived experience of TRPGs through the lenses of real-time responsive avatars is something that is relatively new to the field. As a starting point, we use the work of IJsselstein et al., as they develop a Game Experience Questionnaire, a tool designed to measure experiences in games, without being restricted by the medium. This tool is later used by Barbara, (2015), to compare the multiplayer experience between board games and digital games. This is particularly relevant to our avatar TRPG study as it exists on the border between the two. Barbara's study determined a higher level of enjoyment in the board game group, and

suggests that the non-verbal communication that exists in a co-present environment is the reason for it (Gajadhar et al., 2008)(Barbara, 2015) (W.a. IJsselsteijn et al., 2013).

Previous research by Spence, Frohlich, & Andrews 2013, reveals three main elements of research that use performance to address HCI and interaction design at its core. These strands are defined as Performative Experience Design, which provides an interesting perspective on RPG studies that allows us to analyze the results complementing the perspectives of games, virtual communication and digital interaction, (Spence, Frohlich, & Andrews, 2013).

2.4 What Is an Avatar?

Originally from the Hindu culture and used to describe an incarnation of an immortal being, the word Avatar descends from the Sanskrit word *avatara*. Many attribute its origins in games to Neal Stephenson's 1992 *Snow Crash* science fiction novel. In the story, users could enter a virtual world and interact with one another using digital versions called "avatars". In a more comprehensive sense, avatars can be anything that represents a user entity, from tokens in a board game, to pictures, models or icons. (Ahn, Fox, & Bailenson, 2010). An Avatar is a representation of a particular person in an environment. In today's digital communication realm this ranges from icons and images, pictures, to 3D models and real-time video streaming. Studies have shown that the application and nature of different types of avatars have significant effects on users depending on the context (Bailenson et al., 2006; Bente, Rüggenberg, Krämer, & Eschenburg, 2008; Evans, 2012; Kang, Feng, Leuski, Casas, & Shapiro, 2015; Moser et al., 2007; van Vugt, Konijn, Hoorn, Keur, & Eliens, 2007; Von Der Pütten, Krämer, Gratch, & Kang, 2010). The efficacy of avatars as representatives of people has been a long-debated subject in many fields, including HCI. Several studies discussed in the next section of this chapter attempt to explain the nature, extent and effect of these digital representations (Bente et al., 2008; Design, 2016; Javornik & Moutinho, 2017; Paper, 2016; Qu, Brinkman, Ling, Wiggers, & Heynderickx, 2013; Shay, 2013; Von Der Pütten et al., 2010).

Avatar studies have a long history of research in the field of psychology, where research on avatars has paved the way for many theories to clarify its central mechanisms. Psychology research on virtual communication focuses on the study of embodied agents and their effects on this communication, in virtual spaces the body is used as a tool to communicate by doing, much like you would in the real world. Embodied Social Presence Theory (ESP Theory) places the body as the central mean of communication and suggests that "embodied representation combined with goal-directed shared activity in a shared virtual or real space" has an effect on how users perceive both themselves and the environment by improving their engagement in their shared activities and communication acts (Mennecke, Triplett, Hassall, & Conde, 2010). This theory

has been greatly influential prompting social actions from users when interacting with an embodied conversational agent (Von Der Pütten et al., 2010). However, despite research done on the importance of embodiment, because of the physical nature of embodied theory, per Baileson's 2004 work, there is a difference between what it's called an embodied agent and an avatar. And it wasn't until early 2000's that avatars could be used effectively in psychology research, where change from embodied agents to avatars, was enabled by advances in facial recognition and animation of digital models in real-time. (Bailenson et al., 2006).

ESP Theory is not only constructed only from embodied theory, as the body alone needs to move and act to create meaning. Avatar studies rely on Activity Theory to complement their approach. Activity Theory suggests that humans develop a sense of meaning during all type of acts that allow us to have an impact on our environment, and these acts could be any type of interaction, through tools, words, actions or even context. "The primary focus of Activity Theory is on the social nature of activity in context" (Mennecke et al., 2010). This is particularly important in the subject of tabletop roleplay, as it moves the focus away from technology and centers it on users understanding of the world, their perception of other players and the contextual decisions they make without being hindered by the limitations of technology.

At the core of ESP Theory is the Theory of the Mind, which focuses on comprehending the reality behind the avatar of the communicator. This creates a conflict with Activity Theory, as we can only understand others through our own lenses; so we cannot read the other peoples' minds, and thus we are bound to interpret their actions, body movement and other stimuli in that context. "Understanding one's environment is, in part, a subjective process and understanding it is internalized through the available stimuli" (Mennecke et al., 2010). This theory shares the concept of *Diegesis*, a narrative style explained below that depends on the communication of each individual's perception of the story.

Chapter 3 TRPGs: Communication, Emotion, and Challenges

It was essential to this study to first define and determine the elements of a traditional TRPGs, how these elements relate to each other, and the way these are impacted by the online medium in which the game session is conducted. In this chapter, we first explore the role of communication in games. Given the deep connection between multiplayer interaction in TRPGs it is necessary to study the defined knowledge that the role of communication has on games as a medium, and how it affects the players' immersion. Immersion is a concept that is displayed by the players' level of involvement and their elicited emotions. Emotions play a big role in game research, so we explore the research on emotional affect in games. TRPGs are built on the structure of different mechanics and concepts. Because of this, TRPGs constitute a different challenge from video-games and board games. As they differ from the more common video-game research, we review these differences in media, and how they might be affected by digital media communication such as the use of avatars. We then look at the field of avatar research, where we explore the ability of avatars to convey human emotion, and their ability to accurate represent human expression.

3.1 Communication and Games

TRPGs are cooperative games by nature. In them, players are expected to work together to achieve one common goal, while maintaining each players' motivations in mind. While some of the pre-written campaigns and adventures have a clearly defined story arch, the reality is that TRPGs have no definitive-end. Campaigns can extend over months or even years, in which players get together to continue where their characters left off. There are no clear winners or losers, so it is not a competitive environment. However, each PC has a different background and motivation for "adventuring", a personal goal, a driving sentiment that compels them to continue traveling across this fictional world with his/her companions. Since

each character differs in personality and goals, conflict is bound to arise sooner rather than later. Players have distinct views on problem-solving per their individual capabilities and expected outcomes.

In any TRPG or any other game, players are expected to achieve a goal, whether it is common or not. It is to be expected that players would then communicate with each other to coordinate efforts in order to achieve these goals in cooperative scenarios. In semi-cooperative games, players are expected to at some point to negotiate with each other, and in competitive games, players are expected to be silent, but these explanations do not explain the constant communication that exists in competitive play. In their work Drachen & Smith, 2008, define three main theories for game-based communication:

> **The functionalist perspective**: Communication between players serves as a tool for coordination, information-sharing, and negotiation of appropriate behavior. In this perspective, communication is thought to be relatively tightly focused on the game itself (as opposed to game-external topics).
>
> **The strategic perspective**: Communication between players serves as a tool for furthering the narrow, goal-oriented interests of the specific player. From this perspective, it would be expected that players not share information, without getting something in return. In competitive games, players would not be expected to communicate beyond taunts and possible short-term alliances. As with the above perspective, communication would presumably be relatively tightly focused on the game itself.
>
> **The socializing perspective**: Communication between players is only indirectly related to the game. From this perspective, the game itself may be an activity around which players are social. In this context, it would be expected that player communication be unfocused and resemble conversation in non-gaming contexts.
>
> Player Talk
> The Functions of Communication in Multiplayer Role-Playing Games
> (Drachen & Smith, 2008)

Several differences in communication were found according to the type of media used to play RPG. In their study Drachen & Smith, (2008), found that the amount of communication varies and is sometimes inverted in RPGs depending on the medium. A comparison was made between a group of TRPG and Computer RPG (CRPG) players, both in a co-located setting, where all players in a group were physically present. Participants in the CRPG reported higher communication during the downtime activities, such as shopping and exploring, and remarkably lower verbally intensity during life and death digital encounters, as opposed to the TRPG group. This suggested a strong link between the current game activity (combat, shopping, exploring) and the verbal intensity of the players, which makes the measuring and comparison more complex, but determines the possibility of words-per-second as a powerful tool for indicating engagement (Drachen & Smith, 2008).

> Stakeholder based consensus building, allows participants seeking consensus to consider strategies that are not normally acceptable to their agencies and constituencies and to cooperate in a way that is stimulating and encourages their genuine engagement.
>
> Consensus Building as Role Playing and Bricolage
> (Innes & Booher, 1999)

Every character's inter-personal conflicts and motivations can be so complex that sometimes disputes between players may seem impossible to resolve. It is in this situation when role-playing that consensus building allows players to form ideas for creating new conditions and possibilities, by letting go of constrains (Innes & Booher, 1999).

Players approach problem solving with a more complete approach than the traditional goal-directed analysis (weight competing evidence, tradeoffs, moral positions). They use collaborative bricolage or tinkering, which means presenting experiences, ideas, methods and scenarios that they can imagine, and piecing them all together as a group as a strategy on which all can agree. During these process, players can learn from each other, and this serves them to evolve their points of view, challenging their convictions to align them better with a shared vision for an otherwise divided issue.

In a separated online environment, communication and dialog between players must be relegated to an online audio service. For the experience to exist at all, it is necessary that it connects all participants through at least one type of medium. Voice-over-IP has long been the preferred means in most online team-based first person shooting (FPS) game groups (Wadley, Gibbs, & Benda, 2007). Video games are by nature more hectic experiences than role playing games, because the pacing of these experiences is much more frantic and chaotic than TRPGs. Players do not take turns to describe their actions to the rest of the party, they instead act in real time and use communication as a mean to coordinate. During studies involving Massive Multiplayer Online Role-Playing Games (MMORPGS), participants declared the experience of using voice communication to be more natural, relaxing and easier, than their previous text-based communication. Some even declared to feel “like a living breathing party” (Wadley et al., 2007). These comments suggest a sense of immersion that speaks of a more intimate nature, experienced through audio dialog. This intimacy is made evident throughout the less exciting parts of the game. Participants reported a feeling of self-awareness, and felt more shy when not in combat scenarios, and they declared that “voice was better for permanent groups than for pickup groups, and that adopting voice had made them reluctant to add strangers to their team” (Wadley et al., 2007). Audio connection made the dialog less anonymous and brought sense of accountability, as opposed to the previous text-only communication. Increased sense of emotional investment is a sign of immersion. However, voice communication has its pitfalls, and it involves stated

problems with players talking over each other, and a lack of an conversation history forces players to repeat themselves to obtain accurate information.

The results from Wadley et al. contrast with the ones obtained from Drachen and Smith. Both studies observed groups engaging in a CRPG environment. The difference can be found in the physical presence of the players, and the previous relationship between the players in each group. Suggesting that verbal communication is a more committed experience with a layer of intimacy, it could lead to a more immersive experience when players are comfortable with each other, but it also brings emotions of shyness and self-awareness when interacting verbally with strangers.

3.2 Games and emotion

Depending on the genre, as any other medium, video-games aim to transmit emotions or cause emotional reactions in their audience. Despite their immersive and affective nature, most video-games have a counter-intuitive relationship with emotions. Most video-games reward "Emotional discipline" which is something that is not found commonly in other media such as books or movies. When players react strongly to an emotion caused by a game, such as surprise, anger or even discovery, they could get distracted or have their visual-motor skills decrease, a natural reaction that can lead to failure in performing the task at hand. Video-game players are encouraged to restrain themselves from showing emotions, and are forced to distance themselves emotionally, a mechanic that differs from the expected approach of a TRPG player.

As a socially dependent experience, other emotions come into play when engaging in TRPGs. Cooperation or antagonism are the main tools for successful role-play, so PCs are expected to have different motivations and goals, consequently other emotional tools come into play when dealing with the concept of cooperation.

In a study by Ketelaar & Au in 2003, they tested the effect of guilt as means to improve cooperation. They found out that players who experience guilt are more likely to cooperate in future situations. Most importantly, they found that guilt can be experienced not only by hindering or antagonizing other players, but NPCs as well. This is an interesting discovery, as more emotional tools become accessible to GMs to create immersive narratives, because it might then allow varied fictional worlds in which NPCs can be the source of guilt. Players create deeper feelings towards the characters in the story, reinforcing the immersive cycle.

3.3 The Challenges of Roleplay

During a traditional TRPG players would develop fictional persona within the rules and genre specified by the game, and continuously engage in prolonged interactive storytelling (Chung, 2013). Many would argue that it is this interactivity that defines games, but interactivity alone is found in many types of different media. Role-play games, in which participants and dungeon master cooperate to build a story, differs because of its immediacy, because the narrative is constructed and experienced at the same time, "all art and all media are interactive – not necessarily when they are perceived or experienced, but definitely when they are created." (Pohjola, 2004). To improve the experience of RPGs we must improve on tools that deliver a better immersion in real time.

For newcomers, TRPGs are a complex experience, filled with complicated rule interactions, established lore and concepts. Players are expected to understand these rules and, at the same time, pay attention to how they are affected by an ongoing narrative. This creates an additional challenge for players. In the same way one would learn to use a controller for a digital game, role-players must develop a different set of skills to improve their game experience. Players are expected to portray their characters to a reasonable extent in accordance to those characters' motivations, personality and capabilities, and they must also pay attention

to other players' verbal and non-verbal communication. "There is little or no time to reflect on the main moments and actions in conducting a conversation." (Holsbrink-Engels, 1997).

Different studies have determined there is an increased score in creativity tests on players that engage in traditional tabletop RPGs as opposed to those who engage in electronic RPGs (Chung, 2013; Dyson et al., 2016). While they are both games defined by a rules structure, one of the main differences between electronic and tabletop it's the tradeoff between aesthetics, social engagement and the liberty to develop, change, and impact the story and game world.

A TRPG is filled with moral dilemmas that players have to endure and overcome in order to prevail. This does not refer only to the challenges presented in the game by the GM, but also that players model their actions based on their knowledge of real world social conventions and knowledge. Role players create distinctions between themselves and the personas they are portraying, however sometimes these limits fail, and "role-players prove unable to compartmentalize themselves so discretely" bleeding their real-world personalities into the fictional world (Waskul & Lust, 2004). One of these main problematics is described as Meta-Gaming, the dilemma between bringing real world knowledge into the fictional world, including knowledge that would be impossible for the character to know beforehand.

This situation poses a dilemma for those players that have previous knowledge of the situation, "It is a difficult moral decision for a player not to use a solution to a problem because his character would not have thought of it" (Waskul & Lust, 2004). However, role-players have declared consistently that this dilemma is critical for good role-play. If a player is incapable of separating this knowledge, then they are meta-gaming, and it becomes a game of dice rolling instead of role-playing, players reported that meta-gaming is capable of spoiling a gaming experience (Waskul & Lust, 2004).

We now summarize the challenges presented by TRPGs, with these objectives in mind we considered possible solutions using contemporary technology improvements to digital communication.

THE CHALLENGES OF TRPGs

- **Immediate creation and consumption of the media:** Intervention needs to happen on an immediate level to keep up with the process of "inter-immersion".
- **Players are expected to portray their characters:** A minimum level of "acting" is needed for players to more accurately convey, their character's motivations, personality and background.
- **Distinctions between themselves their personas:** To avoid "meta-gaming" players need to separate their game knowledge from their in-game actions. This is improved with immersion.
- **Attention split by rules knowledge, game changes and players' interactions:** Players need to keep track of multiple information sources and changes at the same time.

Chapter 4 Live-Avatars: effective, immersive and influential

We focus on the concept of avatars as our main intervention and solution to the challenges presented by TRPGs. We explore avatars' social and psychological implications, and some of the effects they pose as tools for immersion. We look at avatars' effect on human disclosure and communication: the limitations, the lack of realism, and the potential of using abstract models. Finally, we explore the use of real-face tracking technology in our everyday life, and their potential as immersive toys for social media platforms.

4.1 Avatars as reliable conductors of emotion.

To successfully compare the effect that avatars have on immersion and TRPGs enjoyment, it is necessary to ascertain they are reliable communicators of human emotion. Facial expressions of emotions are important in non-verbal communication, and to prove the effectiveness of avatars as effective channels for these expressions, we look at Moser et al's. 2007 study. If we use the measuring of the amygdala activation as a moderator of face processing, avatars are a reliable medium with high potential for Fantasy and Role-Play scenarios. According to Moser, avatars produce a similar response to human faces when testing for the amygdala activation. The amygdala has been previously defined as one of the main contributor in the valence of stimuli when it comes to expression recognition. This result suggests the potential of avatars as they have the advantage of being highly manipulable and controllable, in addition to accurate emotion conductors (Moser et al., 2007). It is still possible for users to distinguish between real faces and digitally produced faces. In the context of a fantasy RPG setting however, this aspect has lesser impact, as players are required to impersonate non-existent make-believe creatures, as opposed to life like realistic representations of other individuals.

While an MRI is an accurate mean to evaluate emotion, it is not the most accessible, but fortunately other studies support the findings of Moser. In their research Qu et al. (2013) were interested in determining participants' ability to recognize emotional expressions in virtual humans while they spoke and listened in parallel. Mainly they found that speaking avatars were easier to recognize than the listening avatars, likely because of the vocal emotional expression in the speaking phase. In addition to this, they compared these results to the results using real participants from different backgrounds, determining that virtual human expressions can be determined regardless of the cultural background. so this suggests that virtual emotions can be implemented in virtual scenarios with a high probability of success on a global scale, (Qu et al., 2013).

Von Der Pütten et al. (2010) designed a study to evaluate whether peoples' belief in interacting with either an avatar or an agent lead to different social effects, finding that there were no visible differences. When participants were asked to rate their experience when talking to an agent or an avatar, however the increase in realism did affect both the scores (Von Der Pütten et al., 2010). Von Der Pütten et al. (2010) base their work on a modified concept of *Ethopeia*, claiming that people do not anthropomorphize as the original concept states, but instead, human brains have slowly evolved and trained to treat every person and place as real, since in the past there were no fictional places or people. Without any active signaling to the brain that an interaction is being made with a fictional person, the brain automatically defaults to treating the agent as it would any other person, with the same protocols and mannerisms.

Avatars can conduct emotion accurately and still be manipulable. While realism is an important factor in evoking social responses from users during a conversation with a human-like virtual character, the effects of these virtual characters are not well defined. Interested in defining how can avatars be manipulated and what effect do these manipulations have on participants, H.C. van Vugt et al. (2007) developed a framework

to explain persona and realism effects on participants, by showing students three different scenarios: a realistic character, an unrealistic (fantasy) character, and finally no character at all, they found that there is no persona effect on the task performance, when controlled for some perceptions. The realistic character showed more engagement, but a stronger correlation was found between aesthetics and task-relevance, and even further correlation in engagement user, and ultimately when merging user engagement and task performance it became easier to predict satisfaction than either factor separately. "In sum, several appearances and task-related factors contributed to user engagement and user satisfaction." Concluding that realism is not all that matters (van Vugt et al., 2007).

4.2 Avatars effects on communication

Sharing the concern for realism in avatars and its effect on collaborative virtual environments, Baileson et al. (2006) designed and tested what they called an *emotibox*. This digital avatar, an abstract approach to avatars that rendered color, shape, and orientation on a rectangular polygon, which produced an avatar that could very accurately represent behavioral realism, but was designed to have a very abstract form, low on form realism. Taking advantage of real-time face tracking technology to render facial expressions and measure verbal and non-verbal self-disclosure of users during a videoconference. Baileson et al. found that verbal and non-verbal self-disclosure and higher identification of emotion was found during the *emotibox* condition, participants felt a higher level of confidence when reporting to an avatar than when reporting to a person. Baileson et al. further discuss the possibility of improving the avatar system to maintain the benefits of anonymity, increasing self-disclosure, but with a higher co-presence and transmission of emotion (Bailenson et al., 2006).

A similar approach was conducted by Kang & Gratch as they attempted to increase the self-disclosure of participants by combining avatar realism and the users anticipated future interactions (AFI) when they

interconnect with either virtual humans or real humans during computer-mediated communication. They observed participants verbal behaviors to measure self-disclosure, and they found that participants reveal more intimate information when talking to virtual avatars (Sh Kang & Gratch, 2010). This research matches the Bailenson et al. study. This allows us to form a theory in which the use of real-time avatar provides a certain level of anonymity, which leads to increased emotional investment and self-disclosure and in doing so, providing a deeper more immersive experience of gameplay, which could lead to higher levels of enjoyment. However, the co-presence factor lost from a traditional approach has yet to find a virtual equivalent it is possible that co-presence can be achieved by utilizing a more polished software with higher avatar detail.

Javornik et al. (2017) develop a study to measure the effects of face changing software in mobile devices, as the popularization of this augmented reality technology (technology that superimposes a computer-generated image on a video of the real world) becomes more common. They attempt to bring the self-disclosure effects of avatars into the smartphone, the most popular portable mean of communication. They developed an app named *MagicFace* and measured peoples reaction and perceived convincingness. Most of the participants enjoyed stepping into the character, and demonstrated it to be an enjoyable experience, however the author emphasizes concerns about the novelty effect of the software should be noted (Javornik & Moutinho, 2017).

TRPGs are not merely a conversation between participants, so to compare the benefits of non-verbal communication in video-chat to its avatar counterpart, Visschedijk et al. (2013) considered it necessary that the avatar condition contain all possible stimuli portrayed in a video-chat, including: posture, facial expression and tone of voice. Visschedijk et al.'s research focus was to allow players to make tactical decisions in a game, according to their perception of other players' behavior and intentions: "the

combination of posture with either facial expression or tone of voice is sufficient to ensure recognition of human emotions in tactical decision-making games." (Visschedijk, Lazonder, Van Der Hulst, Vink, & Leemkuil, 2013). Their research findings strongly suggest that the combination of posture with either facial expression or tone of voice in a digital avatar were more than enough cues to inform the decision making of the players. They base their findings on the cue dominance approach by Warren & Riccio in 1985.

Finally, we consider Bente et al. (2008) study to understand avatars influence on a number of factors during digital collaborations, such as: social presence, interpersonal trust, perceived communication quality, nonverbal behavior, and visual attention. Bente et al. tested for chat, audio, audio-video and avatar, and they found many similarities between the condition of video-chat and avatars. Both of these conditions reported a high level of exposure to the "virtual other" as well as "visual attention" as compared to text and audio conditions (Bente et al., 2008). But that was not the only interesting result in Bente et al.'s research. The data shows that the condition using only audio, statistically speaking, is no different than the video or avatar conditions, in terms of social presence, trust, and user satisfaction (Bente et al., 2008).

4.3 Commercial use of real-time facial manipulation

The advances on face recognition technologies have made their ways on to popular mainstream communication and media sharing platforms. Popular applications have developed internal tools for augmented reality toys based on face recognition.

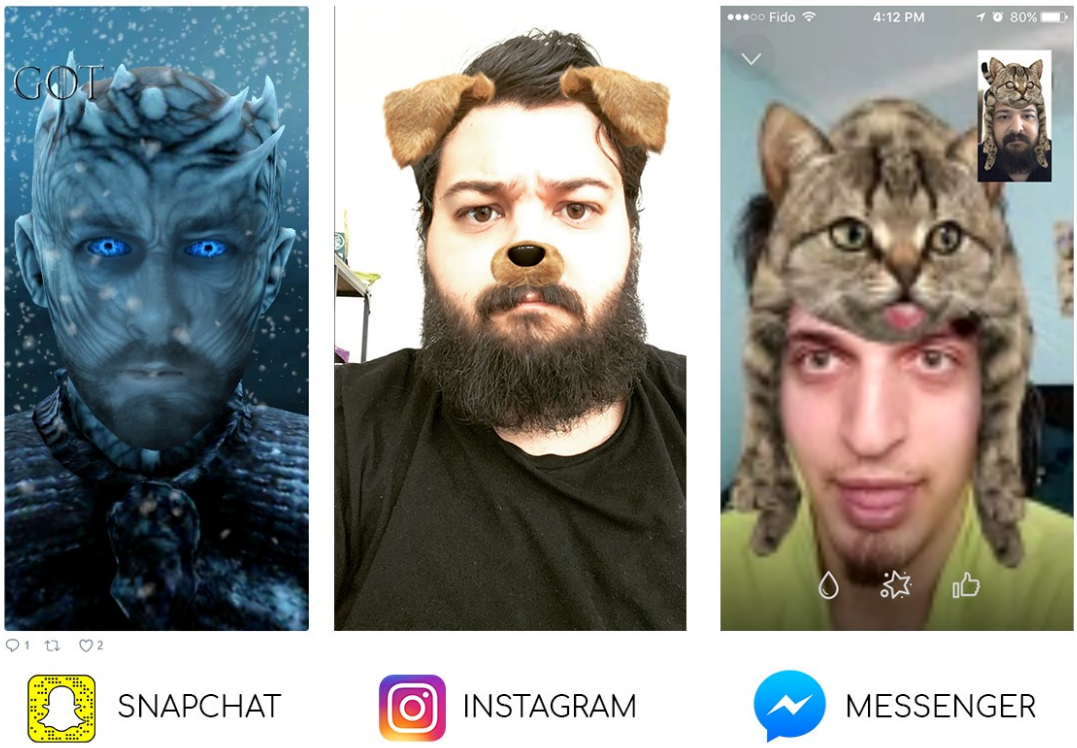

Figure 5 Social Media platforms with real-time face recognition filters.

Popular social media platforms offer current face recognition filters as additional features to their content media sharing. These popular filters are restricted for use inside the limits of the applications, and are not currently compatible with other communication tools. They allow the creation and publishing of short videos for sharing. As shown in Figure 5, on the left, *Snapchat* manages to alter completely the look while maintaining facial expression animations, *Instagram* (middle) and *Messenger* (right) use the technology as augmented reality, as an overlay manner, and with less extreme changes. These tools, while effective, do not offer any range of characters for fantasy role-play. They do not allow creation of custom characters, or editing of current ones. From these platforms, currently, *Messenger* is the only one that allows the filters to work during live tele-conferencing but only within its own platform. These filters exist as complementary features inside their own platforms, and cannot be used in conjunction with other tele-communication tools.

These tools do not offer the compatibility necessary to be suitable for online TRPGs. During our exploration we found one tool that offers the minimal requirements for our study: *Facerig* (Holotech Studios, n.d.). This tools offers compatibility with video conferencing tools, customizable fantasy character models, and real-time face recognition. We discuss this tool more deeply in section 5.2.

With the information gathered throughout this chapter, we design an approach based on the proven efficiency of Avatars to improve communication. This Live-Avatar method will allow us to test, measure, and examine probable means of improving the online TRPG experience. We refer to Live-Avatars as 3D modeled characters that react in real-time, using live facial recognition technology and animation.

BENEFITS OF LIVE-AVATARS

- **Immediacy:** By utilizing live, real-time technology, we are able to intervene during the "inter-immersion" process cycle.
- **Effortless visual portrayal:** 3D models can portray some of the characters' background, and personality. Reducing the acting load on the user.
- **Visual feedback:** The combined feedback of verbal and augmented non-verbal communication creates a better environment for the diegetic cycle to grow.

Chapter 5 User Study

With the objective of improving immersion during online TRPGs, we designed and ran an experiment based on the augmentation of player faces with animated digital 3D avatars. This improvement was measured using the game experience tools provided by IJsselsteijn et al., (2013). We expected to increase the levels of enjoyment and positive affect as a result of our immersion intervention.

5.1 Hypotheses

Co-local multiplayer interactions have been found to rank higher in the user experience studies in relationship to their digital counterparts, with the idea that board games create a more enjoyable experience by bringing people together and facilitate interaction through the game's tangible interface (Barbara, 2015). We believe the use of facial recognition technology to augment the perception of other players in the game can create more immersive experiences during online video-call interactions, reducing the user experience gap between physical-co-local and digital-online tabletop roleplaying game experiences.

This layer of augmented reality is capable of transmitting non-verbal aspects of human communication on top of a fantasy persona, may prove useful by easing the player into the role-play by supporting the concept of the imaginary characters into a visual representation of their peers' personas.

It is important to note that the proposed improvement attempts to increase the experience as it currently exists during online video-call interactions. We believe that better immersion in online TRPGs is unlikely to make those sessions more enjoyable than physical co-local TRPGs, but rather simply better than it is now the case in online ones.

5.2 Design

A TRPG is an experience based in the development of a narrative experience, so to maintain narrative consistency between participants we use a between-subjects design, where all users engage in the same story. We designed an experiment to measure and compare immersion between two online groups: a control group (only an audio-visual communication software), and an experimental group (uses real-time face-recognition avatars to alter the way they are perceived).

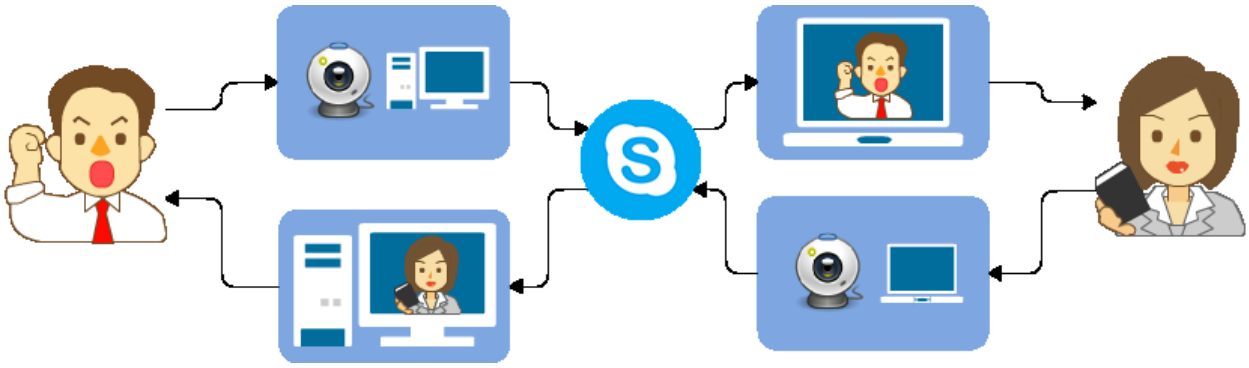

Figure 6 Control group: Communicate using video-voice-chat only.

The control group in our study used only Skype as a medium of communication during the experimental session as shown in Figure 6, Each participant sat at an isolated station to avoid any effects of physical co-located play.

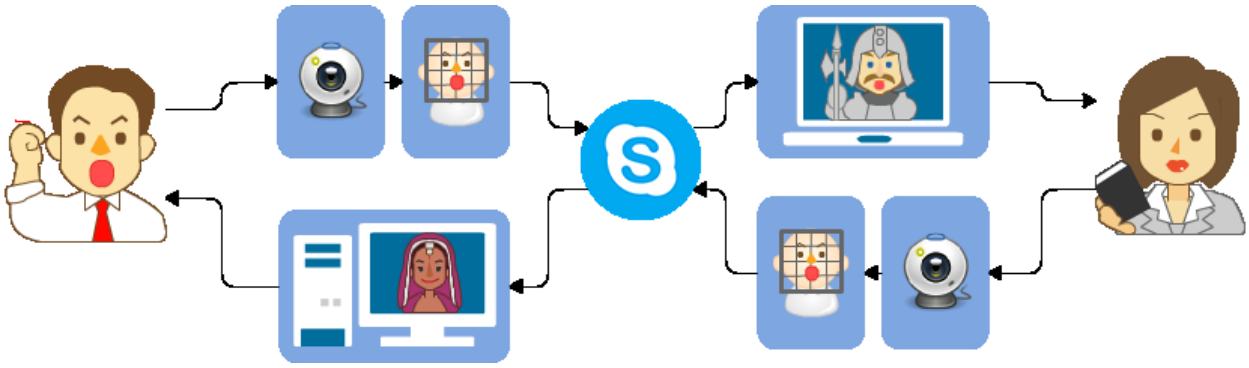

Figure 7 Experimental group: communicate with an additional layer of augmented avatars.

Our experimental group used animated digital 3D model software, to alter the video stream, before feeding it to the Skype call. The result was a video-meeting in which every participants' face was replaced by a 3D model that moved and talked in real time Figure 7.

Figure 8 Facerig (Holotech Studios, n.d.) Face recognition and real-time 3D model animation.

For the face recognition and avatars, we used the *Facerig* (Holotech Studios, n.d.) software as illustrated in Figure 8. The software contains a pool of available 3D characters and needs no specialized hardware or software to function. To achieve a better performance, we used PS3 Eye cameras for a higher framerate (60fps) than common web-cameras. This allows for a smoother lip synchronization and better results with the *Facerig* tracking, making it easier to distinguish expressions as well as any other non-verbal communication.

Using *Facerig*, participants in the experimental condition perceived each other through an augmented representation of their respective character, the augmented version consists of a software which takes input from the webcam and uses facial recognition technology to live stream a participant's facial expressions

onto a 3D fantasy model of the character, this live-stream technology creates a live puppet effect between the subject and their digital persona, in which characters seem to react and talk on their own.

5.3 Participants

Our experiment protocol was cleared by the Carleton University Research Ethics Board (CUREB-B), see appendices. A total of 35 participants volunteered to take part in the experiment. They were recruited through posters around Carleton University campus, a posting in Carleton's Research Participant Facebook group, as well as other social media local groups for comic books, tabletop, and other role-playing games. As shown in the Figure 9, participants' age ranged from 18 to over 50 years old. Most participants had at least 1 year of experience with role-playing games, except in two occasions. Participants were distributed randomly across the groups, but the demographics of both distributions were very similar, see Figure 9.

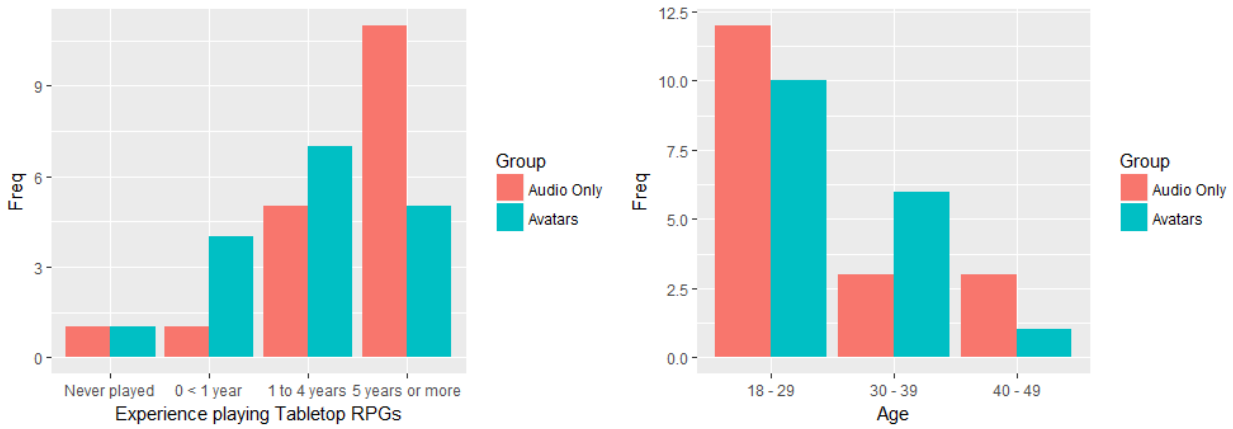

Figure 9 Participants Experience and Age distribution.

5.4 Procedure

The experiment was organized in five sections, see Figure 10. First, participants were explained the extent of their involvement in the study and the intent of the experiment, to which they all agreed. During the setup, participants choose or were assigned a game character and an isolated computer work-station. In the

game session, participants played a game of D&D while being video-recorded. After the game, participants filled-in an online questionnaire about the game session. Finally, participants were debriefed, explaining the reasoning for the blind study (i.e. they would not be influenced by our expectations about avatar immersion).

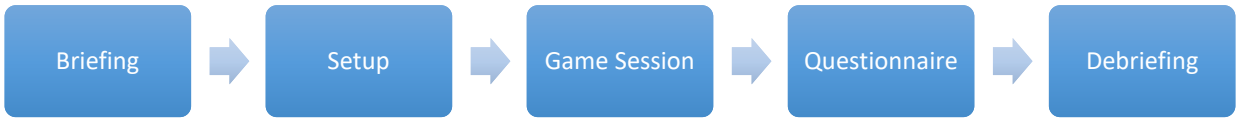

Figure 10 Experiment procedure.

Sessions were run throughout the span of a week, with sessions scheduled every 4 hours. A total of 11 sessions were run, each game-session had an average duration of 2 hours and 15 minutes, plus an additional 15 minutes for the questionnaire and debriefing. During the game session, the subjects interacted with the researcher, who played the role of a designated mediator referred to as "the Game Master" (GM), in addition to interacting with other participants. We decided to run the games ourselves, and not use an external GM, in an attempt to maintain the game-narrative as homogeneous as possible between the two groups. The sessions were run intercalated for counter-measure and avoid practice bias on the researcher.

5.4.1 Briefing

Participants were informed about the purpose of the study before beginning and signed a consent form confirming they understood and agreed to the terms of the study; all participants agreed to participate and consented to be audio and video recorded. To keep the session as similar as possible between groups, a pre-generated published story was used to run the game. Participants were then verbally asked about their knowledge on the published adventure to avoid bias with their upcoming game session, and all reported to have no previous knowledge of the story.

5.4.2 Setup

Each participant used a Microsoft windows work-station, with mouse, a PS3 Eye webcam, keyboard and a headset for communication. They were placed in an isolated room to better represent the conditions of an online session, as shown in Figure 11, in which none of the players are physically present with each other. Participants were given a pre-filled sheet containing all information pertinent to their assigned character, as well as pen and paper to write down personal notes, and a set of dice to roll during their turn.

Each session had participants play in a group, and each group played the same adventure with up to four participants and a minimum of two, each participant had control of a different character. Each of the 4 characters has a different set of abilities depending on their in-game class and race. The group composition was designed to authentically represent the configuration of a typical role-playing adventure group.

Figure 11 Participant in control group at an isolated work-station, with character sheet, dice and pencil.

Using a between-subjects design, participants were randomly assigned to one of two groups. Participants in our control group, were set-up to perceive each other in a traditional way, using only Skype for audio-visual communication.

Figure 12 Session with four participants using Augmented Avatars instead of video.

Participants in our experimental group used the Facerig software as discussed earlier. Figure 12 shows the session as perceived by the participants in the experimental group, where each one portrayed a different character with its own visual personality. These images were captured from the point of view of the researcher, a smaller window on the bottom right shows the avatar that is being streamed to the other participants.

5.4.3 Game Session

To perform the test, participants engaged in a traditional game of Dungeons and Dragons. In this game, participants were expected to collaborate with their fellow players to achieve a final goal, and reach the end of the story. Each session had an approximate duration of 2 hours and 15 minutes.

Each participant decided and controlled the actions of one character within the game, the participants also narrated, to a minimum degree, their respective characters' actions, these actions range from dialog choices and mannerisms to positioning and maneuvers during game combat scenarios. All interactions were done online through webcam and a headset for audiovisual communication.

The GM (the researcher) impersonated other non-player characters in the story and instructed the subjects of their in-game tasks and challenges, as well as describing scenarios and environments in the story verbally. Also, the GM adjudicated the course of actions of enemies and challenges within the adventure, while guiding the story towards equal resolution. This is the typical protocol for any typical TRPG session.

5.4.4 Questionnaire

Upon finishing the game session, all participants completed an online survey designed to measure the player's experience, the GEQ (Game Experience Questionnaire). This is a questionnaire designed to measure the user experience in all types of games, including physical (board games and tabletop) and digital (console, PC). The GEQ gathers information on several different categories, such as: flow, challenge, annoyance, immersion, and others. (W.a. IJsselsteijn et al., 2013; Wijnand IJsselsteijn et al., 2008). In addition, the GEQ provides different modules that participants filled to measure their perception on the social aspect of the game and their return to the "real world". E.g.

"28. I was deeply concentrated in the game"

not at all	slightly	moderately	fairly	extremely
0	1	2	3	4

5.4.5 Debriefing

Participants were clarified about the objective of the blind study and the intention of avoiding both narrative and novelty bias. Also, to participants in the control group we demonstrated the Facerig software, explained our proposed intervention and its setup. We also obtained some comments on its potential effects on the results. Some participants made comments on their own experience E.g.

> *"I had to pay a lot of attention, I started drawing maps of what you (the GM) described, and this helped me get into the story"*
>
> *– Participant in Control Group*

> *"I would like it if the characters could show my weapons and armor as I level up, if later I get a heavy plate, I would like to see my character wearing it"*
>
> *– Participant in Experimental Group*

5.5 Analysis plan

Our experiment had one independent variable, the condition, either the control condition or the experimental condition. As dependent variables, our primary focus was immersion, and other related findings from the GEQ. The GEQ provides several modules, for the purposes of this experiment we focus on the CORE, SOCIAL and POST-GAME modules.

We chose these modules for our study as they contain the statements that relate to our dependent variable (Immersion). The CORE module contains the Flow category, which explores participants' emotional connection with the outside world. Also, this module contains the Sensory and Imaginative Immersion category, which relates to the players' perception of themselves, the narrative, and their environment. In the SOCIAL module, we are interested in all the categories because they relate to inter-player communication. But more importantly the category in this module, Behavioral Involvement, relates to our dependent variable more directly. We include the POST-GAME module for both the exploration of Positive and Negative experience categories, and we expect the Returning to Reality category to also provide insights on immersion.

Chapter 6 Results

In this chapter, we present the results of our experiment. We first describe a problem that arose early in our experiment, and how we coped with it. We then review statistics for the study and present visualizations to explore differences between our two conditions. At an initial glance, while we expected a clear distinction between groups for each question. However, what we found was a more subtle pattern.

6.1 Malfunction and resolution

During the sessions with participants in the control group (our traditional audio-video approach), the web-cameras malfunctioned, freezing video and producing a black screen instead of live video, see Figure 13. This left only audio as means of communication between participants. Without time to reschedule participants, sessions were run and recorded as planned. The resulting condition was therefore "*Audio-Only*", as illustrated in Figure 14. This malfunction did not affect the experimental group, allowing the use of animated 3D avatars to be run as initially planned.

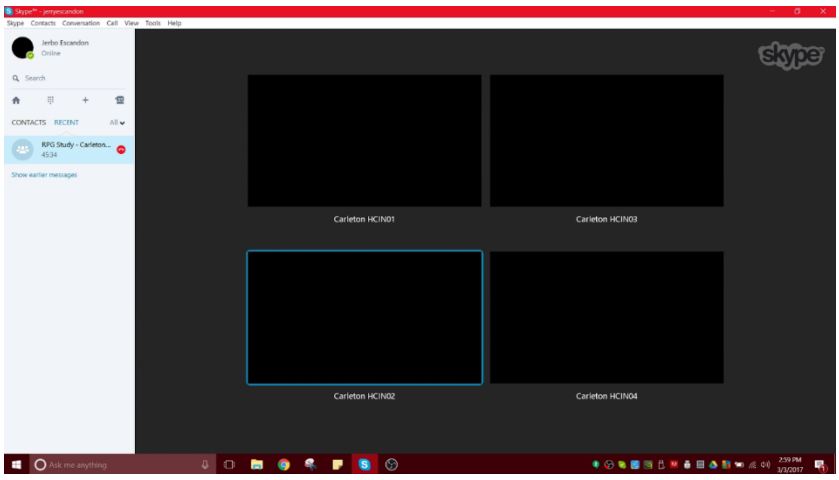

Figure 13 PS3 Eye camera malfunction, leaves just audio.

Considering the malfunction of the cameras during the control group sessions, we expected an even stronger difference between the conditions, because the experimental group presented engaging visuals, while the control group had no visuals at all. However, what we observed was a surprisingly strong similarity in data distribution. In the face of this information we continue our statistical analysis to uncover deeper insights.

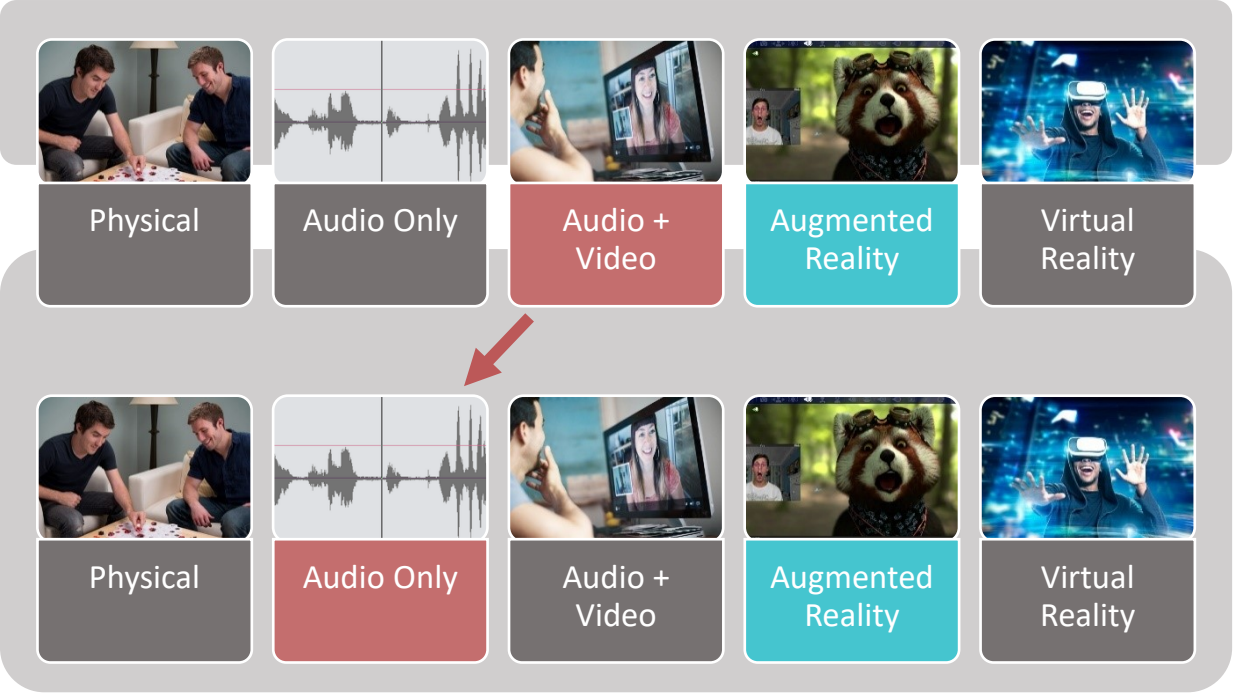

Figure 14 change between conditions from our planned study

In the following analysis, we labeled the conditions as Audio-Only (control group), and Avatar (experimental group).

6.2 Statistical analysis

Leveraging the Game Experience Questionnaire (GEQ), we can analyze the data of our approach by following the protocol described by W.a. IJsselsteijn et al., (2013). This requires the grouping of questions into categories. The protocol dictates that we average the score of each question within the category for each participant. Data collation and analysis was performed using the R statistical package and the JASP software.

Table 1 Descriptive statistics per category between conditions

Group Descriptives

	Group	N	Mean	SD	SE
Competence	Group A	18	3.311	0.505	0.119
	Group B	17	2.953	0.541	0.131
Sensory and Imaginative Immersion	Group A	18	2.814	0.454	0.107
	Group B	17	3.138	0.556	0.135
Flow	Group A	18	2.444	0.638	0.150
	Group B	17	2.788	0.841	0.204
Tension/Annoyance	Group A	18	0.092	0.191	0.045
	Group B	17	0.195	0.238	0.058
Challenge	Group A	18	0.811	0.366	0.086
	Group B	17	1.129	0.458	0.111
Negative affect	Group A	18	0.542	0.494	0.117
	Group B	17	0.588	0.353	0.086
Positive affect	Group A	18	3.478	0.495	0.117
	Group B	17	3.729	0.367	0.089
Psych Inv. Empathy	Group A	18	3.111	0.435	0.103
	Group B	17	3.118	0.436	0.106
Psych Inv. Negative Feelings	Group A	18	1.556	0.463	0.109
	Group B	17	1.800	0.608	0.148
Behavioural Involvement	Group A	18	2.722	0.412	0.097
	Group B	17	2.882	0.478	0.116
Positive Experience	Group A	18	2.917	0.531	0.125
	Group B	17	3.030	0.584	0.142
Negative Experience	Group A	18	0.269	0.263	0.062
	Group B	17	0.225	0.235	0.057
Tiredness	Group A	18	0.167	0.343	0.081
	Group B	17	0.353	0.523	0.127
Return to Reality	Group A	18	1.352	0.530	0.125
	Group B	17	1.157	0.567	0.137

The three modules used in our experiment, gave a total of 14 categories. Descriptive statistics for each of these categories are shown in Table 1. In the table, Group A refers to the control condition (Audio Only) and Group B refers to the experimental condition (Avatars). We conducted both ANOVA and Kruskal-Wallis tests, for differences between the groups across the categories, but found no significant differences. Moreover, we then conducted pair-wise tests for each category separately but again, found no significant differences, see the Appendix (8.8) for details. The Appendix also shows descriptive statistics for each statement within the categories, and test results for each statement. Overall, we were surprised by the lack of significance. This concluded our statistical analysis, for our a priori questions. We now proceed to post hoc analysis and begin by exploring the data distributions visually.

6.3 Comparative data visualization

We create histograms to visualize the distribution of participant scores by category and condition. Even though the statistical power is insufficient to make any claims, a deeper examination of the obtained data can help orient future studies.

Figure 16 shows the distributions for the categories in the CORE module. In this module, apart from Competence, the Avatar condition reports slightly higher scores on every category, both positive (Flow, Positive Affect, Sensory and Imaginative Immersion) and negative categories (Challenge, Negative Affect and Annoyance).

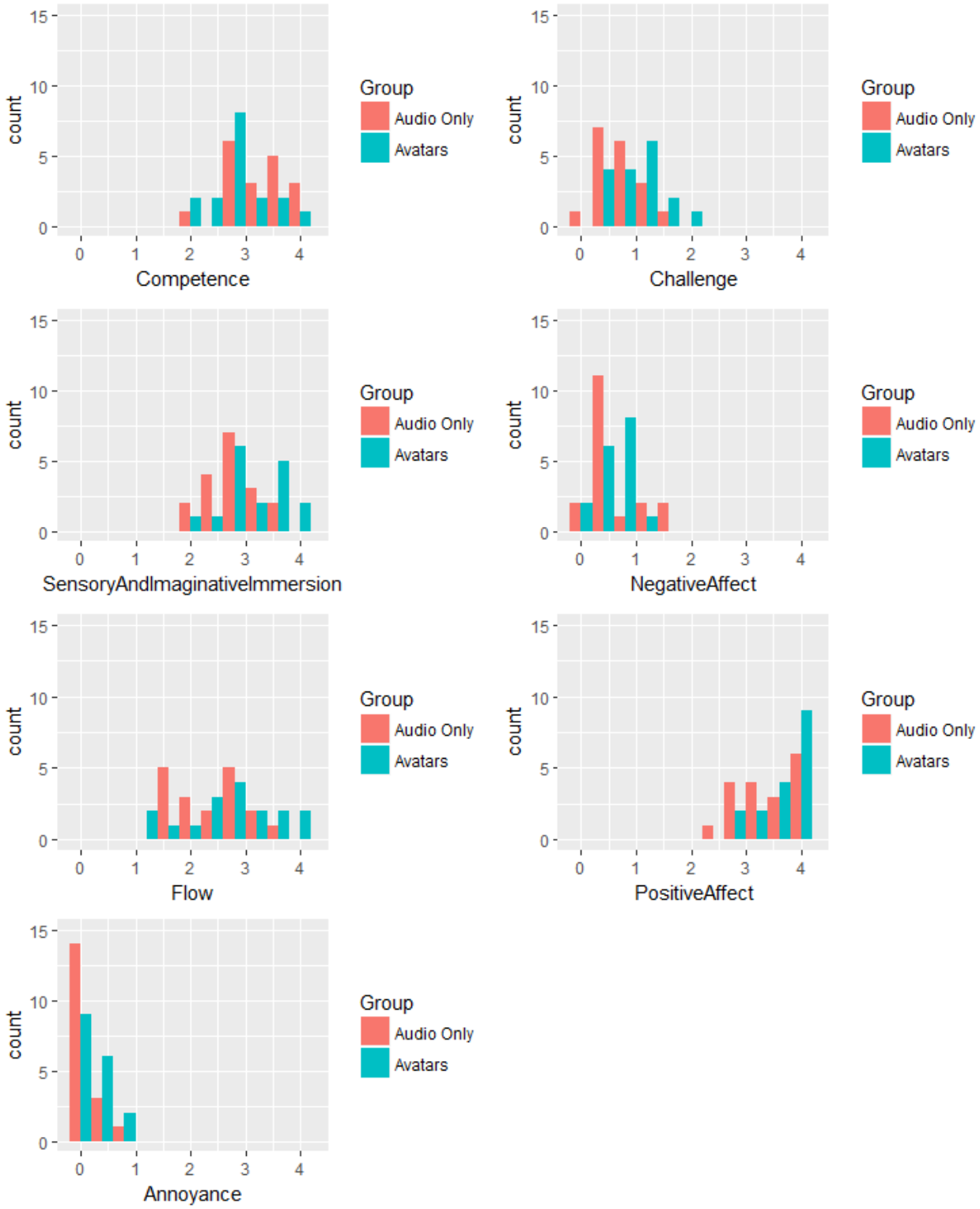

Figure 15 Barplots for the results in the GEQ's CORE module.

Figure 16 Barplots for the results in the GEQ's SOCIAL module.

The SOCIAL module shown in Figure 16, consists of three categories. These categories attempt to measure the experience of each player in response to the presence and interaction with other players. The category *Behavioral Involvements* shows noticeably higher scores in the *Avatar* condition. This suggests a higher emotional investment, which is an indicator of immersion, one of the traits we expected to improve with our intervention. Nevertheless, A higher score is also noticeable in the *Negative Psychological Involvement* category, this conflicts with previous scoring but supports previous findings in the CORE module reported above, where the *Avatar* condition seems to affect both positive and negative categories.

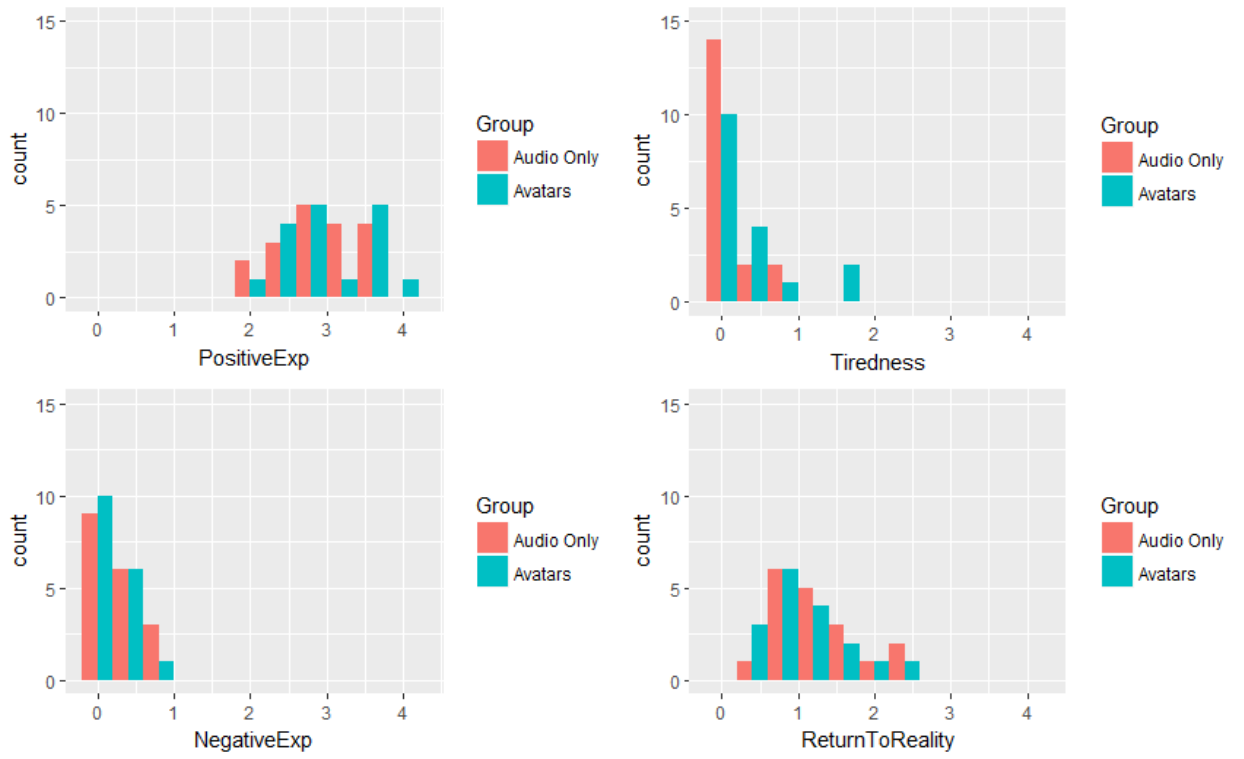

Figure 17 Barplots for the results in the GEQ's POST-GAME module.

Finally, in Figure 17, POST-GAME, the last module, shows a similar response in most cases. However, both *Tiredness* and *Positive Experience*, show slightly higher scoring for the *Avatar* condition. Overall most plot figures in all three of the modules show a very similar distribution in both groups, but then slight increases in scores as well as the small extensions of the distribution tails describing the *Avatar* condition suggest an impact on the experience.

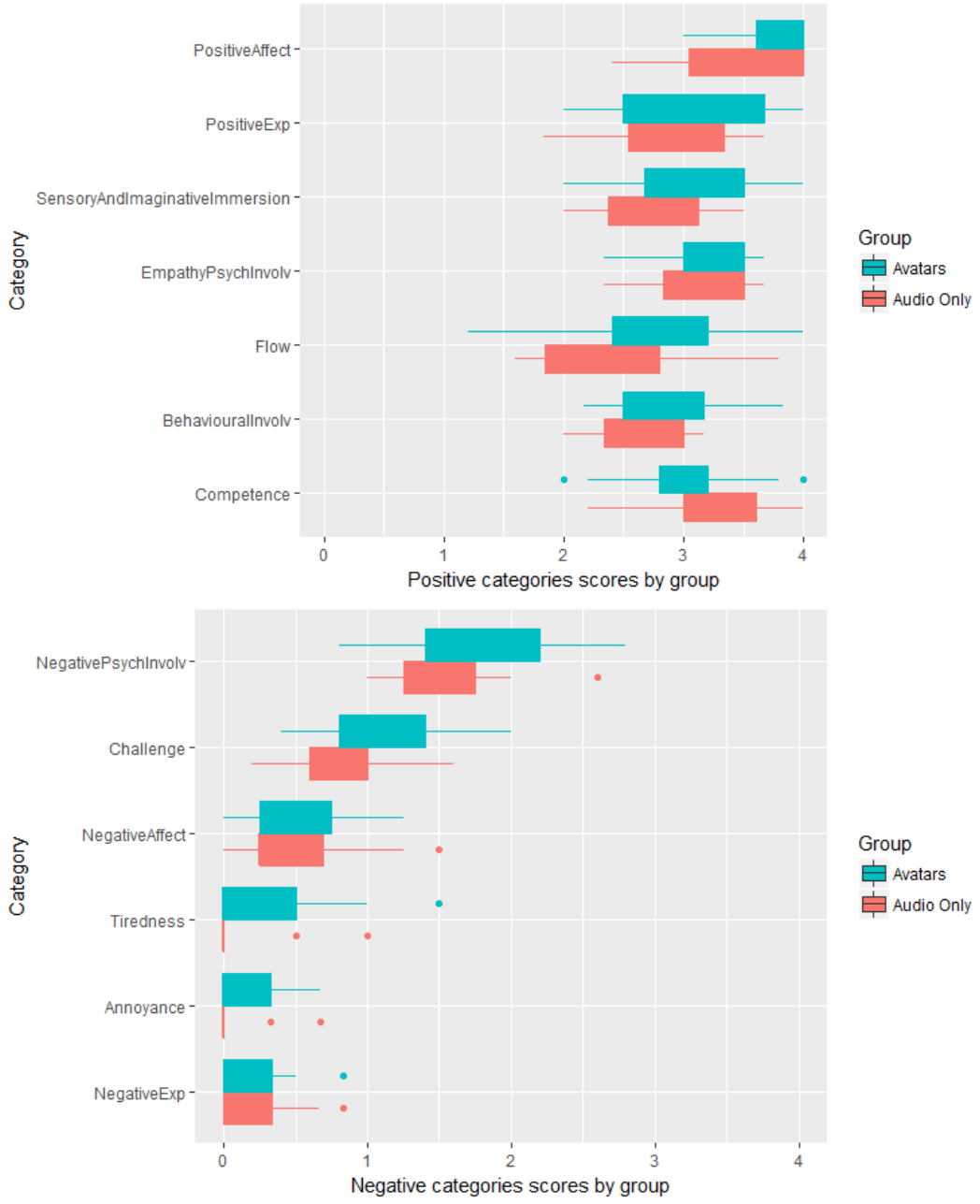

Figure 18 Positive and Negative categories grouped together.

To better visualize, however small, the positive and negative increase of scores perceived in the *Avatar* condition we created two grouped boxplots, as shown in Figure 18. These plots contain all positive and all negative categories grouped accordingly across all three modules. The category *Competence*, in the positive plot is the only average score where *Audio-Only* ranks higher than *Avatars*. The data displays a certain increase both positively and negatively in the *Avatars* group.

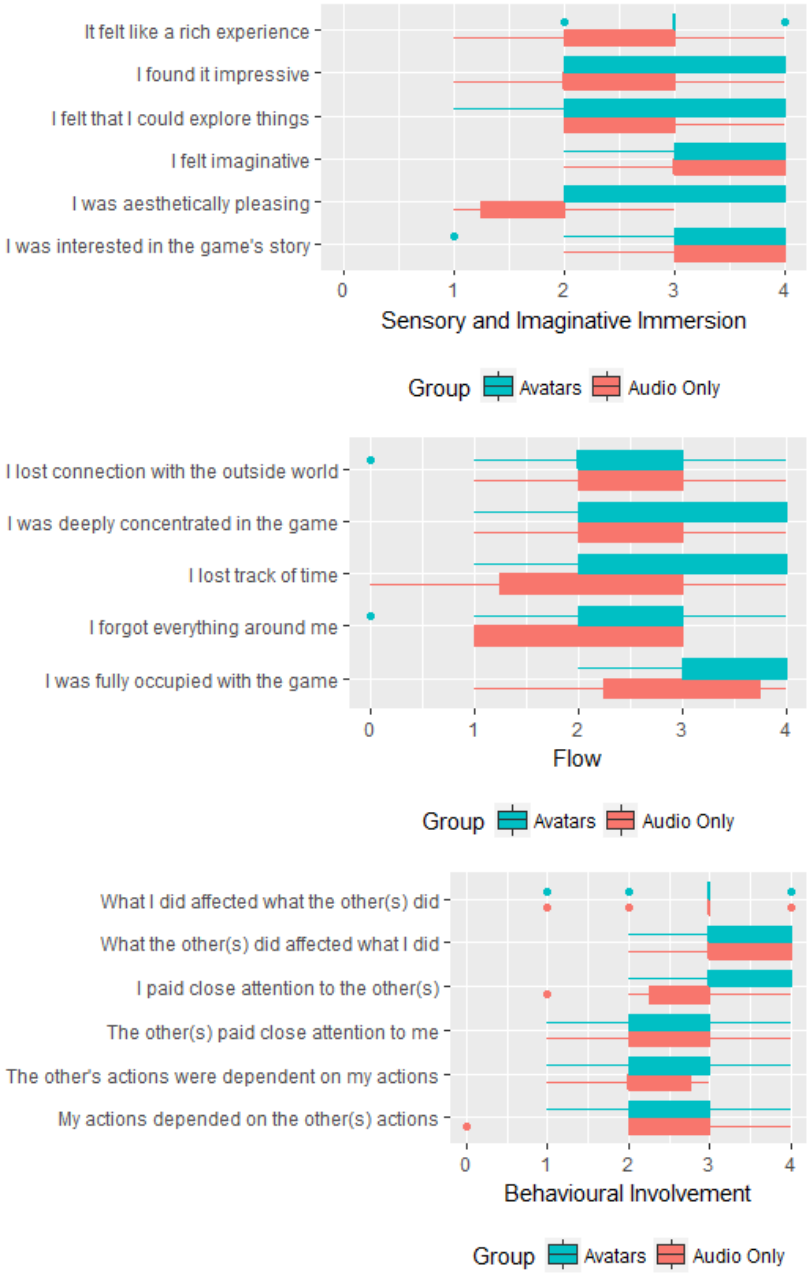

Figure 19 Boxplot of questions in sensory and imaginative immersion category.

Part of our main research question was the improvement of the experience through immersion, to measure the immersion we deeper look at three main immersion related categories and their questions, *Sensory and Imaginative Immersion, Flow,* and *Behavioral Involvement,* as shown in Figure 19. We observe similar distributions in both conditions for each statement. However, the Avatar condition scores slightly higher consistently in every item presented. These results are consistent with our previous observations.

6.4 Recursive Partitioning Analysis

Attempting to understand the issues involved in immersion, we wished to single out the most defining statements in each of the three immersion-related categories. We use the Recursive Partitioning approach to split the data at its most critical statements (Fallis, 2013). The result is two maximally distinct subsets. The process is recursive, yielding a hierarchical structure as shown in Figure 20.

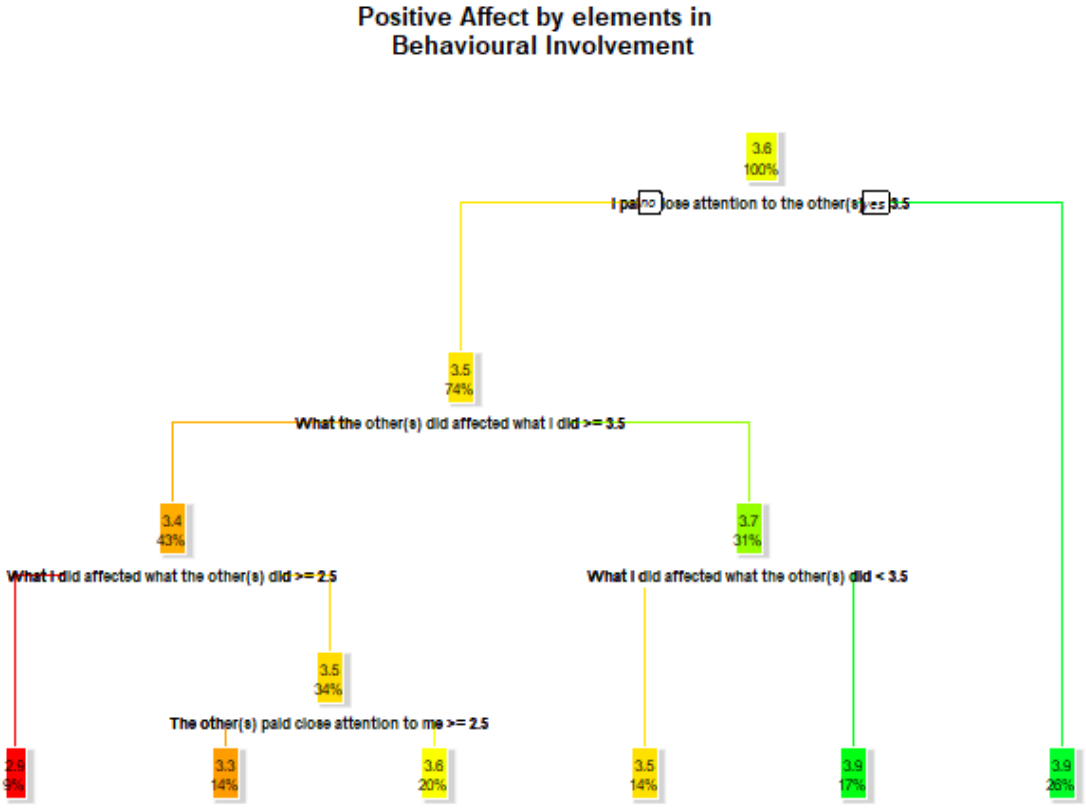

Figure 20 Positive Affect as affected by Behavioral Involvement.

All trees are based on scores from the GEQ on the Likert scale of 0 to 4. In the case of the Behavioral Involvement category (Figure 20) the most critical statement was "I paid close attention to the others", split

at the point of 3.6. Followed closely by “What the other(s) did affected what I did”, split at the point of 3.5. The subtree on the right places participants with scores of 3.6 or higher. The tree on the left places participants with a score less than 3.6. This process repeats recursively down the branches.

The tree partition approach provides complex interactions between the elements in the data, but it allows us to speculate on the priority of players’ enjoyment. In the case of Figure 21, we could argue that clear communication allowing players to follow each other in detail is necessary for enjoyment. Tools can support this by recording players’ placement, health, abilities and other types of information pertinent. However, when this initial statement is met, the most important aspect of the game is an egocentric approach to social interaction. Players are interested in knowing how they get affected by other’s choices, more so than the other way around.

The Flow category presented in Figure 21 splits at the statement “I was fully occupied with the game” at a score of 2.6. In this case, the statement is visually demonstrated to be the most critical element, because of the length of the branch.

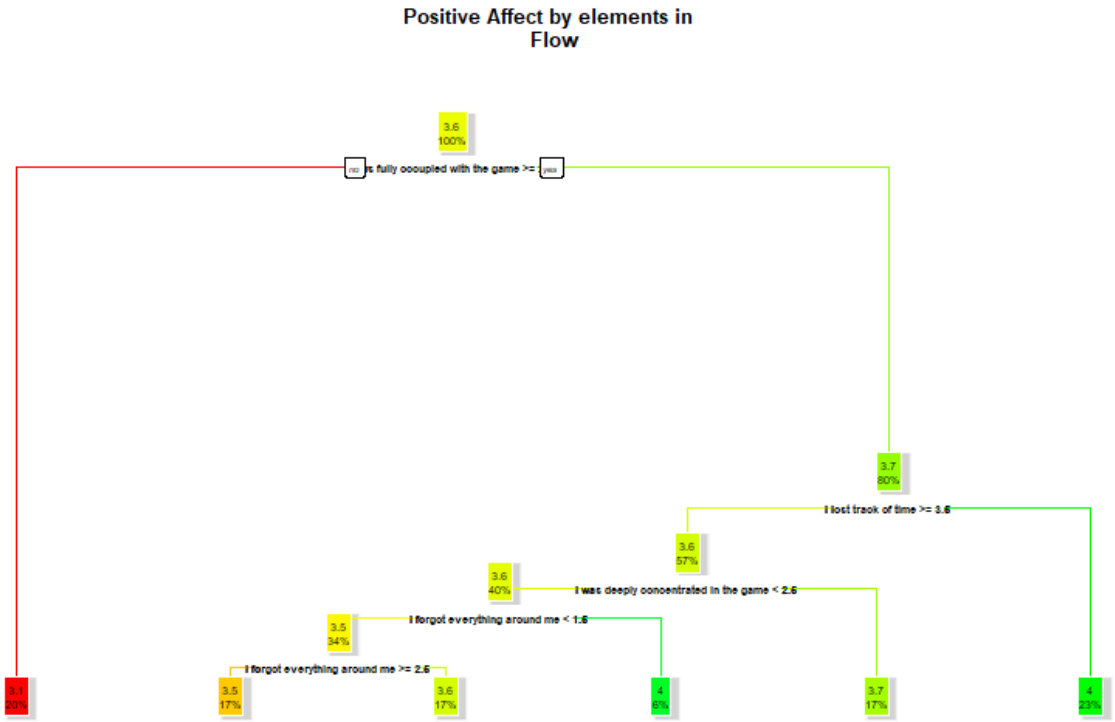

Figure 21 Positive Affect affected by elements in Flow.

In the case of Flow, we speculate that a combination of in-game alternatives, and reduced external distractions, produce an optimal setup for enjoyment. While players can feel that they have clear achievable goals, and alternatives to pursue them, their engagement and enjoyment increases. We could argue that time-sinks, long stagnated-battles or a lack of a clear path to follow, are dangerous pitfalls to avoid if we want to maximize enjoyment

The Sensory and Imaginative Immersion category presented in (Figure 22) splits at the statement “It felt like a rich experience” at a score of 2.5. Then breaking into two possibilities, depending on the side of the tree, if the initial statement is not ranked high enough, then the most important statement is “I felt that I could explore things”. If the initial statement is true, then the following most critical statement is “I was aesthetically pleasing”. In the case of sensory and Imaginative Immersion, it is difficult to speculate. “A rich experience” could both include the presented digital avatar, or from the world-aesthetics created by each singular individual. The brain is a powerful engine, and with the right narrative and description rich experiences can be achieved. When the initial statement is not met, the most critical follow-up was the

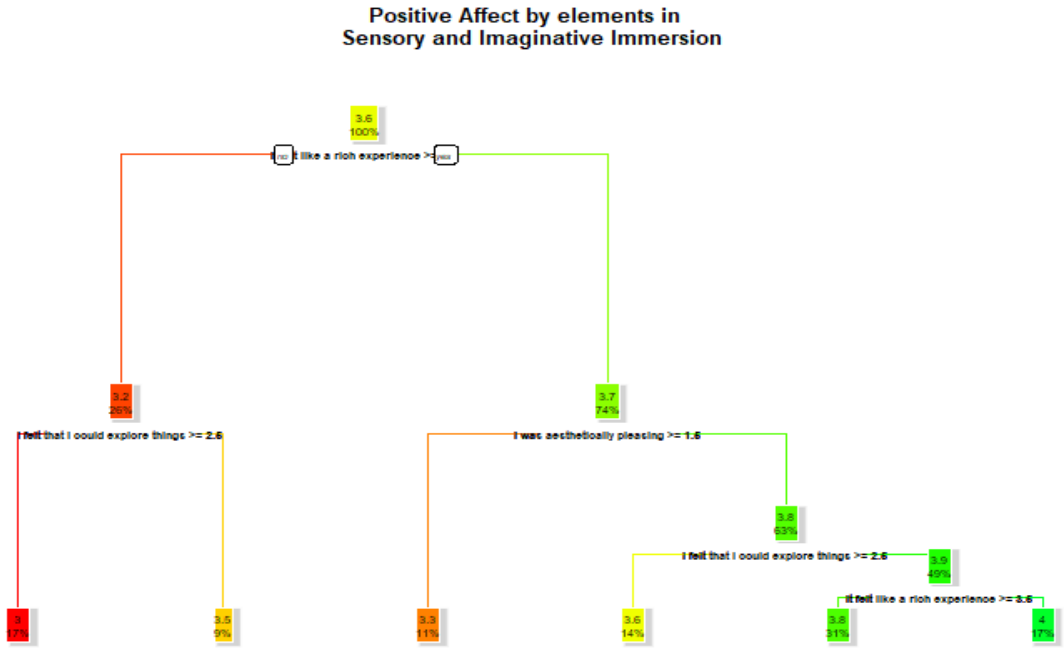

Figure 22 Positive Affect affected by elements in Sensory and Imaginative Immersion.

possibility of exploration, which suggests a player pursuit for agency and world impact. However, when players found themselves pleased with the experience presented, their next focus was personal aesthetic satisfaction. An interesting outcome given that half the sample played without visual representation. Perhaps their personal visualization of their character was important, and each gave high value to picturing their character in detail.

The GEQ statement that more directly refers to avatar visualization is “I was aesthetically pleasing” one of the only significant results in our independent T-tests ($p = <.001$) in Appendix 10.6. According to this, participants placed in different groups were significantly affected by the independent variable. Nevertheless, according to partition tree analysis, this was not considered the most critical factor in the Sensory and Imaginative Immersion experience category, where over 74% of participants require only the perception of a rich experience. We explored the data more deeply to distinguish which group scored lower or higher at the splitting point. The group on the left (lower than 3.6) was comprised by 9 “Avatar” condition participants, and the group on the right had 8 “Avatar” condition participants and 18 “Audio-only” participants. Overall, the distinctions highlighted by the recursive partitioning methods suggest that the visual nature of an avatar may not be as important as initially anticipated.

Chapter 7 Discussion

When the cameras failed during the experiment, our initial predisposition was to go back to the recruitment stage and start the process again to find and reschedule more participants once the issue had been resolved. We believed the conditions to be so radically different that resulting data would be so clearly distinct it would be a biased comparison, particularly in those categories related to immersion. However, the initial results portrayed in Figure 15, Figure 16 and Figure 17 were so similar that we suspected there could be an insight worth considering.

To understand these results, we look back at the work from Mennecke et al. 2010. Their work discussed the importance of Activity Theory, and it states that users place value not in the props, graphics, or narrative in an experience, but in the user's ability to impact the environment. This theory becomes extremely powerful in the context of a TRPG, a medium that comprises at its core the premise of infinite possibilities. In TRPGs players are limited only by the extent of their creativity, so they need only express their actions or goals, and it is up to the GM and players to create a narrative that conveys integrates that into the game world. This interaction is not limited by the players' ability to perceive each other or even the world itself, because it only requires a means of communication between participants to function. As their ability to impact the world remains, so does their enjoyment and immersion.

Considering an alternative to Activity theory as a possible foundation for our results, we noticed that our data resembles the data reported by Bente et al. in 2008. Their findings suggested no differences between *Audio-only, Video-chat* and *Avatar* conditions when measuring for social presence, trust, and user satisfaction during digital collaborations. These results are less unusual than originally regarded.

However, even when a general overview of the data suggests no distinction, the data in the Figure 18 suggests that the experience is not categorically improved by the presence of augmented digital avatars, but it intensifies every aspect of the experience, not in a significant way but consistently nonetheless. The *Avatars* condition affected not only the positive categories, but the negative ones as well. We speculate that this could be caused by the additional layer of Augmented Reality software in its current condition. The software implemented can have occasional interruptions. Sometimes players needed to stand still and recalibrate for a second to get their 3D characters to perform accurately to their facial expression. This minor annoyance did not seem to affect any participant strongly, none reported to be hindered by it, but it was clear by the analysis of the videos that players required a constant self-awareness of how their character looked. It was not a seamless interaction, and so this is the possible cause for the lower scores in the *Competence* category. It forces participants to skillfully manipulate their digital puppets while at the same time focus on the ongoing game.

Another interesting interaction comes up during the review of the *Sensory and Imaginative Immersion* category. Since the design of the study changed unexpectedly, there was no time to edit appropriate statements for the new *Audio-Only* condition. Participants responded to the best of their knowledge, all questions presented, which brings up a particular item: “I was aesthetically pleasing”. We expected this statement to have categorically opposing responses, but in fact had some overlapping results. Figure 19 illustrates each distributed statement of the category. The *Avatars* condition was expected to have some relevant results, the *Audio-Only* condition however, had no visual representation of the participants, yet still it was ranked with an average of 1.94, whereas any number above 0 is surprising given the lack of any visual representation. An explanation could be the perceived visual in the individual’s “mind’s eye”. Another option could be that the detailed narration of the environment, themselves, and their actions gave them a sense of perceived aesthetic of themselves in the world.

The lack of impact on avatar perception is also conflicting with common tropes on RPG videogame mechanics. When starting a new game in a contemporary RPG such as *The Elder Scrolls: Skyrim*, *Mass Effect* or *Final Fantasy XIV*, it is commonly introduced by offering players the option to customize their in-game characters with very high detail, a mechanic that has seen steady increase in potential and capabilities throughout the years. However, as impressive and popular as these tools are, none of this avatar curiosity and attention had impact on the presented live-avatar experience. Perhaps the lack of customization is the missing link between players and their in-game identities. James Paul Gee comments in his book "What video games have to teach us about learning and literacy", on the importance of overlapping motivations between player and character. The inclusion of customizable characters could allow players to find common ground between their reality and the digital persona of which they are assuming identity.

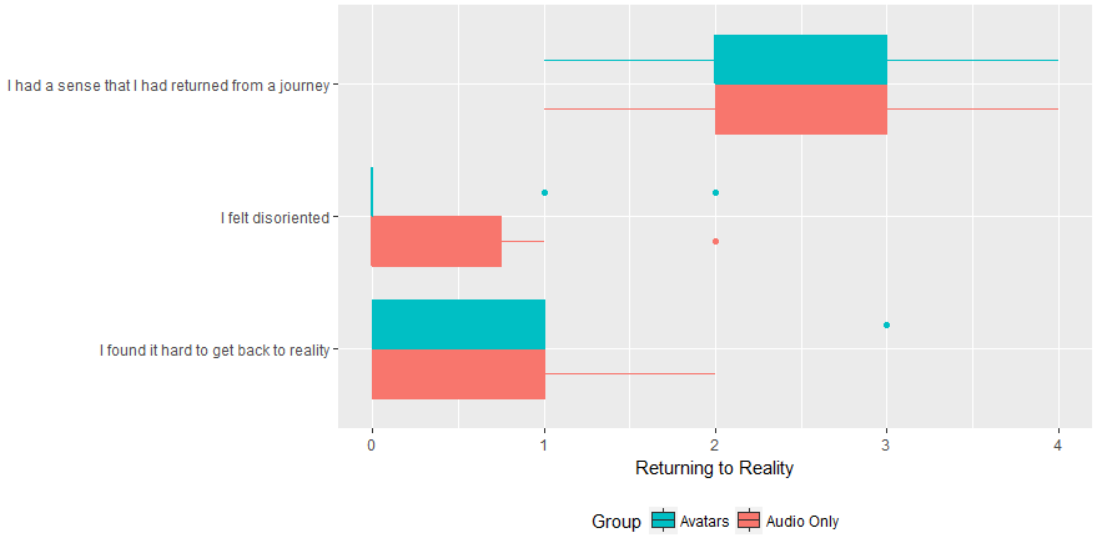

Figure 23 Return to reality divided by questions.

Lastly, there seems to be an item in the post-game module that contrasted with the rest in its own category, the statement "I had a sense that I returned from a journey". This led to a more dispersed distribution of the overall category, as shown in Figure 23. This indicates a more positive connotation than the rest of the items in the category. This can may have caused problems when comparing the category as a whole between groups.

Chapter 8 Conclusions

This thesis explored a potential way to improve immersion in online versions of TRPGs by introducing a real-time animated avatar. We first explored the existing research on TRPGs to better understand the relationship that this particular medium has with technology. Research defined the experience as a strong exercise in imaginative collaboration, strengthening the social bond between players. We also discovered exploratory work in the field of digital avatar, suggesting improved interactions through anonymous personas. We discovered the importance of player agency and game mechanics as the critical metric in game experience.

We conducted a blind experiment between groups with different conditions. Both our control group (Audio-Only) and our experimental group (Avatars) participated in a similar session of Dungeons and Dragons. While we expected the results to vary between conditions, analysis of our data suggests only subtle and complex differences in their perceived experience.

Previous work, such as the study performed by Cairns et al. in 2014, looked at the single player experience viewed through different lenses. They discovered that perspective had no strong effect on a game's experience, instead, it's mechanics were far more important determining the levels of enjoyment. TRPGs are socially dependent experiences, and our study furthers Cairns et al.'s results by exploring the effects of augmented reality tools as enhancers of social presence. We looked to define the power of a digital immersion enhancement tool as potentiator of the game experience, but instead we discovered that enjoyment and experience are not dramatically improved by flashy computer graphics, digital presence, or even visual representation. We learned that immersion is not the same as enjoyment, and while impressive visuals and responsive avatars push for more immersive tools, our results suggest the level of satisfaction

in-game is determined not by the level of immersion, but by the user's ability to impact the world, as suggested by Activity Theory.

This understanding can be applied to other existing and upcoming media. For example, in today's ongoing attempts to build, define and standardize virtual reality controllers, we can use this knowledge during design stages to improve the experience of users by focusing efforts on empowering the players to achieve more meaningful interactions. We urge designers and developers to not let immersion get in the way of functionality. By letting players impact the world with meaningful interactions, we pave the way to better game experiences. The higher the intervention of digital tools, the higher the burden on developers to make or break the experience, so digital tools must be carefully designed to improve the non-verbal communication in TRPGs without relinquishing the control of the narrative over to a game engine or system.

8.1 Limitations and Future Work

The lack of statistical significance in our results creates complications in making a clear statement, so future projects should strive for a larger sample of participants. One way to create this is to change the experiment from between-subjects design to within-subjects. But, as explained early before, TRPGs are a narrative activity and any previous knowledge of the play-session disrupts the results. When creating a within-subjects experiment, it is necessary, once per each condition, to determine different adventure narratives, schedule the same group of participants, and counter balance the adventure order, to obtain non-biased data.

A subject of study that was lost by analyzing Audio-Only data is the role of anonymity. In our original design and related work, anonymity plays an important role by allowing the participant to partake without

concern for recognition, by masking their appearances in front of their peers. But both *Avatars* and *Audio-Only* conditions create a safe space for self-disclosure. Video-chat interactions are more personal by nature, as participants can perceive each other as they are. We question the importance of anonymity in the process, would a video-chat condition produce similar or worse results than their anonymous counterparts?

This study aimed to define a closeable gap between video-chat and avatar conditions, with the uncovered knowledge that is important to consider both ends of the spectrum. Future studies should include physical co-local play, both video with and without the intervention of digital tools, and if possible an all immersive VR approach. Revealing how these different approaches are perceived could benefit the design and development of all future tools.

Real-time augmented avatars are in their essence tools for immersion, and as many tools, the outcome can be improved with practice. In our design, all *Avatar* participants were new to the tool. It would be beneficial to explore the effects of tool practice on the results. Daily usage could improve a player's ability to engage in a TRPG via the *Facerig* software. This could also uncover a novelty effect, lowering the originally reported scores.

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10: Appendices

10.1 Recruitment Poster

10.2 Consent Form

Carleton UNIVERSITY
Canada's Capital University

Consent Form
Defining the immersion gap between Online RPGs and Augmented Online RPGs

This information is to ensure that you understand the purpose of this study and the nature of your involvement. Based on this information, you should be able to determine whether you wish to participate in this study.

This study has received clearance by the Carleton University Research Ethics Board–B (CUREB-B Clearance #106126) and this clearance expires on December 1st, 2017.

Purpose and Task Requirements: We will be measuring impacts on users' game-narrative and social immersion as well as psychological and behavioral involvement in an online session of a traditional RPG.

Potential Risk or Discomfort: It is highly unlikely that participating in this research will result in any discomfort. However, you are required to sit and stare at a computer screen for at least an hour straight, possible eye strain or lumbar discomfort could be experienced. Please inform the researcher if you determine you are not eligible to participate in this study.

Research Personnel: The research supervisor for this study may be contacted anytime if you have questions or concerns: Dr. Anthony Whitehead, School of Information Technology, Carleton University, AnthonyWhitehead@cunet.carleton.ca

Contact in case of concerns: If you have any ethical concerns with the study, please contact Dr. Andy Adler, Chair, Carleton University Research Ethics Board-B (by phone at 613-520-2600 ext. 4085 or via email at ethics@carleton.ca).

Video and Audio recording: The researcher will need to record audio and video of this session for data analysis. Screenshots of the session may be used during our final report; however, no names will be associated with the images.

Anonymity/Confidentiality: Anonymized comments you make may be reflected in our summary report, however, the raw interview data will be destroyed after the completion of the study in December 2017.

Right to Withdraw: Your participation in this study is entirely voluntary. During the study, you have the right to not answer any questions or to withdraw at any time without explanation. If you would like to withdraw once you have begun, simply tell the interviewer. Your data will not be saved.

Page 1 of 2

This document has been printed on both sides of a single sheet of paper.
Please retain a copy of this document for your records.

Agreement:

I _____, agree to participate in a study in online role-playing games. This study aims to measure levels of player immersion and engagement during online social game interactions.

I _____, agree to be video and audio recorded during this study. The researcher for this study is **Gerardo Escandon**, in the Department of Engineering and Design. This study involves one 120-minute session which involves a game session of a traditional RPG through online interactions, followed by a survey of the experience. With your consent, notes may be taken.

If you would like a copy of the finished research project, you are invited to contact the researcher to request an electronic copy, which will be provided to you.

CUREB contact information:
Dr. Andy Adler, Chair (CUREB-B)
Carleton University Research Ethics Board
Carleton University
Tel: 613-520-2517
ethics@carleton.ca

Researcher contact information:
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School of Information Technology
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Tel: (438) 928-8955
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Supervisor contact information:
Anthony Whitehead
School of Information Technology
Carleton University
Tel: 613-520-2600 ext. 1696
Email:AnthonyWhitehead@cunet.carleton.ca

_____ _____
Signature of participant Date

_____ _____
Signature of researcher Date

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10.3 Debriefing

Carleton UNIVERSITY
Canada's Capital University

Debriefing Script
Defining the immersion gap between Online RPGs and Augmented Online RPGs

This information is to inform you of the purpose of your particular scenario in this study and the nature of your involvement in the study. As mentioned before, we will be measuring impacts on users' game-narrative and social immersion as well as psychological and behavioral involvement in an online session of a traditional RPG.

GROUP A (Control Group): You participated as part of the control group, in which no intervention was applied, as part of the efforts to emulate a traditional approach to a session of online role playing games and it will allow us to measure and compare changes against the experimental group.

The experimental group, on the other hand, participates in a similar session in which all the characters and story remain the same, but players do not perceive each other through just video feedback, but instead meet through digital portraits of their characters that move and speak in real time (See example on computer)

GROUP B (Experimental Group): You participated as part of the experimental group, in which an intervention was applied, as part of the efforts to measure and compare changes against the control group. In this group players perceive each other through digital portraits of their characters that move and speak in real time.

On the control group however, participants meet each other through unaltered video feedback similar to an everyday video-chat conversation, this as an effort to emulate a traditional approach to a session of online role playing games. This will allow us to measure and compare changes between both groups.

Page 1 of 1

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10.4 Game Experience Questionnaire

Core Module

Please indicate how you felt while playing the game for each of the items, on the following scale:

not at all	slightly	moderately	fairly	extremely
0	1	2	3	4

1. I felt content
2. I felt skillful
3. I was interested in the game's story
4. I thought it was fun
5. I was fully occupied with the game
6. I felt happy
7. It gave me a bad mood
8. I thought about other things
9. I found it tiresome
10. I felt competent
11. I thought it was hard
12. It was aesthetically pleasing
13. I forgot everything around me
14. I felt good
15. I was good at it
16. I felt bored
17. I felt successful
18. I felt imaginative
19. I felt that I could explore things
20. I enjoyed it
21. I was fast at reaching the game's targets
22. I felt annoyed
23. I felt pressured
24. I felt irritable
25. I lost track of time
26. I felt challenged
27. I found it impressive
28. I was deeply concentrated in the game
29. I felt frustrated
30. It felt like a rich experience
31. I lost connection with the outside world
32. I felt time pressure

Social Presence Module

Please indicate how you felt while playing the game for each of the items, on the following scale:

not at all	slightly	moderately	fairly	extremely
0	1	2	3	4

1. I empathized with the other(s)
2. My actions depended on the other(s) actions
3. The other's actions were dependent on my actions
4. I felt connected to the other(s)
5. The other(s) paid close attention to me
6. I paid close attention to the other(s)
7. I felt jealous about the other(s)
8. I found it enjoyable to be with the other(s)
9. When I was happy, the other(s) was(were) happy
10. When the other(s) was(were) happy, I was happy
11. I influenced the mood of the other(s)
12. I was influenced by the other(s) moods
13. I admired the other(s)
14. What the other(s) did affected what I did
15. What I did affected what the other(s) did
16. I felt revengeful
17. I felt schadenfreude (malicious delight)

Post-game module

Please indicate how you felt while playing the game for each of the items, on the following scale:

not at all	slightly	moderately	fairly	extremely
0	1	2	3	4

1. I felt revived
2. I felt bad
3. I found it hard to get back to reality
4. I felt guilty
5. It felt like a victory
6. I found it a waste of time
7. I felt energized
8. I felt satisfied
9. I felt disoriented
10. I felt exhausted
11. I felt that I could have done more useful things
12. I felt powerful
13. I felt weary
14. I felt regret
15. I felt ashamed
16. I felt proud
17. I had a sense that I had returned from a journey

10.5 Descriptive statistics by statements between conditions

Group Descriptives

	Group	N	Mean	SD	SE
I felt content	Group A	18	3.389	0.698	0.164
	Group B	17	3.765	0.437	0.106
I felt skillful	Group A	18	3.167	0.707	0.167
	Group B	17	2.882	0.857	0.208
I was interested in the game's story	Group A	18	3.556	0.616	0.145
	Group B	17	3.412	0.870	0.211
I thought it was fun	Group A	18	3.667	0.485	0.114
	Group B	17	3.882	0.332	0.081
I was fully occupied with the game	Group A	18	2.944	0.873	0.206
	Group B	17	3.412	0.712	0.173
I felt happy	Group A	18	3.444	0.616	0.145
	Group B	17	3.647	0.493	0.119
It gave me a bad mood	Group A	18	0.056	0.236	0.056
	Group B	17	0.000	0.000	0.000
I thought about other things	Group A	18	1.389	0.916	0.216
	Group B	17	1.353	0.931	0.226
I found it tiresome	Group A	18	0.278	0.752	0.177
	Group B	17	0.588	0.618	0.150
I felt competent	Group A	18	3.500	0.618	0.146
	Group B	17	3.000	0.707	0.171
I thought it was hard	Group A	18	0.278	0.669	0.158
	Group B	17	0.882	0.600	0.146
I was aesthetically pleasing	Group A	18	1.944	0.725	0.171
	Group B	17	3.059	0.899	0.218
I forgot everything around me	Group A	18	2.000	0.840	0.198
	Group B	17	2.471	1.125	0.273
I felt good	Group A	18	3.333	0.594	0.140
	Group B	17	3.588	0.507	0.123
I was good at it	Group A	18	3.389	0.698	0.164
	Group B	17	2.882	1.054	0.256
I felt bored	Group A	18	0.444	0.705	0.166
	Group B	17	0.412	0.507	0.123
I felt successful	Group A	18	3.389	0.698	0.164
	Group B	17	3.412	0.618	0.150
I felt imaginative	Group A	18	3.333	0.686	0.162
	Group B	17	3.471	0.624	0.151
I felt that I could explore things	Group A	18	2.778	0.732	0.173
	Group B	17	3.000	0.935	0.227
I enjoyed it	Group A	18	3.556	0.511	0.121
	Group B	17	3.765	0.437	0.106
I was fast at reaching the game's targets	Group A	18	3.111	0.676	0.159
	Group B	17	2.588	0.870	0.211
I felt annoyed	Group A	18	0.111	0.323	0.076
	Group B	17	0.294	0.470	0.114

Group Descriptives

	Group	N	Mean	SD	SE
I felt pressured	Group A	18	0.333	0.686	0.162
	Group B	17	0.529	0.624	0.151
I felt irritable	Group A	18	0.056	0.236	0.056
	Group B	17	0.059	0.243	0.059
I lost track of time	Group A	18	2.222	1.114	0.263
	Group B	17	2.941	1.088	0.264
I felt challenged	Group A	18	2.056	0.802	0.189
	Group B	17	2.176	0.728	0.176
I found it impressive	Group A	18	2.500	0.924	0.218
	Group B	17	2.824	0.883	0.214
I was deeply concentrated in the game	Group A	18	2.556	0.984	0.232
	Group B	17	2.824	1.074	0.261
I felt frustrated	Group A	18	0.111	0.323	0.076
	Group B	17	0.235	0.437	0.106
It felt like a rich experience	Group A	18	2.778	0.808	0.191
	Group B	17	3.059	0.659	0.160
I lost connection with the outside world	Group A	18	2.500	0.857	0.202
	Group B	17	2.294	1.160	0.281
I felt time pressure	Group A	18	0.500	0.707	0.167
	Group B	17	1.059	1.088	0.264
I had to put a lot of effort into it	Group A	18	0.889	1.079	0.254
	Group B	17	1.000	1.061	0.257
I empathized with the other(s)	Group A	18	2.833	0.618	0.146
	Group B	17	2.647	0.493	0.119
My actions depended on the other(s) actions	Group A	18	2.778	1.003	0.236
	Group B	17	2.882	0.857	0.208
The other's actions were dependent on my actions	Group A	18	2.167	0.618	0.146
	Group B	17	2.353	0.931	0.226
I felt connected to the other(s)	Group A	18	2.833	0.857	0.202
	Group B	17	3.176	0.728	0.176
The other(s) paid close attention to me	Group A	18	2.611	0.698	0.164
	Group B	17	2.529	0.800	0.194
I paid close attention to the other(s)	Group A	18	2.833	0.786	0.185
	Group B	17	3.235	0.664	0.161
I felt jealous about the other(s)	Group A	18	0.167	0.383	0.090
	Group B	17	0.706	0.849	0.206
I found it enjoyable to be with the other(s)	Group A	18	3.500	0.618	0.146
	Group B	17	3.529	0.800	0.194
When I was happy, the other(s) was(were) happy	Group A	18	3.222	0.732	0.173
	Group B	17	3.176	0.529	0.128
When the other(s) was(were) happy, I was happy	Group A	18	3.389	0.698	0.164
	Group B	17	3.471	0.514	0.125
I influenced the mood of the other(s)	Group A	18	2.444	0.705	0.166
	Group B	17	2.765	0.903	0.219
I was influenced by the other(s) moods	Group A	18	3.111	0.676	0.159
	Group B	17	3.118	0.781	0.189

Group Descriptives

	Group	N	Mean	SD	SE
I admired the other(s)	Group A	18	2.889	0.583	0.137
	Group B	17	2.706	0.920	0.223
What the other(s) did affected what I did	Group A	18	3.111	0.758	0.179
	Group B	17	3.412	0.618	0.150
What I did affected what the other(s) did	Group A	18	2.833	0.985	0.232
	Group B	17	2.882	0.928	0.225
I felt revengeful	Group A	18	0.444	0.856	0.202
	Group B	17	0.235	0.562	0.136
I felt schadenfreude (malicious delight)	Group A	18	1.611	1.290	0.304
	Group B	17	2.176	1.425	0.346
I felt revived	Group A	18	2.667	0.767	0.181
	Group B	17	2.647	1.057	0.256
I felt bad	Group A	18	0.111	0.323	0.076
	Group B	17	0.176	0.529	0.128
I found it hard to get back to reality	Group A	18	0.833	0.707	0.167
	Group B	17	0.706	0.772	0.187
I felt guilty	Group A	18	0.333	0.686	0.162
	Group B	17	0.000	0.000	0.000
It felt like a victory	Group A	18	3.444	0.616	0.145
	Group B	17	3.235	0.664	0.161
I found it a waste of time	Group A	18	0.056	0.236	0.056
	Group B	17	0.118	0.332	0.081
I felt energized	Group A	18	2.611	0.698	0.164
	Group B	17	3.000	0.866	0.210
I felt satisfied	Group A	18	3.167	0.707	0.167
	Group B	17	3.529	0.514	0.125
I felt disoriented	Group A	18	0.389	0.698	0.164
	Group B	17	0.294	0.588	0.143
I felt exhausted	Group A	18	0.111	0.323	0.076
	Group B	17	0.235	0.437	0.106
I felt that I could have done more useful things	Group A	18	0.778	0.878	0.207
	Group B	17	1.000	0.935	0.227
I felt powerful	Group A	18	2.778	0.732	0.173
	Group B	17	2.882	1.111	0.270
I felt weary	Group A	18	0.222	0.548	0.129
	Group B	17	0.471	0.874	0.212
I felt regret	Group A	18	0.222	0.428	0.101
	Group B	17	0.059	0.243	0.059
I felt ashamed	Group A	18	0.111	0.323	0.076
	Group B	17	0.000	0.000	0.000
I felt proud	Group A	18	2.833	0.985	0.232
	Group B	17	2.882	0.697	0.169
I had a sense that I had returned from a journey	Group A	18	2.833	0.857	0.202
	Group B	17	2.471	1.125	0.273

10.6 Independent Tests per statement between conditions

Independent Samples T-Test

	Test	statistic	df	p
I felt content	Student's	-1.896	33.00	0.067 [a]
	Mann-Whitney	108.500		0.087 [a]
I felt skillful	Student's	1.073	33.00	0.291
	Mann-Whitney	183.000		0.300
I was interested in the game's story	Student's	0.567	33.00	0.575
	Mann-Whitney	160.500		0.790
I thought it was fun	Student's	-1.526	33.00	0.137 [a]
	Mann-Whitney	120.000		0.140 [a]
I was fully occupied with the game	Student's	-1.730	33.00	0.093
	Mann-Whitney	106.500		0.103
I felt happy	Student's	-1.071	33.00	0.292
	Mann-Whitney	127.500		0.341
It gave me a bad mood		NaN		
		NaN		
I thought about other things	Student's	0.115	33.00	0.909
	Mann-Whitney	153.500		1.000
I found it tiresome	Student's	-1.330	33.00	0.193
	Mann-Whitney	101.000		0.041
I felt competent	Student's	2.230	33.00	0.033
	Mann-Whitney	211.500		0.037
I thought it was hard	Student's	-2.808	33.00	0.008
	Mann-Whitney	71.500		0.003
I was aesthetically pleasing	Student's	-4.046	33.00	< .001
	Mann-Whitney	59.000		0.001
I forgot everything around me	Student's	-1.408	33.00	0.169
	Mann-Whitney	111.000		0.153
I felt good	Student's	-1.361	33.00	0.183
	Mann-Whitney	119.000		0.208
I was good at it	Student's	1.686	33.00	0.101
	Mann-Whitney	196.000		0.132
I felt bored	Student's	0.157	33.00	0.877
	Mann-Whitney	148.000		0.861
I felt successful	Student's	-0.102	33.00	0.919
	Mann-Whitney	153.000		1.000
I felt imaginative	Student's	-0.618	33.00	0.541
	Mann-Whitney	137.000		0.569
I felt that I could explore things	Student's	-0.785	33.00	0.438
	Mann-Whitney	127.000		0.372
I enjoyed it	Student's	-1.297	33.00	0.204 [a]
	Mann-Whitney	121.000		0.206 [a]
I was fast at reaching the game's targets	Student's	1.991	33.00	0.055
	Mann-Whitney	207.500		0.057
I felt annoyed	Student's	-1.349	33.00	0.186 [a]
	Mann-Whitney	125.000		0.190 [a]
I felt pressured	Student's	-0.883	33.00	0.384

Independent Samples T-Test

	Test	statistic	df	p
	Mann-Whitney	121.000		0.214
I felt irritable	Student's	-0.040	33.00	0.968
	Mann-Whitney	152.500		1.000
I lost track of time	Student's	-1.930	33.00	0.062
	Mann-Whitney	99.000		0.068
I felt challenged	Student's	-0.466	33.00	0.644
	Mann-Whitney	143.000		0.731
I found it impressive	Student's	-1.058	33.00	0.298
	Mann-Whitney	125.500		0.341
I was deeply concentrated in the game	Student's	-0.770	33.00	0.447
	Mann-Whitney	130.500		0.451
I felt frustrated	Student's	-0.959	33.00	0.344
	Mann-Whitney	134.000		0.350
It felt like a rich experience	Student's	-1.124	33.00	0.269
	Mann-Whitney	124.500		0.308
I lost connection with the outside world	Student's	0.599	33.00	0.553
	Mann-Whitney	169.000		0.592
I felt time pressure	Student's	-1.812	33.00	0.079
	Mann-Whitney	106.000		0.096
I had to put a lot of effort into it	Student's	-0.307	33.00	0.761
	Mann-Whitney	142.000		0.711
I empathized with the other(s)	Student's	0.982	33.00	0.333
	Mann-Whitney	175.500		0.392
My actions depended on the other(s) actions	Student's	-0.331	33.00	0.743
	Mann-Whitney	147.000		0.846
The other's actions were dependent on my actions	Student's	-0.701	33.00	0.488 [a]
	Mann-Whitney	130.000		0.425 [a]
I felt connected to the other(s)	Student's	-1.273	33.00	0.212
	Mann-Whitney	119.500		0.243
The other(s) paid close attention to me	Student's	0.323	33.00	0.749
	Mann-Whitney	159.500		0.826
I paid close attention to the other(s)	Student's	-1.629	33.00	0.113
	Mann-Whitney	111.000		0.130
I felt jealous about the other(s)	Student's	-2.445	33.00	0.020 [a]
	Mann-Whitney	94.500		0.022 [a]
I found it enjoyable to be with the other(s)	Student's	-0.122	33.00	0.904
	Mann-Whitney	139.500		0.616
When I was happy, the other(s) was(were) happy	Student's	0.211	33.00	0.834
	Mann-Whitney	162.500		0.737
When the other(s) was(were) happy, I was happy	Student's	-0.392	33.00	0.697
	Mann-Whitney	148.500		0.882
I influenced the mood of the other(s)	Student's	-1.173	33.00	0.249
	Mann-Whitney	118.000		0.209
I was influenced by the other(s) moods	Student's	-0.027	33.00	0.979
	Mann-Whitney	151.000		0.957
I admired the other(s)	Student's	0.707	33.00	0.484 [a]
	Mann-Whitney	167.000		0.618 [a]

Independent Samples T-Test

	Test	statistic	df	p
What the other(s) did affected what I did	Student's	-1.281	33.00	0.209
	Mann-Whitney	120.000		0.241
What I did affected what the other(s) did	Student's	-0.151	33.00	0.881
	Mann-Whitney	151.000		0.957
I felt revengeful	Student's	0.849	33.00	0.402
	Mann-Whitney	169.500		0.472
I felt schadenfreude (malicious delight)	Student's	-1.232	33.00	0.227
	Mann-Whitney	118.500		0.249
I felt revived	Student's	0.063	33.00	0.950
	Mann-Whitney	152.500		1.000
I felt bad	Student's	-0.444	33.00	0.660
	Mann-Whitney	151.000		0.929
I found it hard to get back to reality	Student's	0.510	33.00	0.614
	Mann-Whitney	172.500		0.487
I felt guilty		NaN		
		NaN		
It felt like a victory	Student's	0.967	33.00	0.341
	Mann-Whitney	179.000		0.349
I found it a waste of time	Student's	-0.641	33.00	0.526
	Mann-Whitney	143.500		0.540
I felt energized	Student's	-1.467	33.00	0.152
	Mann-Whitney	117.000		0.210
I felt satisfied	Student's	-1.727	33.00	0.094
	Mann-Whitney	111.000		0.127
I felt disoriented	Student's	0.433	33.00	0.668
	Mann-Whitney	161.000		0.746
I felt exhausted	Student's	-0.959	33.00	0.344
	Mann-Whitney	134.000		0.350
I felt that I could have done more useful things	Student's	-0.725	33.00	0.474
	Mann-Whitney	133.000		0.493
I felt powerful	Student's	-0.331	33.00	0.743 [a]
	Mann-Whitney	140.000		0.665 [a]
I felt weary	Student's	-1.013	33.00	0.318
	Mann-Whitney	132.500		0.368
I felt regret	Student's	1.379	33.00	0.177 [a]
	Mann-Whitney	178.000		0.182 [a]
I felt ashamed		NaN		
		NaN		
I felt proud	Student's	-0.169	33.00	0.867
	Mann-Whitney	157.500		0.885
I had a sense that I had returned from a journey	Student's	1.077	33.00	0.289
	Mann-Whitney	182.500		0.319

[a] Levene's test is significant ($p < .05$), suggesting a violation of the equal variance assumption

[b] Variance = 0 in It gave me a bad mood after grouping on 1

[d] Variance = 0 in I felt guilty after grouping on 1

[e] Variance = 0 in I felt ashamed after grouping on 1

10.7 Descriptive statistics by categories

Descriptives - Score

Group	Category	Mean	SD	N
Group A	Annoyance	0.092	0.191	18
	BehaviouralInvolv	2.722	0.412	18
	Challenge	0.811	0.366	18
	Competence	3.311	0.505	18
	EmpathyPsychInvolv	3.111	0.435	18
	Flow	2.444	0.638	18
	NegativeExp	0.269	0.263	18
	NegativePsychInvolv	1.556	0.463	18
	NeggativeAffect	0.542	0.494	18
	PositiveAffect	3.478	0.495	18
	PositiveExp	2.917	0.531	18
	ReturnToReality	1.352	0.530	18
	SensoryAndImaginativeImmersion	2.989	0.533	18
	Tiredness	0.167	0.343	18
Group B	Annoyance	0.195	0.238	17
	BehaviouralInvolv	2.882	0.478	17
	Challenge	1.129	0.458	17
	Competence	2.953	0.541	17
	EmpathyPsychInvolv	3.118	0.436	17
	Flow	2.788	0.841	17
	NegativeExp	0.225	0.235	17
	NegativePsychInvolv	1.800	0.608	17
	NeggativeAffect	0.588	0.353	17
	PositiveAffect	3.729	0.367	17
	PositiveExp	3.030	0.584	17
	ReturnToReality	1.157	0.567	17
	SensoryAndImaginativeImmersion	3.153	0.546	17
	Tiredness	0.353	0.523	17

10.8 Independent Tests per category between conditions

Independent Samples T-Test

	Test	statistic	df	p
Competence	Student's	2.026	33.00	0.051
	Mann-Whitney	211.000		0.055
Sensory and Imaginative Immersion	Student's	-1.892	33.00	0.067
	Mann-Whitney	100.500		0.084
Flow	Student's	-1.367	33.00	0.181
	Mann-Whitney	108.000		0.140
Tension/Annoyance	Student's	-1.418	33.00	0.166
	Mann-Whitney	115.000		0.139
Challenge	Student's	-2.278	33.00	0.029
	Mann-Whitney	92.000		0.043
Negative affect	Student's	-0.319	33.00	0.752
	Mann-Whitney	127.500		0.398
Positive affect	Student's	-1.699	33.00	0.099
	Mann-Whitney	108.000		0.125
Psych Inv. Empathy	Student's	-0.044	33.00	0.965
	Mann-Whitney	154.500		0.973
Psych Inv. Negative Feelings	Student's	-1.343	33.00	0.189
	Mann-Whitney	117.000		0.236
Behavioural Involvement	Student's	-1.063	33.00	0.295
	Mann-Whitney	130.000		0.453
Positive Experience	Student's	-0.599	33.00	0.553
	Mann-Whitney	135.000		0.561
Negative Experience	Student's	0.509	33.00	0.614
	Mann-Whitney	165.500		0.682
Tiredness	Student's	-1.252	33.00	0.219
	Mann-Whitney	123.000		0.235
Return to Reality	Student's	1.052	33.00	0.300
	Mann-Whitney	183.000		0.319