MATERIALITY OF THE IMMATERIAL: EMBODIED INTERACTION IN VIRTUAL REALITY GAMING

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ABSTRACT

MATERIALITY OF THE IMMATERIAL: EMBODIED INTERACTION IN VIRTUAL REALITY GAMING

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Recently, with the prices of virtual reality systems dropping due to technological advances, VR gaming is becoming a common practice. As the name suggests, VR is perceived to be immaterial, yet its roots are deeply connected to and intertwined with materiality and real life. This thesis aims to explore the enigmatic nature of VR gaming, through analyzing it from the perspectives of practice theory and embodied interactions. For this purpose, observations and semi-structured interviews were conducted with VR players. The qualitative analysis revealed that this complex practice can be explained in several categories such as embodied capital, sensory factors, factors of discrepancy, ways of knowing and doing, and adaptation.

Keywords: Virtual Reality Gaming, Embodied Interactions, Embodied Capital, Practice Theory, Materiality

ÖZ

MADDİ OLMAYANIN MADDESELLİĞİ: SANAL GERÇEKLİK OYUNCULUĞUNDA BEDENLEŞMİŞ ETKİLEŞİM

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Son zamanlarda, teknolojik gelişmelere bağlı olarak sanal gerçeklik sistemlerinin fiyatlarının düşmesiyle birlikte, sanal gerçeklik oyunculuğu yaygın bir pratik haline gelmeye başlamıştır. Adından da anlaşılabileceği gibi, sanal gerçeklik somut olmayan bir şey olarak algılanır, ancak kökleri maddiyat ve gerçek hayatla derinden bağlantılıdır ve iç içe geçmiştir. Bu tez, sanal gerçeklik oyunculuğunun karmaşık doğasını pratik teorisi ve bedenleşmiş etkileşimler perspektiflerinden analiz ederek keşfetmeyi amaçlamaktadır. Bunun için, sanal gerçeklik oyuncuları ile gözlemler ve yarı yapılandırılmış görüşmeler yapılmıştır. Nitel analiz, bu karmaşık pratiğin bedensel kapital, duyusal faktörler, tutarsızlık faktörleri, bilme ve yapma biçimleri, ve bilişsel adaptasyon gibi birkaç kategoride açıklanabileceğini ortaya çıkarmıştır.

Anahtar Kelimeler: Sanal Gerçeklik Oyunculuğu, Bedenleşmiş Etkileşim, Bedenleşmiş Kapital, Pratik Teorisi, Maddesellik

To those who were always there with me, you know who you are...

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FPS: First-Person Shooter

HMD: Head-Mounted Display

PC: Personal Computer

VR: Virtual Reality

CHAPTER 1

INTRODUCTION

1.1 Background

Virtual reality was introduced as a concept in 1962 with a contraption named Sensorama, that promised to turn movies into reality with the added stimuli of vibration, scent and even wind. (Gigante, 1993). Although there were devices that aimed to achieve different types of visual, isolating experiences, the first notion of interactive virtual reality was brought forward by Ivan Sutherland in 1965 (Mandal, 2013). Ivan Sutherland was a renowned computer scientist who imagined what he called *the ultimate display,* where the border between reality and computer-generated images would blur, and virtuality could be controlled with joysticks capable of force feedback (Sutherland, 1965). In 1968, he published another work that argued visual depth could be achieved by placing two slightly different images in front of the viewers' eyes (Sutherland, 1968). His *ultimate display* would be wearable and track the head motions of the user to translate them onto the image he sees. It was envisaged to simulate the senses in a way that allowed the user to transcend the physical limitations of this world (Biocca et al., 1992; Mandal, 2013). The ultimate aim was to place the user directly inside of the world created by computers, in contrast to a viewer adopting a passive role of an outsider who is limited to the boundaries of the image shown, and has very little inclusion in what is happening on the screen or how the events unfold.

In the initial stages of this new technology, technological limitations and cost of manufacturing complex hardware limited the wide scale implementation of VR. Recently, with the introduction of mass produced, relatively low-cost VR headsets

and systems such as the Oculus Rift (See Figure 1.1) and HTC Vive (See Figure 1.2), VR gaming in particular, became accessible to the consumer market (Pan & Hamilton, 2018). It began to spread as a practice (Chan et al., 2017; Stein, 2016). Today, in addition to entertainment sector which is its obvious strong suit, VR systems are finding their way into education and training programs as advanced tools for learning, the world of business as tools that help with communication and cooperation among teams, and as a means of socialization directly linked to social media applications (Marr, 2020).

Figure 1.1. Oculus Rift headset and controllers (Bradley, 2019).

Figure 1.2. HTC Vive headset, detectors and controllers (Hayden, 2016).

The most prevalent use of this technology, and also the focus of this thesis is virtual reality gaming. VR gaming involves an intricate material arrangement; the hardware, an HMD (Head-Mounted Display) that is worn on the head and controllers strapped to the hands of the player, and the software that coordinates the different inputs, outputs, and bodily movements. The bodily movements and actions of the gamers are reflected accurately in the virtual world by the tracked movements and orientation of the controllers in real time and space. They are reflected in the virtual environment and so, their outcomes are only present in the game world, but the methods and the interaction are tangible enough to be called 'real' at the same time as these movements are really carried out with physical bodies, in physical and spatial environments and in corresponding time frames. These fundamental bodily and practical interactions and cognitive processes of virtual reality gaming indicate how unique, individualistic and material it can be. For that reason, studying the relevant literatures of practice theory, and embodied interactions enabled me to develop a promising approach towards understanding the materiality lying behind the experience.

With all that being said, there is still a lack of studies addressing how the VR gaming experience can differ from traditional gaming via non-immersive means, such as on PCs, smartphones and tablets according to Pallavicini et al (2017).

1.2 Scope and Aim of the Thesis

This thesis explores the materiality of interaction in an immaterial world that is constructed by Virtual Reality (VR) gaming. This world is virtual but real, virtual in the sense that it is simulated, yet it is real in the sense that we perceive it with our senses, and interact with it with our very bodies; in VR gaming players interact with a simulated world through the accompanying hardware and their bodily movements. It is an intricate and paradoxical interaction. To open up this interaction, first VR and the interaction within will be conceptualized from a framework that sees 'all materiality as mixed reality' (Hansen, 2006). Then VR gaming will be described as a practice and the elements involved in this practice will be analyzed.

This thesis ultimately aims to explore the embodied interaction underlying VR gaming in order to provide creative professionals (game designers and designers of the hardware) with meaningful, translatable design input and theoretical foundation that may be useful for upcoming projects, while also providing a general background which the bodily aspect of this interactive practice can be explored further.

1.3 Research Questions

To draw an inclusive theoretical frame so as to unfold the complex and intricate interactions embedded in VR gaming, the following questions were asked.

- How to conceptualize the interaction within VR gaming in terms of material-immaterial dilemma?
- How does practice theory offer an understanding of the elements of VR gaming?

- What are embodied interactions? How are they formed in VR games?
- How do gamers interact with the virtual, and so immaterial environment? How are body, senses, and bodily movements involved in VR gaming interaction?
- How do gamers interact with the hardware?

1.4 Structure of the Thesis

This thesis consists of five chapters. In the first chapter, introductory background information about virtual reality technology and virtual reality gaming along with its intriguing and enigmatic elements are provided to act as a basis for the discussions to be held later on in the thesis. The scope and aim of the thesis are explained and the research questions are presented.

Chapter two presents the theoretical framework of the study in three sections. The chapter begins with the definitions and nuances of materiality, the immaterial, and the allusive relationship between the two. Building on this discussion the next section turns to Practice Theory, as a theory that explains the material and immaterial content of everyday practices of individuals. Practice theory is not opened up in its entirety, but propositions regarding individual practices and their nature, their relationship to material environment and reproduction mechanisms are laid out. Finally, given the very physical aspect of the bodily interaction of VR gaming is the fussy concept of embodied interaction, the acquisition and reenactment of embodied capital and bodily memories is investigated with referrals to phenomenology.

Chapter three presents a detailed overview and explanation on the methodological approach for the research, field study, data collection methods and the analysis of the collected data. The chapter starts by explaining and justifying the adopted qualitative approach strategies, followed by the challenges of locating a suitable setting for the field study, choosing a specific VR game, and sampling of the participants. Finally, the structure and focus of the observations and semi-structured

interviews are explained, as well as presenting the congruent transcription, coding, categorization and insight extraction phases.

Chapter four presents and analyzes the data collected in the field study. The complex bodily and mental interactions present are analyzed under three main sections. The first main section, *ways of knowing* deals with the acquisition of embodied and knowledge capital, the sources of cognitive inputs transferable to virtual reality gaming, and their related inconsistencies between the real world and the virtual environment. In the second section, *ways of doing*, the processes of replicating the pre-existing relationships of the physical world in the virtual world, the disruptions and divergences regarding actions, and how the participants inventively overcame those disruptions are analyzed. In the third section, *immaterial to material experiences*, constitutive factors establishing the materiality of virtual reality gaming that could not be fully presented in the other two sections are explained.

Lastly, chapter five presents the conclusions and the closing remarks of the thesis. The challenges and limitations of the research are explained. Finally, recommendations and possible paths towards further research are also brought forward.

CHAPTER 2

THEORETICAL FRAMEWORK AND DISCUSSION

2.1 Definitions of Virtual Reality and Devices

Up until the emergence of virtual reality technologies, the unreal and fantasy-driven worlds of computer games have been experienced by the gamers via a two-dimensional flat screen. Each magical being, each battle, each spell and each action of the in-game characters have been observed via the flashing pixels on a flat surface. With the help of VR headsets, the gaming industry has begun to shift towards a new way of entertaining gamers, by placing them directly inside fantasy worlds. The player is no longer an outsider to the events happening on the screen and feels like an actual part of what is going on in those 'alternate' universes.

VR is a concept that has been described in various ways, some technical, some functional or meaning-based. Bardi (2020) describes it in simple terms as the construction of a simulated, artificial environment where the user is placed in the middle of the experience. The user can then interact with the three-dimensional medium and experience the stimulation of as many senses as possible, such as hearing, vision, touch, and smell, although the last one is not available for the commercially available products. Goradia et al. (2014) regard it as an interactive experience in which the user can witness a simulated version of 'real' environments in three dimensions. What is shown on the display is determined by the tactile feedback acquired from the user via motion. Bamodu and Ye's (2013) compilation of definitions involve VR as a feeling of being immersed within an interactive computer simulation and, to quote Bamodu and Ye (2013, p.1):

> A high-end Human-Machine Interface, that combine technologies such as computer graphics, image processing, pattern recognition, artificial intelligence,

> networking, sound systems and others to produce computer simulation and interaction, which gives the feeling of being present through multiple synthetic feedback sent to sensorial channels like virtual, aural, haptic and others.

The most recognizable component in every VR system is the head-mounted display (HMD). HMD is what essentially allows us to experience virtual worlds and it is the main piece of equipment that makes the concept of virtual reality different from traditional user interfaces for media consumption (Dredge, 2016). All of the VR prototypes that were developed for various purposes had the HMD as their primary feature. Until the last decade however, the idea of using VR technologies or gaming on them were inaccessible for the general consumer. That changed when the first commercially produced VR system, Oculus Rift was announced and with its announcement, a new era began for gamers and game developers (Dredge, 2016).

In VR systems here are two screens adjacent to each other for each eye and the combination of the images shown on them create a stereoscopic 3D image. The user's head motions are tracked with the embedded sensors and translated to the displayed image (Desai et al. 2014)**.** The Oculus, like most of its successors, requires a powerful computer as the source. That means the application runs on traditional PC hardware compatible with VR, and the image is fed to the HMD in real-time. The challenge here is, in order for the VR experience to be satisfactory and immersive, the HMD has to display a high-quality image with a higher resolution than the widely accepted industry standard of 1920x1080 (1080p). Furthermore, the frame rate should be high enough that responsiveness of the system is not diminished. The user's head motions need to be translated to the image displayed as swiftly as possible to avoid motion sickness (Chan et al., 2017). As the graphical quality increases (textures, effects and resolution), it becomes exponentially harder for the computer to pump the required frames per second.

Nevertheless, Oculus Rift was a huge step forward for implementing VR systems to the arsenal of gamers. Tan et al. (2015) report in their study that the majority of the participants who tried the low-cost and compact Oculus Rift for the first time stated

that they experienced heightened experiences and a richer engagement with the game elements. Furthermore, they stated that a higher degree of flow and immersiveness were present on the HMD compared to a traditional desktop setup.

Another VR device that followed Oculus Rift's footsteps was HTC Vive. Being similar to the Rift, Vive also came with hand-held controllers and a HMD. What separated Vive from its predecessor was that it came with a base station that tracks the user's movements within a confined space which meant when the user walked, the displacement could be translated into the virtual world accurately (Dredge, 2016). With these advanced HMDs, the general consumer population were granted more accessibility to VR experiences. What followed was the investment of large amounts of money and resources by game companies towards creating new experiences and developing games for the existing and upcoming VR devices (Chan et al., 2017).

2.2 The Immaterial-Material Dilemma and Games

Although VR games and applications are digital and non-existent in a literal sense, or in other words immaterial, the way we make meaning of and be affected by them can be real enough to be called material. Therefore, an exploration of materiality is needed to understand the material and immaterial connections of VR. Meskell (2005) states that the term materiality comes from the power of realizing the world and crafting subjects from non-subjects. This is something to be done in the real world if taken literally. Meskell (2005) further notes that such craftsmanship gives meaning to objects and that there are no priori ones. They must be sensed and experienced by humans and therefore gain its meaning as an object, making humans cultural agents. Regarding this argument, VR could be a way of seeing, feeling and even manipulating an immaterial, virtual world, therefore deeming it 'real' even though there is no actual physical interaction. The things we did to realize ourselves throughout history can now be repeated in virtual worlds with way fewer physical boundaries.

A similar approach towards materiality is adopted by Karl Marx. In his book, Miller (2005) notes that Marxism is based upon a philosophy of praxis. Marx evaluates what humanity is by the ability to transform the material world by production. We replicate ourselves in this transformation we perform and, in the process, understand who we are. Miller (2005) further opens the discussion by introducing the 'artifact' which is given meaning by the human effort towards its creation. The literal approach towards the artefact and meaning leaning over the physicality of things, often overshadows the emotional and internal aspects of our relationship with artifacts or in a more general sense, the material world around us. VR may or may not exactly affect how we perceive the real, material world we live in, but in fact, it is utilized effectively to create a new, virtual one with its own rules, appearance, methods of interaction and manipulation. Therefore, the material culture we can speak of within VR environments may form and function differently from the 'material culture' examined by sociologists and anthropologists up until now. Though of course, these two are bound to be intertwined to an extent.

The concept of virtuality is valid for natural and augmented human perceptual experiences (Ryan et al. 2019). Our minds have the ability of turning any form of stimuli into reality. For the virtual worlds as in digital VR, the vivid experience comes from the sense of presence. Compared to the traditional screen, VR breaks the ambiguous barrier between what is material and immaterial once again. Instead of the user looking into a screen with a frame, hinting that what is seen is just a moving picture, the user is almost teleported within a new environment. The screen was just a mean reminder of the disjointedness between the game world and ours. With VR, the physical and emotional responses given towards game events are more intense and more 'real'.

Biocca (1992) refers to presence as the perceptual illusion desired from virtual reality. Being present in a virtual environment is closely tied to the connection between the stimuli received by the sensory organs of the user and the output devices of the computer. The look, feel and sounds of the simulated environment has to be convincing to disassociate the user from the real world and make him/her believe

that this is a new reality. This is tried to be achieved by making use of the natural way we interact with the material world. Every conscious or unconscious movement that we make within the simulated world must be reflected appropriately just as it would in the real world, turning them into creative tools and means of communication.

There is also another point to talk about, which is the importance of games. There is a reason why games are the most dominant form of usage of VR technologies. Games and play in their cores are both material and imaginary. They make use of that which is material, but fondle with the real notions of them (Giddings, 2014a). A stick becomes a sword or a wand, a broom becomes a means to fly, a stone becomes a castle or a goal. In other forms of media, viewers can still accept the characters and events presented as a kind of reality, but games give the players an incomparable power over the altered meanings of material objects. Wolf and Perron (2014) take a closer look at the nature of video games. They state the involvement of the player is a necessity for any game imaginable and games should be received with their meanings which are to be created with the cooperation of developers, systems, and players. They also report that the industry nowadays focuses on virtualization and immateriality. Their take on the issue is, the next step towards breaking the material ties of gaming from the immaterial nature of it is by setting the player free of the material artifacts used with the games, and the industry is working towards achieving that dream. The setting games take place are also of importance because game spaces convey the physical characteristics of real environments and our cognitive processes about them. Video games offer new ways to reimagine actual environments, time, constraints, rules and materiality (Giddings, 2014b).

2.3 Practice Theory and VR

VR gaming appears as a modern-day recreational practice (praktik), in the sense that Reckwitz (2002) defines praktik as “a routinized type of behavior that involves bodily and mental activities, use of ‘things’, background knowledge and

understanding, and evokes emotions" (Reckwitz, 2002, p.249). It is important to note that Reckwitz (2002) distinguishes praktik from praxis within the field of praxeology. His praxis involves the whole of human activity. He argues that a practice (praktik) is a pattern filled out by often unique related actions and can dictate how things are described and understood (Reckwitz, 2002).

Schatzki (1996) differentiates the two notions of practice, practice as 'a temporally unfolding and spatially dispersed nexus of doings and sayings' (Schatzki, 1996), and practice as 'performance', the 'carrying out' of a practice in accordance with its doings and sayings (Warde, 2005). These doings and sayings are linked to each other through understandings of what to say or do, through rules, principles, and instructions, and through what he calls 'teleoaffective' structures embracing tasks, emotions, and moods (Schatzki, 1996). Schatzki (2012) defines sayings under his classification of doings, where he suggests all doings also concurrently say things. Doings and sayings are just basic bodily activities underlying and encompassed by practices. The practical understanding necessary for the performance is knowing 'how to act' and 'how to do' according to the desired practice (Schatzki, 2012). Doings and sayings have to convey at least some of the general understandings and rules about the practice to be considered as elements within the organization of said practice. Recreational practices, which VR gaming can probably be associated with the most, falls under Schatzki's (1996) second classification, which is practice as performance. Performances require repeated activity and certain processes towards learning 'how to act' and 'how to do' in Schatzki's terms. These are almost always bodily in VR, and involve concepts of embodiment such as cognition and perception, while also adopting to a certain extent Schatzki's 'doings and sayings', meaning the principles, tasks and rules of operation.

Here, it should be noted that practice theory and the most well-known theorists of the field such as Bourdieu, Giddens, Foucault, de Certeau, Schatzki and Reckwitz are usually mainly concerned with explaining the dynamics of society and consumption. Practice theory is often used as a means for explaining and theorizing human interaction and how society functions as an organism. Yet, the interactions

and dynamics concerning society most certainly stem from the practices of the individuals and how they interact with, modify and restructure the aspects of the material world around them.

This research makes use of Reckwitz's (2002) definitions of praktik, his argument of 'interconnectedness between elements of practice', which opens up further discussion about the "formation, reproduction and dissolution of practice" (Pantzar & Shove, 2010, pp. 449-450), and effectively is backed up by Schatzki's (1996; 2012) theoretical approach. In other words, for this research, practice theory is used as a perspective that opens up broader discussions on embodied interactions, bodily performances, competences of individuals, the meanings and interpretations of materiality, how practice theory includes the relationship between the object, body and environment, and how these relate to the individualistic and paradoxical practice of virtual reality gaming, while excluding the social and macro-scale arguments and connections found predominantly within practice theory.

There is an undeniable interaction between materiality and practices that works both ways (Schatzki, 2012). The doings and sayings of the practice are executed by embodied agents, humans, and most practices require these material entities to modify or utilize other material entities. The two-way interaction between them dictates that most material arrangements would not even exist in the first place without the practices that require them (Schatzki, 2012). A clearer explanation would be; practices often require tools, both bodily and material. Those practices are precisely what give the material arrangements meaning, while the same practice may not be able to fully happen without the material arrangement. Therefore, it is crucial to understand the material arrangements behind a practice, before understanding the practice itself (Schatzki et al., 2001), things must be treated as inseparable elements of practice (Reckwitz, 2002). Reckwitz (2002) also states these material arrangements are not merely used, but understood and reinterpreted each time a practice is performed.

Moving from Schatzki's perspective, stating practices are made up of "embodied, materially mediated arrays, and shared meanings" (Schatzki, 2001, p.3), Shove and Pantzar (2005) argue practices require a certain preliminary competence and material objects in many instances. Hui (2017) also argues that each time a practice is performed, it includes varying elements. She notes the same activity is never repeated in an exact same manner, therefore being subjected to dynamic reproduction and diversity. Schatzki (2002) also touches upon this overlap in his work, and notes: "...a particular doing, for instance, might belong to two or more practices by virtue of expressing components of these different practices' organizations." (Schatzki, 2002, pp.87). This ambiguous, yet frequently faced act of changing the context of practices can be valid for both material objects (as in different uses for the same tool), which can also be seen as an intersection between different practices, and abstract understandings, so elements of one practice can easily find its way to another.

Shove and Pantzar's (2005) work also presents a solid example for how variation in both the use of material objects and abstract concepts create novel practice and how a practice is dependent on these ties. In their work, they explore the practice of Nordic walking, a type of recreational activity and exercise born in Scandinavia, where the walker uses two walking sticks to traverse varying landscapes. Although the main concern of the article is revolving around the relationship between practitioners, consumption and production, they provide valuable insights about how practices come to be, what the elements of practices are, and how they are reinvented by the agency of practitioners and "the material dimension to practice" (Shove & Pantzar, 2005, p. 44).

Walking is one of the first skills we acquire during our early childhood. Nordic walking improves on this innate skill, integrates additional material elements like walking sticks, which are used out of their context (necessities arising from disabilities), and evolves the practice of walking into a fun activity (Shove & Pantzar, 2005). The practitioners of Nordic walking transform the rules and understandings of regular walking and how it is 'done' not for the sake of intentionally creating a

new practice, but through a creative process of natural re-invention. What happens eventually is the production and then the reproduction of a new practice, through the change in the use of material elements.

Shove and Pantzar (2005) argue that reproduction is a crucial step for the endurance and lasting of a practice. For a practice to be considered as an entity, it should be repeated and then reproduced first and foremost. Nordic walking brings new meaning and new methods upon a regular everyday activity, which every able-bodied human being performs on a daily basis. Shove and Pantzar (2005) state this brings up the question of competence and skill. They report Nordic walking is a 'skill' that needs training, mainly for learning how to use the walking sticks effectively in various environmental conditions, and that the material quality of the walking sticks also has to be purposed for those conditions.

Pantzar and Shove (2010) argue that everyday objects or mundane concepts are waiting to be linked together, which when appropriately reinvented and transformed will result in the birth of a novel practice (Shove & Pantzar, 2005), as in the case of Nordic walking. These elements could be "things (material), bodily knowledge, competence or skill; and mental activities" (Pantzar & Shove, 2010, p.450). Walking sticks, which are traditionally used as physical supports for those having trouble walking, gain new meanings and context of use, linked with the innate skill of walking of individuals, and introduces a new form of it requiring additional competence (Shove & Pantzar, 2005).

Reckwitz (2002) explores a similar relationship between the practitioner and the practice by taking a closer look at football players. At first sight, football seems like a simple game, played by 22 players, who are chasing and kicking a ball into one of the two goals. He points out while football players effectively have to use balls and goals, what they actually do is far more intricate than learning how to do it and repeating it mindlessly. Players and coaches have to constantly come up with new strategies and new ways of coordinating the players on the field. He notes that we train our bodies to be utilized in a determined way for learning a practice (Reckwitz,

2002). Moving from the example of football, Reckwitz (2002, p. 252) states, "...within the practice these bodily performances are necessarily connected with certain know-how, particular ways of interpretation, certain aims and emotional levels which the agents, as carriers of the practice, make use of…". Therefore, our bodies are more than just instruments of practice, and the practice itself is almost always a bodily performance, accompanied by mental activities that direct it (Reckwitz, 2002). Reckwitz (2002) views the practice of football, a self-improving and self-reproducing interaction with materiality and meaning, as a perfect example for his argument. Nordic walking is in this regard an extreme example of how Recwitz's propositions about know-how and interpretation can transform a practice.

From Pantzar and Shove's (2010; 2005) separate works, we can deduce that practices do not merely emerge with all their elements already in place. A practice almost always has ties with other practices or at least their elements, they emerge with the creative input and initiative of individuals, by the reappropriation and redefinition of objects, performances, skillful actions, and concepts. This argument seems to be valid for VR gaming as well, considering what happens in the virtual world is orchestrated by that same creative initiative and the effort towards redefining the context of regular actions by the designers. The users are also involved with that argument. As practitioners of this novel practice, they learn how to incorporate their bodily skills and knowledge (elements gathered from or shared with other practices), in order to perform the actions in the virtual world. While doing so, they also get used to subconsciously acknowledging the cognitive transformation of the controllers they are holding in their hands into different objects (which are again elements of other practices) throughout the gameplay experience. To put it more clearly, the controllers adopt varying usages and visual representations, such as a sword, a racket, a gun or a bow based on the game played. The player utilizes the same controller sometimes as a bow, and sometimes as a gun. The controllers present a certain flexibility or malleability of perception, so within the virtual world, the player is convinced they are indeed holding and using the object, since the way they

move their body and hands, and what they see with their own eyes is directly harmonious with its real-life counterpart.

Hutchings and Jarvis (2012) argue that repetition and skill lie beneath the regularization of a 'technique' of a practice. The practitioner-to-be observes, copies and tries to adapt the practice regularly and in a continuous manner up to the point that it becomes automatic and performed without conscious effort. The authors name this occurrence as 'embodied knowledge'. This knowledge, which is gained as a result of previous experience and previous practice is what guides practices, in contrast to other forms of knowledge (Hutchings and Jarvis, 2012). Usher et al. (1997) conceptualize this knowledge as practical knowledge, meaning 'knowledge embodied in acting-in-the-world'. Hutchings and Jarvis (2012) suggest that practitioners are not taught, they learn by themselves. This mechanism, this way of knowing works through hearing about the practice, observation and finally demonstration. The practitioner experiments with it for a bit before his practice becomes 'performative'. The routinized practice, which is learned through repeated, reflexive performance, cannot be improved necessarily, meaning the practitioner would not get better at it by simply repeating the same action (Hutchings & Jarvis, 2012). On the other hand, if the practitioner reflects on the performed task, learns and improves from his attempts, it becomes 'performance-enhancing practice' which is a result of additional knowledge about the practice itself (Hutchings & Jarvis, 2012).

What all of these arguments bring us to is, virtual reality has to be regarded as a complex and rich practice that includes variation, adaptation, know-how, bodily and mental skills, its own rules, cognitive and perceptual processes, understandings, interpretations and dynamics. The role the controllers adopt and the mental or bodily activities required from the player varies for each game played. There is no direct visual connection established between the player and the controller, nor the real world. The player sees an interpretation of the controller as an in-game object that the game world dictates and requires. The method of use of the controller has to be modified to a certain extent, to mimic the real-life usage of said in-game object,

whatever it may be. Therefore, although an outside viewer would see a person using two controllers and a HMD every single time he or she plays a game, it could be a new practice that requires different embodied knowledge in each game for the player.

The point is, the controllers and the games are not just part of the practice of VR gaming. When we talk about VR gaming as a practice, we have to acknowledge that it is more than a self-contained practice, and more of a melting pot of various bodily practices which are simplified and restructured for recreational purposes within the simulated, virtual world. Virtual reality contains its own methods of production, it enables the user to realize different other practices through a single object (controller). In Hui's (2017, p.54) words, "...better understanding is needed of how variation between practices relates to their interconnections and interdependence." That is precisely why practice theory needed to be brought up and is an essential part of the study when it comes to exploring virtual reality gaming.

2.4 Embodiment and Embodied Interactions

Heim (1995) argues, we use VR technology to surpass the limits of the material world and our own flesh, to leave 'embodied' experiences behind and land in 'hyperreal/disembodied' experiences. In reality, the disembodied, immaterial experience within VR has close ties with our regular 'embodied' experiences, and is mixed reality, if we were to use a better term. According to Hansen (2006), all reality is mixed reality, meaning anything experienced by the individual is made real by that individual's perception and action. In that sense, VR is just as real a version of reality, since the ways of control in VR makes use of the natural way we interact with the material world (Biocca, 1992), and our own physicality, our embodiment.

In VR, the user replicates real-life movements and actions as much as the hardware and the game allows. The internalized knowledge of ways of doing and ways of knowing certain things comes from everyday life and actions, but happen in a different, simulated context. Dant and Wheaton (2007) call this innate knowledge

which accumulates through past everyday experiences and practices ‘embodied capital’, where Bergson (1990) names this phenomenon of natural way of movement ‘bodily memories’. Finally, Connerton (1989) focuses on the same issue by regarding the human body as a site for collective memory, for habitual capital, which dictates and enables the social and physical interactions we engage in with the material world around us, through a lifetime of repetition.

When we say embodied interactions or embodiment, we mean possessing a physical, material manifestation, our bodies through which we interact with this world (Dourish, 2004). While this definition might seem to cover the basics of the concept, ‘embodiment’ is usually wrongfully received as just ‘physical manifestation’. Yet, the more valuable meaning behind is that it is grounded in everyday life, and the human experience (Dourish, 2004). It is participative and a way of existing. As well as being physically embodied in the world, embodied agents shape and are shaped by the world, which is the ground for all human activity. Our bodies are our primary instruments for dealing with the physical nature of this world, the means of operation of which are shaped by the social and physical environment of the individual through training (Mauss, 1973). Therefore Blanke and Metzinger’s (2009) definition may close the gap. They argue that the term embodiment is inclusive of “the subjective experience of using and having a body” (Blanke & Metzinger, 2009, p.7). Turner’s (2012) take on the concept of embodiment is based on it being a solidarity of human consciousness, physical body, and practice.

The connection which we share with our surroundings is organized and based on habit, since practices and skills acquired throughout the lifetime of a person become routine and rarely require the cumbersome process of re-learning (Turner, 2012). Therefore, the technologies we come across are intertwined with acquired practices, defining and being defined in the sense of ‘being’ in that world by the embodied person (Turner, 2012). These definitions undoubtedly apply to the real, physical world, yet they also apply to the simulated world of VR with a small handicap. Although we experience VR with our bodies and utilize it to direct our experiences,

VR enables us to modify the representation of our bodies' structure and size in some cases, therefore playing with the individualistic sense of our own bodies (Kilteni et al., 2012). Despite taking its roots from real life, the concept of embodiment may operate in a slightly different way when it comes to virtual reality.

Kilteni et al (2012) refer to the embodiment in VR as 'sense of embodiment, where it means having and operating a body specifically within the virtual environment, tie it to self-location and distinguish it from presence. Where self-location is concerned with the relationship of the subject's mind to the body, presence is related to one's self and the environment it is in (Kilteni et al., 2012), or in Steuer's (1992, p. 75) words:

> The experience of one's physical environment; it refers not to one's surroundings as they exist in the physical world, but to the perception of those surroundings as mediated by both automatic and controlled mental processes.

So inevitably, studies on VR must consider both the user's embodiment within the virtual world and the user's embodied interaction with the virtual environment.

To tie it up to 'embodied capital', the user's actions within VR will be based on their embodied capital, and the seen results of those actions should respond to the expected outcome, again based on the embodied capital, to solidify the sense of embodiment in VR. Tham et al.'s (2018) work confirms it. They have carried out a study using three VR devices from low-end to high-end and with varying technical capabilities. They found out that the sense of embodiment in VR was in fact closely related to the level of fidelity of the simulation. The better the sensory feedback was (audio, visual, tactile) and the more initiative given to the user, the more embodied and present the users felt.

Dreyfus (1996) notes three embodiment arguments by Merleau-Ponty. First is the literal, physical embodiment of the human, limbs, height and appearance. Second, bodily skills and responses, where the physical body of the individual is actively utilized and its agency taken advantage of, and third, the cultural understandings and

skills acquired from the daily lives and surroundings of the individual. Each has a contribution towards the embodiment of the individual in his own mind (phenomenological body) and others' (objective body). Dourish (2004) further informs us that according to the Merleau-Pontian approach, the body adopts a crucial role in perception theory, since the perception of the surrounding reality stems from the sense of the body. Or, in other words, perception and representation are inevitably constructed by embodiment and 'purposeful engagement' with the world (Anderson, 2003). So therefore, the body has to be regarded as a physical existence residing and operating within this world. Also, this view should be further contemplated by considering the body in relation to tasks, actions and the space it is confined in that dictates the body's affordances (MacAnn, 1993).

Stolz (2015) argues, cognitive sciences demonstrated that human cognition itself is an embodied phenomenon and is closely tied to human perception and action (Matthews, 2002). Merleau-Ponty's (1962) argument, the human being not a duality of mind and body where either has distinct roles, but acts as a whole is supported. Merleau-Ponty (1962) sees the very being of the human to be the source of existence and the person's engagement in the world is brought by itself. This type of cognition in question is specifically named 'embodied cognition' and differs from the traditional view of cognition (Foglia & Wilson, 2013). Foglia and Wilson (2013) report that views on traditional cognition separate the mind and the body, seeing the body as a means of receiving sensory input and performing the behavioral output processed by the mind, focusing more on the mind as the primary driver of cognition. The view of embodied cognition on the other hand places great focus on the role of motor and sensory functions of the body. The body itself regulates and gives form to the nature of mental activity (Foglia & Wilson, 2013).

Embodied cognition cannot only be viewed as an end product, rather, it should be seen as a process of inquiry (Johnson, 2011). Our senses and motor functions are the primary conduits of this inquiry. Kozel (2011) argues that our vision itself, which is arguably the most important bodily and sensory input for the individual, is material

and so is tactile interaction. She suggests while working with bodies and digital technologies, our mode of perception, materiality and concept of knowledge deviate. The virtual environment brings its own set of rules and affordances upon which the body improvises (Kozel, 2011), and the bridge between the virtual and the real is formed by motor activity, the physical use of the human body (Hansen, 2006). Heidegger's philosophy places emphasis upon the human hand when it comes to tacticity and the power of touch. It is a crucial part of humanity, since it is the hand that dictates an individual's practical involvement in the world (Turner, 1992; Turner, 2012). Merleau-Ponty also stressed the role of tactile sensation, touching, as a main driver of interaction in addition to vision. The touch is immediately answered by the object, by the world, making the touch both an action and a mode of perception (Kozel, 2011). This is especially true for virtual reality systems, since the main form of interaction with the virtual world is the hand-held controllers that adopt and translate many functions of the human hand, and make up a rather large part of the embodied actions possible within.

The body's way of working is learned and processed by interacting with objects, and familiarizing oneself with materials as stated earlier, but many of those spatial skills acquired in the real world work in an altered means in human-constructed worlds (Keating & Sunakawa, 2011). The importance given to orienting, moving and understanding the body on the screen in a virtual setting should be no less than doing it in the real world. Keating and Sunakawa's (2011) argument is based upon the virtual worlds experienced through a screen as is evident, meaning there is a greater difference in the ways of operating the virtual body or the avatar, compared to how it is achieved in the real world. Keating and Sunakawa's (2011) work however was based on interactions with the virtual world through a 2D screen. In the case of virtual reality, the user is tied more closely to the foundations of the real world, can utilize his innate skills of body orientation and spatiality more efficiently since the barrier of the 2D screen is not present, and can conjure the same operative skills with greater potential as a result, albeit with slight alterations.

Lee and Ingold (2006) tackle the issue of embodiment through the act of walking. Walking and displacement is a crucial part of VR alongside vision and touch (the use of hands), since the movement within is perceived from first-person perspective, and locomotion within the virtual world will be immediately associated with walking. Walking is a natural and essential part of everyday life. Virtual reality systems offer the choice of walking in the real physical space to move your character but it is not feasible due to the obvious scale difference between the room the game is played in, and the often vast game world (Riecke & Schulte-Pelkum, 2013). Certain attempts such as omnidirectional treadmills towards implementing this natural way of interaction with the game world have been made, yet are not successful. Lee and Ingold (2006) argue in their study that walking itself is not the conveyor of the embodied experience, but that it coexists with the movements of the walker and the other walkers he/she inevitably shares a common space and performance. The embodiment walking provides is founded by the social engagement between the walker's self and the environment. The walker continuously connects with the ground and his surroundings by the repeated action of stepping forward, alternating his feet (Lee & Ingold, 2006).

Another point is, human beings choose their actions according to their surroundings, and are especially good at regulating their affordances and requirements while walking, such as calculating the width of a gap that has to be hopped over, or the height difference between two surfaces which require the walker to ascend or descend to traverse between (Fajen, 2013). This type of embodiment is in slight contrast with that found in VR. Locomotion within VR is generally achieved by thumbsticks, which takes the action of walking away from the equation but introduces a new way of displacing the virtually corporeal body, that may not reflect, or accurately imitate the real action of walking, and therefore transforms an innate skill to one that needs re-acquiring.

Lee and Ingold (2006) also suggest that the strong embodied experience walking provides may be related to some factors found outdoors such as the weather

conditions which become part of the emotion and becomes something the walker effectively is forced to react to and alter the way he uses his body. Moreover, the pace of walking is adjusted to the spatial freedom an open space provides, strengthening the notion of movement. So walking, in a sense, is made real by the embodied action and perception it involves (Lee & Ingold, 2006). On a side note, VR is experienced indoors but the virtual scenes may not always be. This may create a contradiction, where the user's eyes tell him that he is in an open space outside, while his other senses may lack the supporting feedback.

CHAPTER 3

METHODOLOGY

This chapter explains the approaches taken towards and during the study for the aim of uncovering and analyzing the intricate interactions found in virtual reality gaming. The adopted qualitative approach and data collection methods for this research is justified and grounded based on the literature and the context of the research questions in the first section. Also, how, and why I divided the field study into two successive phases are explained.

Section two presents the details of the first phase of the field study, consisting of the preliminary preparations that needed to be made. These preparations are: the further familiarization of myself with VR technologies and games, the selection of a location that I could conduct the study at, the selection of the game that would become the study material, and the specific hardware that the game would be played on. The details regarding these preparations are presented within their respective parts.

Section three presents the second phase of the field study where I conducted my observations and interviews. The methods and setting of both the observations and the semi-structured interviews are explained in detail. Also, the sampling method required by the conditions of the research is explained.

Finally, section four presents the process of the analyses of the data acquired during the observations and the interviews. The details of the section consist of the tools used for the transcription and coding of the interviews, and the tools used for the grouping, categorization and visualization of the coded data.

3.1 Approach to Research and Data Collection

This thesis focuses on the individual bodily experiences and practice of VR gaming, and effectively utilizes the literatures of practice theory, phenomenology, and embodiment. I will be treating VR gaming as an embodied practice as presented in the theoretical framework because it is a cognitive and bodily interaction, containing complex doings and knowledge that can include the reproduction of real-life practices and/or unique inventive processes.

The overall approach of this thesis is inevitably qualitative and phenomenological to an extent, since the aim is to deduce a sound, general framework from the experiences of VR players, which are individual experiences. Miles et al. (2014, p.5) note that "phenomenology tends to look at data thematically to extract essences and essentials of participant meanings". As (Pilotta, 1993, p. 351) notes, "phenomenology does constitute a potentially determinable framework within which to pose and to establish means for making decisions about specific meaningful questions concerning human action and knowledge". In this sense, the literature regarding the concept of embodiment as it is explored and dissected in this thesis, is still fed by phenomenology even though phenomenology was not addressed individually.

Under the light of these, this thesis adopts qualitative methods to unearth the complex bodily interactions involved with VR gaming. Due to the nature of virtual reality interaction being so bodily, cognitive, individual, and complex, the qualitative methods of observation, and semi-structured interviews (Patton, 2005) were utilized to make an attempt towards deciphering it in its real-world setting. The study was divided into two phases. The first phase of the study consisted of me familiarizing myself with various VR games and hardware. Then I selected an appropriate place where the experience of each participant could be directly and accurately observed and selected a game that contains the complex bodily interactions that define the characteristics of the domain of VR gaming. During the second phase I conducted the observations and interviews in a commercial setting where players come and play

in hourly periods. The data acquired from these qualitative research tools was transcribed, coded, categorized, and then analyzed.

3.2 First Phase of the Study

In the first phase of the research, I aimed to familiarize myself with the VR gaming field. I can be considered a 'gamer' in the sense that I prefer spending most of my free time playing and exploring video games. Despite that, I still did not possess enough knowledge about the games and the hardware options of the practice in detail since I never owned a VR system. I was aware of the fact that every game was different in terms of genre, level design, interaction design, and stylistic and visual choices. Therefore, I firstly had to do my own research to familiarize myself with the games available for VR, what each different VR system could do, and how the orchestration of various devices used in unison worked. Even for the same game and hardware, the conditions the games are played in could still cause inconsistencies. For that reason, the first phase of the field study consisted of me finding an appropriate place where I could carry out my own informed observations according to the literature and experience the game and the hardware first-hand to have a solid grasp on the fundamentals of the complex interactions involved with VR gaming. After finding the right place, and the game, the owners of the venue were informed thoroughly about the subject, aims, methods and the duration of the research, and were asked for their consent for providing the required facilities.

Also, I decided to choose only one game because as stated earlier, each game offers a different experience with its own interactions and presentation. Such a variation in source material would indisputably compromise the consistency and the reliability of the data, and would produce isolated, disrelated clusters of findings. The game I was going to use as research material had to contain many bodily interactions and had to be relatable to real life by the participants in terms of actions, environments, and graphics. A game called Arizona Sunshine which will be explained in detail in

the following part met these needs and coupled with the fact that it was the most played game in the venue according to the owners, the game was selected.

With their permission, I played Arizona Sunshine from beginning to end twice. After each hour of game time, I took a break and noted down what I had experienced, what the game required me to do, how I managed to accomplish the tasks given to me by the game, and the hardships I encountered. Doing this before engaging with the participants enabled me to set logical and well-defined expectations, while also providing a reference point from which I could build an interview guide that can open up aspects of embodied interaction.

3.2.1 Study Site: VR Station

VR systems are unfortunately still not common in Turkey, due to them still requiring personal computers with somewhat high processing power to play most of the games efficiently and without any performance-related issues. Also, VR systems, while being more accessible as of today compared to five or six years ago in terms of price, are still not cheap enough in our country for the average consumer to buy and enjoy. Therefore, in order to work with a sufficient number of participants to ensure the variety and the quality of the data acquired throughout the process, a commercial setting where people come for a designated period of time to play VR games became the best choice.

In Ankara, I could only find three venues that could accommodate me with the necessary facilities, hardware, and participants for conducting the field study of this research. Two of those entertainment venues were situated in remote districts of the city and one was in Bahçelievler district. All things considered such as transportation, population, customer base, and the district being famous for harboring many entertainment venues, bars, and restaurants that increases the possibility of people trying out virtual reality, it became clear that conducting the

study in the VR café, ‘VR Station’ (See Figure 3.1) would supply the research with a varied sample group and numerous participants.

Figure 3.1. VR Station from the street.

VR Station is situated on 63. Sokak, Bahçelievler and it is a popular VR entertainment stop with four semi-enclosed game rooms (See Figure 3.2), four separate personal computers and four sets of VR equipment for each room or player. The venue works with hourly reservations and offers more than fifteen single-player and multiplayer games for its customers. The computers and headsets are connected to the local network, enabling customers to come in groups of two, three and four, and play their game of choice together in a multiplayer setting. The three walls around the game rooms are padded with soft cushions to ensure the safety of the players, and they are isolated from the main space with curtains that are fully closed during sessions as shown in Figure 3.3.

Figure 3.2. Game rooms of VR Station.

Figure 3.3. A standard game room in VR Station.

For the purposes of communication and aural isolation, players are also provided with headphones that are connected to the VR headsets they are wearing. In addition, they have an outside area with glass walls, tables and comfortable chairs for their customers for when they wait for their turn, or to relax and have a drink after an intense game session (See Figure 3.4). Naturally, this outside area happens to be an exceptionally ideal environment to conduct interviews with the players immediately after their sessions end, and without external disturbances such as noise from the streets and the other players.

Figure 3.4. The outside area used for interviews.

3.2.2 The Game: Arizona Sunshine

The selection of the game was a crucial part of the research. Since the focus of this research is the nature of complex bodily interactions present in the practice of VR gaming, the selected game had to provide the means to qualitatively measure and observe those interactions by containing as many physical interactions as possible, while also resembling the 'real world' in the sense that the game world looks closer to our reality and involves actions that would not be far from their real-life counterparts. As mentioned earlier, VR Station offers more than fifteen games for its customers. However, after talking to the owners about how popular each game was, one of those games clearly stood out. The owners stated that around seventy to eighty percent of the people visiting there were playing a game called Arizona Sunshine. The setting and the mechanics of the game matched the requirements of the research,

and coupled with the fact that it would be the correct game of choice for acquiring the largest number of possible participants within the designated time for the field study, Arizona Sunshine became the subject game of this study.

Arizona Sunshine is a survival first person shooter (FPS) game, released in 2016 for Oculus Rift, Oculus Quest, HTC Vive, Valve Index and Playstation VR systems. FPS means that the player would play the game through the eyes of the in-game character, and that the game involves shooting with firearms. The game has two modes, 'story mode' and 'horde mode', that can be played with up to two and four players respectively (Ambalina, 2020). So if the player wishes to experience the story of the game, he/she can do so with a partner, while the horde mode where the players fight against waves of zombies until they die can be played with four players. For the purposes of this research, only the 'story mode' of the game was analyzed, due to the 'horde mode' being just about clearing waves of zombies closing in on the group of players while the players are almost stationary within one designated area.

In Arizona Sunshine's 'story mode', the player wakes up in a cave during a zombie apocalypse in the state of Arizona when he hears a voice on the radio. After learning there may be other survivors out there, he embarks on a journey (Vertigo Games, n.d.), visiting and exploring various locations such as highways, mines and military encampments, to find the source of the transmission. On the way, the player makes use of the weapons (pistols, submachine guns and grenades) lying around, and resources (food for health, ammunition, flashlight, light sticks, keys) to beat the zombies (See Figure 3.5) wandering around and make progression through the levels. During the journey, the player encounters various surprises and stressful situations to test his or her survival skills.

Figure 3.5. Arizona Sunshine’s zombies attacking the player (Melnick, 2019).

When the game is booted up for the first time, the player is met with a calibration sequence to determine how tall the in-game avatar should be, to successfully match the real-life actions of the player (i.e., crouching and reaching). In the game, there are two ways of locomotion. The player can either walk physically or use the thumbstick to choose a location he can teleport to. The exact point the player will end up is clearly indicated by the game. When the player is happy with his choice, he simply releases the thumbstick and is instantly teleported to the set location (See Figure 3.6). The player can also pick up many small objects lying around, open doors, drawers and car trunks, and can utilize a number of available weapons to fight zombies.

Figure 3.6. Teleportation marker in game (Brown, 2017).

There are also various ways that a player can interact with the game world using his or her own physicality other than locomotion. The players are placed in a town in the deserts of Arizona and have to travel through many open and enclosed spaces. The players open the doors of buildings they encounter by themselves, meaning by actually reaching for the handle, holding it and swinging their arms. The same logic and sequence of action applies to other objects such as drawers, lockers, refrigerators, cars, and suitcases, as well. The resources of the game are hidden inside these everyday objects and furniture. These resources can be listed as firearms, bullets, grenades, burger patties used to refill lost health points, and a flashlight in one instance only. Throughout their journey, players actively look for these resources by interacting with the listed objects in the same way as doors.

The enemies in the game are the zombies as mentioned earlier. To fight them and survive throughout the story missions, players utilize firearms such as pistols and submachine guns, and explosives such as grenades. The operation of the guns is designed by taking real life practice as reference. As such, the players can aim by aligning the front and rear sights of the gun in front of their eyes. In addition, the game also offers a laser pointer that signifies where the bullet will hit if the player

fires it. Each gun in the game has a limited number of bullets that can be fired before it needs reloading. When the players fire all of the bullets, they have to press a button next to the thumbstick, which causes the empty magazine to be released and dropped to the floor. Then, the player has to move the gun close to the belt on his waist, where the collected extra ammunition is stored. After doing this, the gun is ready to be fired again until the next reload. The extra bullets are scattered in the game world as magazines. The player reaches for the magazine after locating one, grabs it and releases his grip after placing his hand on his waist. The interaction regarding grenades is a bit more complicated. Firstly, they are stored on the player's chest. To successfully throw one, the player puts his hand on his chest, presses and holds the grab button to pick it up, presses the magazine release button to pull the safety pin, and throws it with his arm while letting go of the grab button.

3.2.3 The Hardware: Oculus Quest 2

The VR headset used in 'VR Station' is called Oculus Quest 2 (See Figure 3.7). It was launched towards the end of 2020 and was offered to the general consumer as an affordable, light and versatile VR system (Robertson, 2020). Standardly, it consists of a strapped headset with two screens allocated for each eye, and two hand-held controllers. The headset is arguably the best commonly available headset as of today in terms of image quality, motion detection accuracy, weight, and software support. It also supports a low-resolution camera which is used to accurately measure and draw the boundaries of the available space for gaming, so that the device can warn the players if they get too close to a wall or an obstacle. It executes this protective measure by displaying a blue net on the screen that accurately represents the actual wall in the real world (See Figure 3.8), so that the player can understand the distance between himself and the wall and take a step back towards a safer area of the room.

Figure 3.7. Oculus Quest 2 HMD and controllers (Kuchera, 2020).

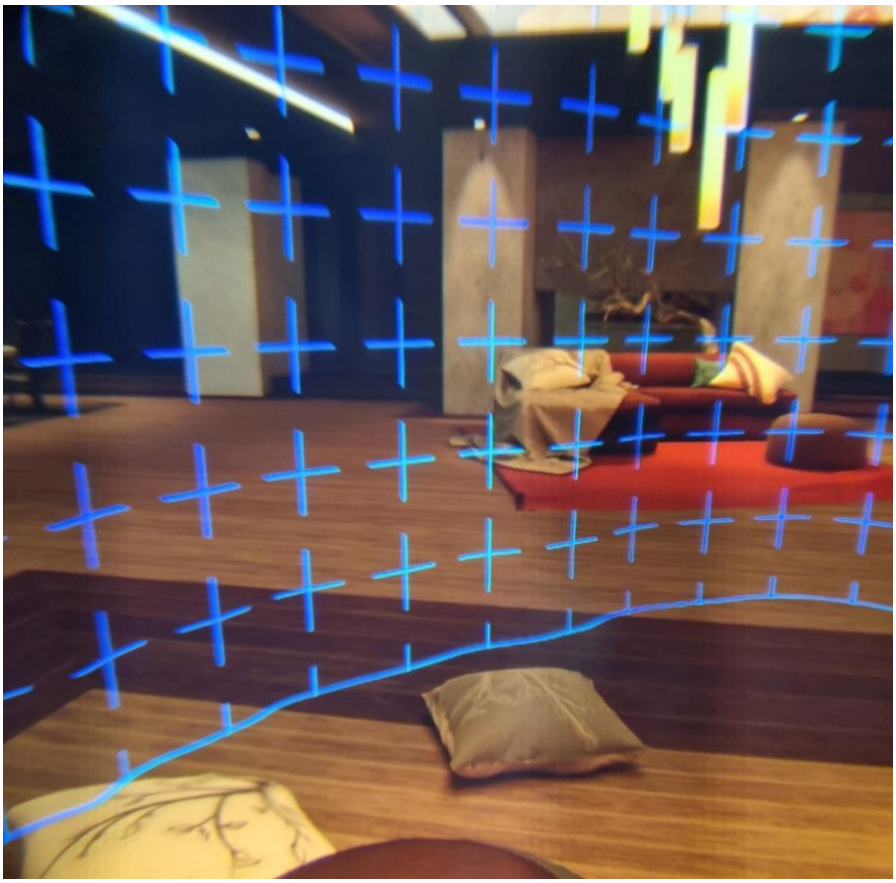

Figure 3.8. Oculus Quest 2 ‘Guardian’ in action (Hawthorne, 2021).

There are two controllers, one for each hand. The controllers have multidirectional thumbsticks, two face buttons, one home button, one trigger button that would be under the index finger, and one grip button that would be under the middle and ring fingers (See Figure 3.9). The orientation, position and acceleration of the controllers are accurately detected by the system and this data is communicated wirelessly to the headset in real time. For additional safety, the controllers are strapped tightly to the hands of the player, making it impossible to throw it out of the hand by accident during intense movements.

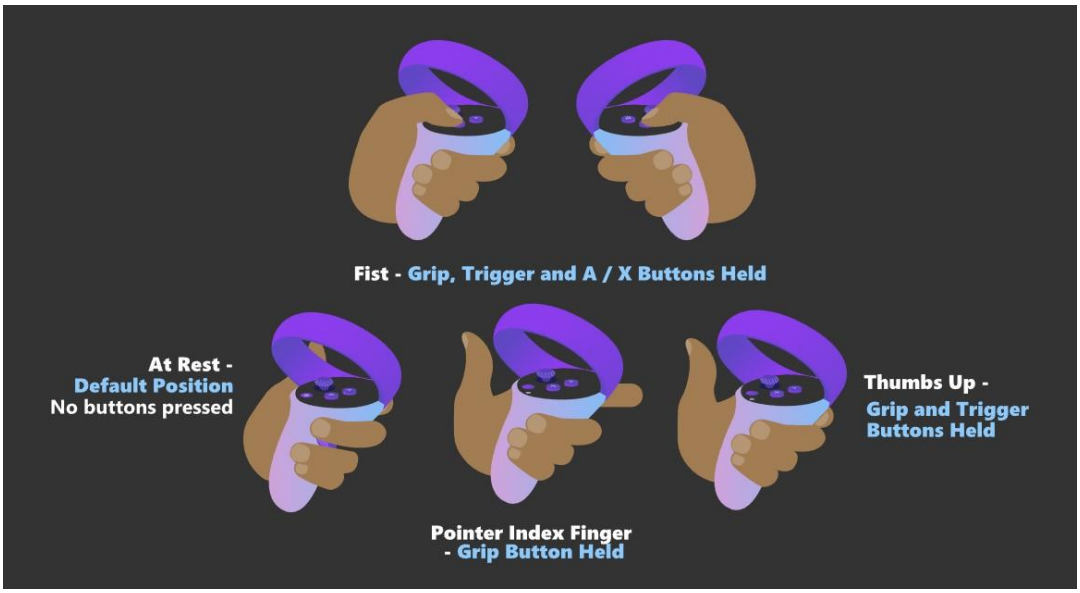

Figure 3.9. Illustration of Oculus Quest 2 controllers in use (Microsoft, 2022).

3.3 Second Phase of the Study

The mental and written notes that I had taken during and after my initial experience with the hardware and the game were utilized for the second phase of the study. The affordances, objectives, aspects, and possible material interactions within the game were carefully noted down, and an outline was drafted for the questions that could be asked to the participants after their sessions. The interview guide was then refined after revisiting the literature and took its final shape.

During this phase, the gameplay sessions of consenting participants were observed and interviews were conducted consequently. All but two of the participants called the venue for reservation before coming, and again all but two of those played for one hour. Upon their arrival, the candidate participants decided on the game they wanted to play without my interference. If the game and the game mode they had chosen happened to be the subject game of this study, I stepped in before they put on the hardware and explained the research I was conducting to them. During this time, the candidate participants were handed the Informed Consent Form (See Appendice A), which clearly listed the aim and scope of the study, what methods of data collection would be used, what would be expected of them during the research. The players who agreed to be a part of the study were asked to sign the form and the study was conducted as will be explained in the following parts.

3.3.1 Data Collection Methods

Where qualitative study shines is its ability to focus on the individual's own views and experiences, and how it enables the researcher to captivate the essence of the unique data the individual provides, which becomes a serious issue with quantitative approaches that may disregard the subjective yet valuable data for the sake of standardization (Marshall & Rossman, 2016). Therefore, understanding the complex interactions that come with VR gaming required "deeper perspectives that can be captured through face-to-face interaction and observation in the natural setting" (Marshall & Rossman, 2016, p.207). The first part of accomplishing this was through direct observation.

As mentioned, and shown earlier, the game rooms of VR Station are separated from the main area with curtains that are fully closed while a player is in game. Additionally, there are monitors outside of the game room that display the game through the eyes of the player for the owners to track gameplay as shown in Figure 3.10. The existence of such a setup made it possible to watch the bodily movements and the in-game events simultaneously. So, it was possible to distinguish what the

players were aiming to do, how they reacted in certain situations, what they saw in the game, and match all of these with their way of moving.

Figure 3.10. The monitor placed outside of the game room to track gameplay.

One disadvantage was that each player played the game in a separate room and each monitor was situated in front of the game room it was connected to. Since the overwhelming majority of the players observed came in pairs, it meant that only one player could be observed at a time. So, throughout their sessions, the participants were asked to leave their curtains open, and when any of the players encountered a certain event, or tried a particular action, their rooms were approached, and notes were taken accordingly. The way the players interacted with the hardware and the game world was noted down right away. Any interesting events, struggles or reactions were also noted down (See Figure 3.11). The field notes taken throughout the game sessions were then used in the semi-structured interviews that took place

directly afterwards, to open up discussions and direct specific questions to the participants about their experience.

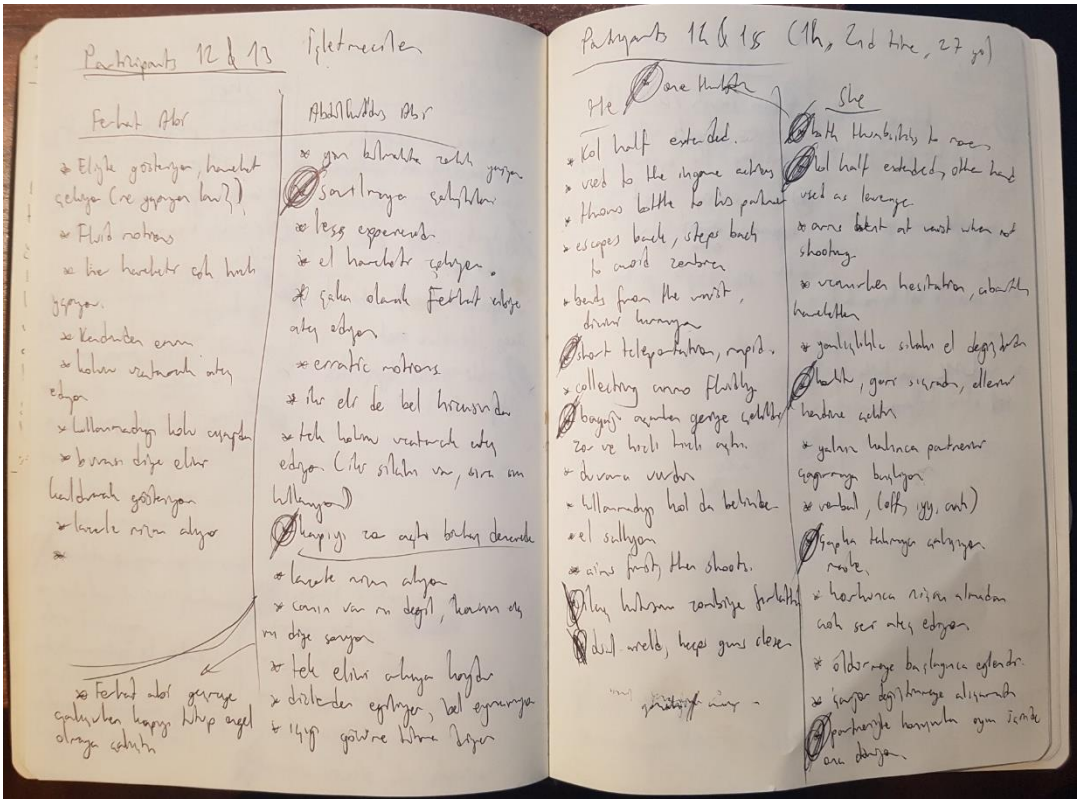

Figure 3.11. Field notes taken during observation.

The observations were conducted on 23 participants in total. There were 22 pairs, where one pair was the owners of the venue, and one player who played the game by herself.

Continuing with the interviews, Creswell (2014) informs us that studies that are entangled with phenomenology place the individual experiences at the center of their foci, and try to gather data through the perspective of those individuals as opposed to other types of research. Moving from this, data collection methods that enable the researcher to reach those individuals one by one and to work with them meticulously are preferable or even more so, mandatory. One of the most widely used methods for phenomenological research are interviews (Giorgi, 2009), and since each individual

provided slightly varying data according to the contents of the one-hour long observations, semi-structured interviews were the interview method of choice. Reporting from Galletta (2013, p.2); "The semi-structured interview […] creates openings for a narrative to unfold, while also including questions informed by theory". For semi-structured interviews, the researcher prepares a flexible interview guide by pinpointing the focuses of the research, generally through the reviewing of the relevant literature. The guide for the semi-structured interview (See Appendices B and C) was prepared in this manner.

The interviews were conducted directly after the game sessions ended, in the enclosed outside area of VR Station. A mobile phone was placed in the middle to record the interview sessions for transcription. The interviews were conducted with 21 players out of the observed 23 and lasted between approximately 12 to 35 minutes. The number of questions and the order in which they were asked varied according to the significant events during the observations as detailed in the previous paragraphs, or the natural course of the interviews. The demographic information about the participants can be found below in Table 3.1.

Table 3.1. The demographic data of the interviewees.

Participants	*Age*	*Sex (M or F)*
Participants 1&2	24, 25	F, M
Participant 3	27	F
Participants 4&5	21, 21	F, M
Participants 6&7	28, 28	F, M
Participants 8&9	29, 30	M, M
Participants 10&11	28, 28	F, M
Participants 14&15	27, 27	F, M
Participants 16&17	29, 31	F, M
Participants 18&19	25, 28	F, M
Participants 20&21	22, 22	F, M
Participants 22&23	23, 26	M, M

3.3.2 Sampling

For such a study as this one, determining the approach towards collecting a multifarious and varied sample group proved to be a challenge due to a few limiting factors. Firstly, it was presumed beforehand that the sample group of this study would be more or less limited to certain age groups and a single gender due to the main material of the study being a game. According to the recent quantitative study conducted by Mathews, Morrell and Molle (2018), the average gamer is around 23 years old, and the video game community predominantly consists of male players, by more than 90 percent. These findings were initially concerning, since the research aimed to gather data from a varied sample group with no limitations. Fortunately, this was not the case for VR gaming, at least in a commercial setting where people do not have to buy the equipment to experience it.

Another limiting factor was the inability to manually select and categorize the participants since the study was conducted in a commercial setting and it was impossible to predict who would come in for a game beforehand. In addition, the study was conducted using one mode of one game only (Arizona Sunshine) for the purposes explained in the previous sections, and having such a definitive and restrictive study material in a venue that offers more than fifteen games to choose from, substantially prohibits the possibility of the researcher to select and work with participants belonging to a predefined sample group, within the allocated two months.

Under the light of these, the sample group for the field study of this thesis was forced to remain undetermined and uncontrolled in terms of demographic profile until the end of the study. Every customer who met the criteria for study materials was asked if they volunteered to participate in the research. Bornstein et al. (2013, p.361) define this kind of sampling strategy as ‘convenience sampling’, where the researcher adopts “a nonprobability sampling strategy where participants are selected based on their accessibility and/or proximity to the research”.

3.4 Analysis of the Data

3.4.1 Transcription and Coding

For the transcriptions, an online, web-based word processing software, Google Docs was used. Google Docs makes it easier to store, organize and reach different files since it relies on cloud saves, effectively eliminating the necessity to use only one device. Another useful feature of Google Docs was the ease of marking certain passages throughout the transcripted text, and attaching comments, insights and codes to the marked text which are also saved to the cloud.

After the interviews were over and the transcriptions were completed, I used the 'comment' feature of Google Docs to mark certain passages that contained data that could be valuable and were relatable to the literature. The same was done for the parts in the conversations that did not fully match the expectations or anticipations regarding the literature, but still provided novel phenomena related to embodiment and practices. This was the first cycle of coding. The second cycle consisted of me going through all of the marked text and clearing the non-decisive codings that lead nowhere under the scope of this research, to be left with categorizable and insightful data.

3.4.2 Categorization and Synthesis of Coded Data

The coded data from the transcriptions on Google Docs were transferred to another online tool, Miro. Miro is originally an online collaboration tool for teams to quickly and easily visualize or organize ideas (Perminova, 2022). It achieves this by providing the users with sticky notes, shapes, arrows, and colors that can be applied to everything. The codes and findings were pasted onto Miro's workspace, with quotes accompanying them. These were initially grouped under their respective interviews (See Figure 3.12 and Figure 3.13).

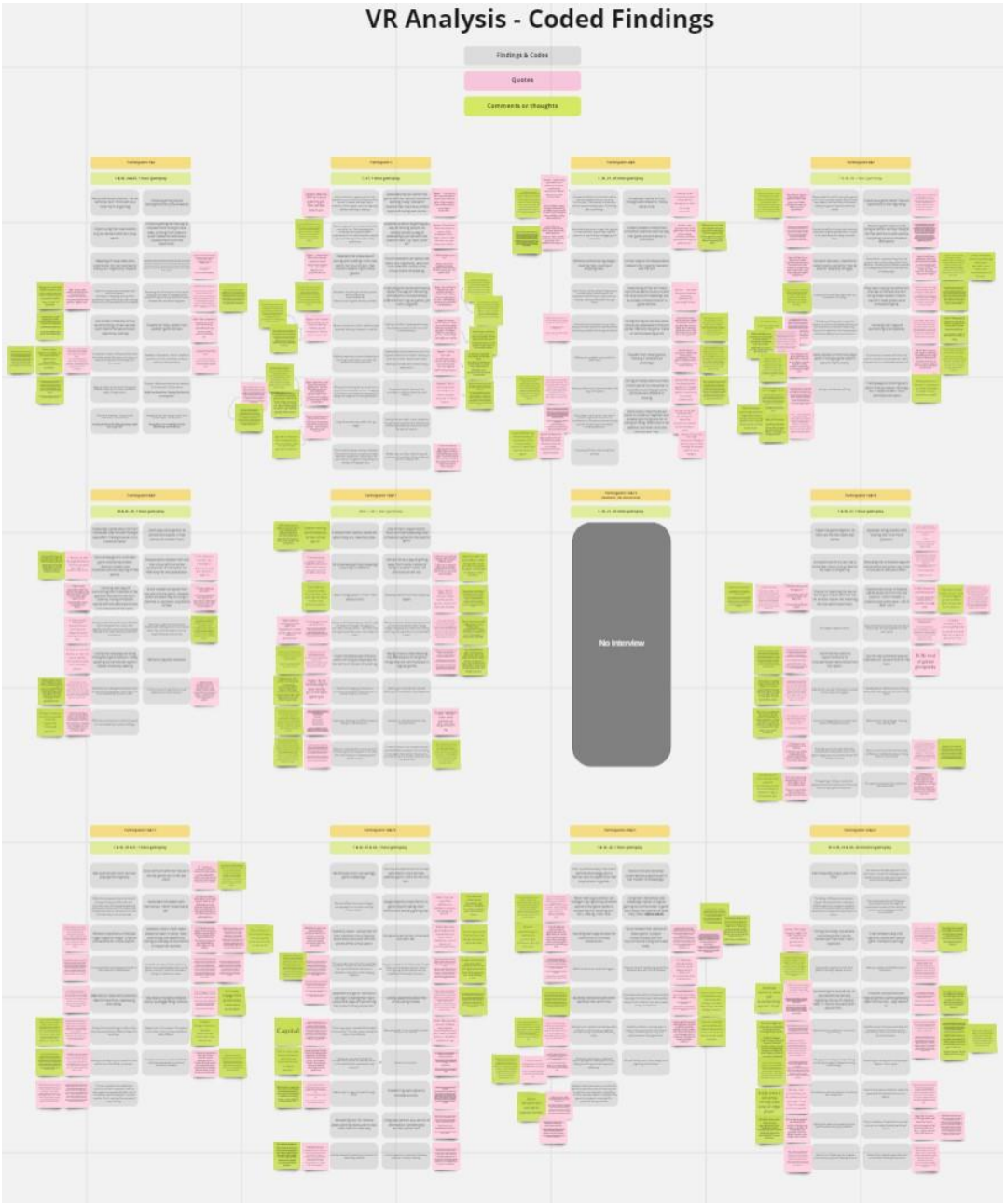

Figure 3.12. Findings grouped under participants in Miro.

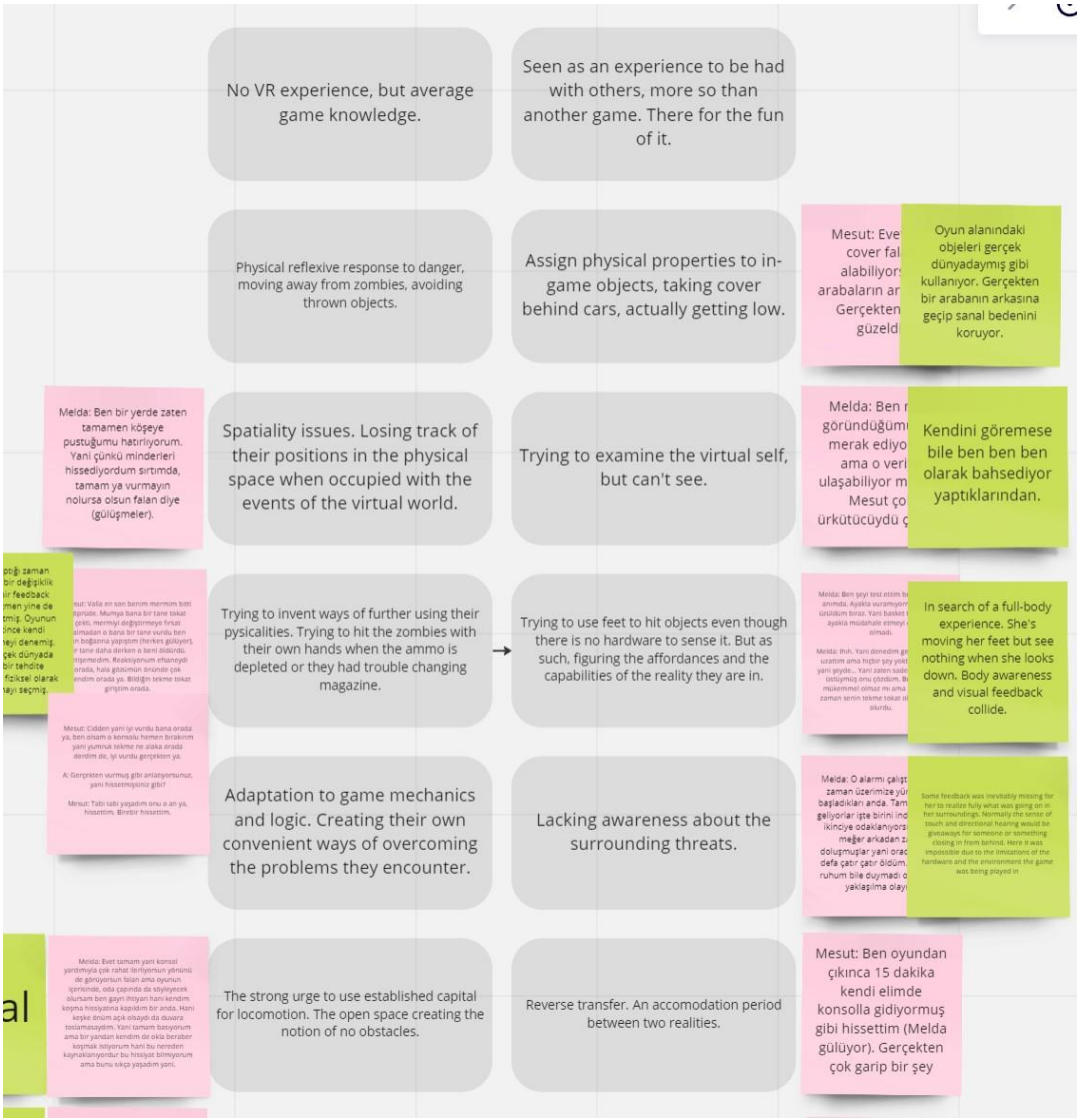

Figure 3.13. Close-up of codings.

Following this, main categories that were derived from both the literature and the codings themselves were noted down and color-coded. Different levels of opacity in the colors were used to distinguish each sub-category that fell under the main categories but carried differing aspects and connotations (See Figure 3.14). The findings were color-coded as shown in Figure 3.15 and re-arranged accordingly to indicate the distribution and the weight of each category in VR gaming (See Figure 3.16 and Figure 3.17).

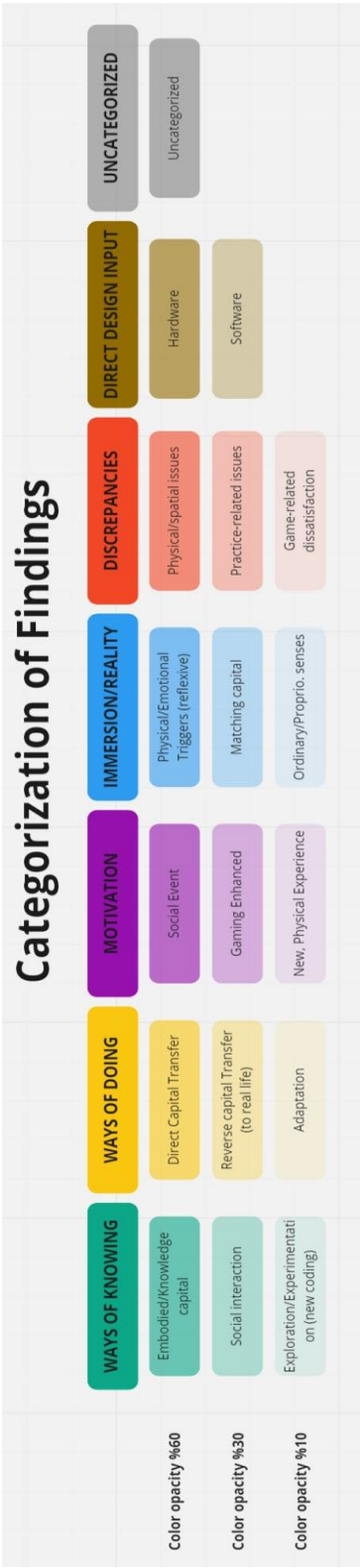

Figure 3.14. Color coding of categories.

Figure 3.15. Rearrangement of color-coded findings.

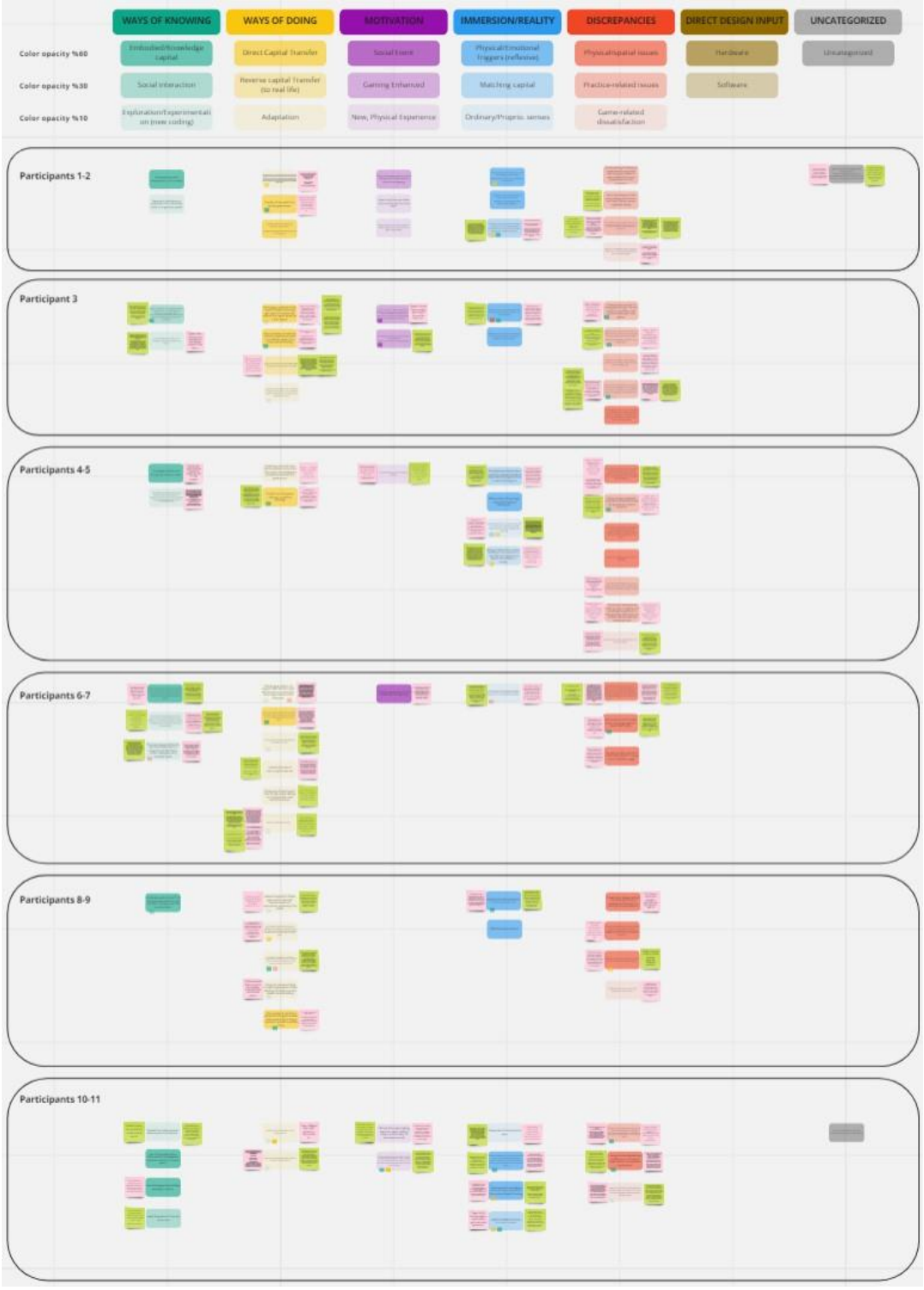

Figure 3.16. Weight distribution of findings, first group.

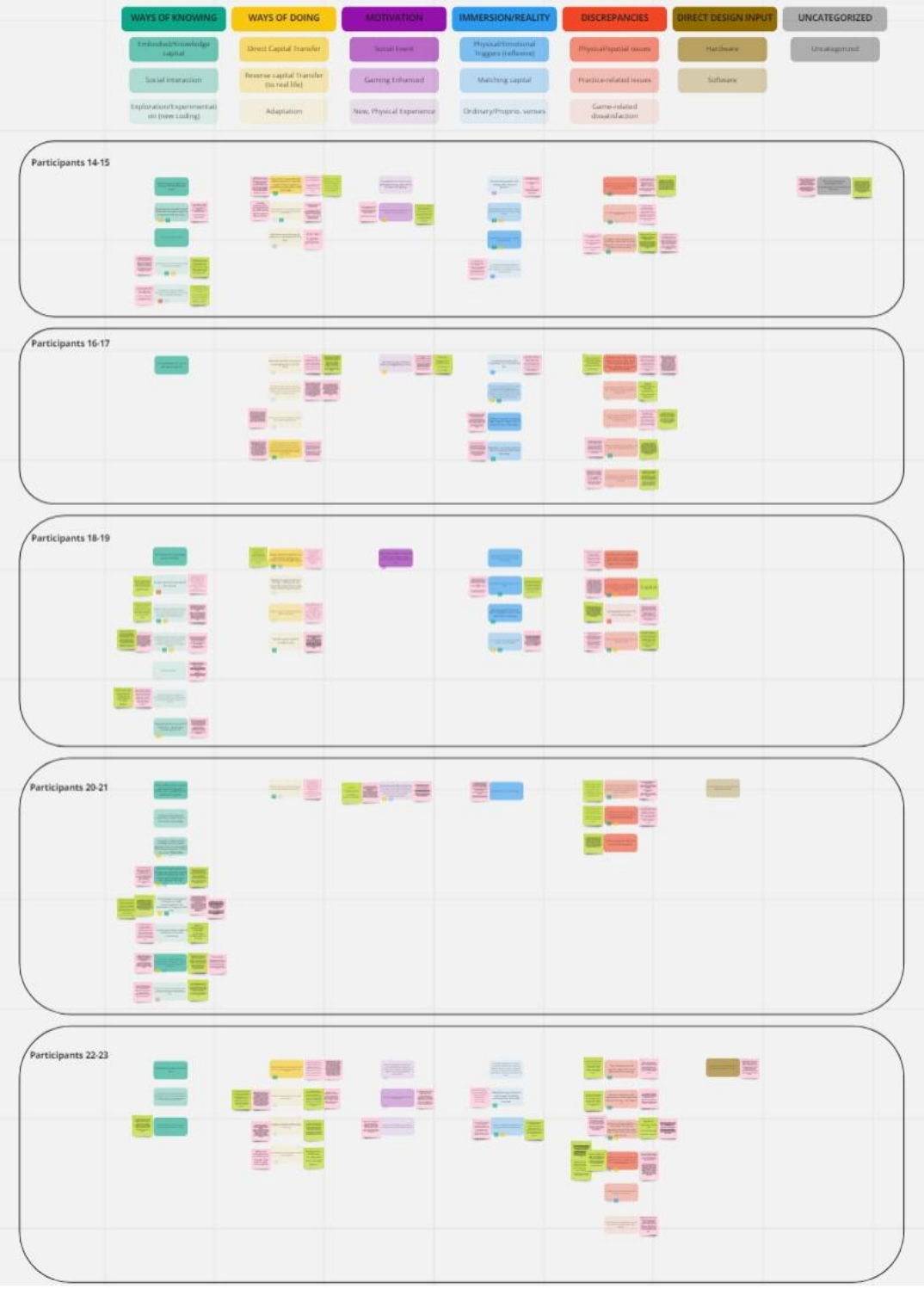

Figure 3.17. Weight distribution of the findings, second group.

CHAPTER 4

FINDINGS AND ANALYSIS OF THE DATA

This chapter presents the analysis of the data collected through the observations and semi-structured interviews conducted during the field study. The first section will be focusing on *ways of knowing.* Ways of knowing is used as a collective term that describes the knowledge regarding the workings of practices and interactions, both in real life and virtual reality. The section is detailed under three subsections. Part 4.1.1 analyzes the substantial effect of pre-formed knowledge regarding physical interactions and gameplay, that were present before the players entered the virtual space. Part 4.1.2 lists and examines the disruptions and *discrepancies* occurring throughout the game sessions related to *ways of knowing,* specifically in the cases that pre-formed understandings fail the participants and inhibit them from interacting with the virtual space as they intend. Finally, Part 4.1.3 presents the individualistic and situational attempts of the participants towards coping with absent or inconsistent knowledge. The cognitive, mental and bodily links formed during these attempts will be referred to as *codings* for the remainder of this chapter, where I suggest participants form new codings for VR practices, and reproduce practices.

The second section will be focusing on *ways of doing.* The *codings* explained and analyzed in the first section ultimately translate to movements and actions. The term *ways of doing* therefore refers to the bodily performances and sequences informed by *ways of knowing,* within the entirety of actions and interactions. The section is once again divided into three parts. Part 4.2.1 will be analyzing the instances of transfer of body capital, where the participants replicate the *way of doing* of a real-world embodied practice in the game world to achieve the same outcomes. As in Section 4.1, *discrepancies* regarding *ways of doing* are presented immediately after the first subsection as they lead to another cognitive and bodily process that will form the backbone of the following subsection. Therefore, Part 4.2.2 will list and examine

the *discrepancies* related to *ways of doing*, meaning the disruptions occurring when the participants fully understand and realize the tasks, but encounter inconsistencies in the forms of actions required to complete them. An important note here is that senses can never be separated from bodily practices, they have a significant role in almost all of the interactions, *ways of knowing,* and *ways of doing.* So, the disruptive consequences of sensory stimuli will be referred to, but the role of senses will be isolated into pieces that relate to the arguments and analyses of the respective sections. More importantly, ways of knowing and ways of doing can never be fully separated in the context of embodied interaction as they constitute the elements of practices as a whole, but for the sake of analysis and being able to dissect the effects of each element, I am treating them in separate sections. Finally, Part 4.2.3 will focus on the cognitive and inventive mechanism the participants effectively utilized to modify their *ways of doing* to execute intended actions, which I will call *adaptations.*

The third and final section of this chapter will be discussing the material-immaterial dilemma caused by the connotations of the word 'virtual' in the practice, and will be presenting the pronounced examples observed, regarding the factors of the perception of materiality. This section is divided into two subsections. Part 4.3.1 will be analyzing the observed influence of bodily senses such as vision, hearing and touch, under a different light than the previous sections. It will be focusing on how real stimuli trigger physical responses, enabling the players to interact and become bodily immersed, even though the stimuli might not always have the correspondence in the virtual space. Lastly, Part 4.3.2 will once again tackle the sensory and practice-based factors of embodiment, but this time consider the materializing effects and examples for when the existing capitals of the participants perfectly match the events and conditions encountered in the virtual space.

4.1 Ways of Knowing

This section focuses on *ways of knowing*, meaning it explores how certain understandings and knowledge are acquired and formed. According to the literature,

the nature of our interactions with the physical environment around us using our own bodies can be explained by regarding the human body as a site of collective memory (Connerton, 1989). Dant and Wheaton (2007) referred to the same reservoir as 'embodied capital', where Bergson (1990) called it 'bodily memories'. Holistically, Turner (2012) explained it as a solidarity of human consciousness, physical body and practice. While ways of knowing and ways of doing always exist in a constant state of exchange, and cannot easily be considered separately. The sometimes-prevailing importance of knowledge and perceptive understanding is summarized by Steuer (1992, p.72) as:

> "[...] the experience of one's physical environment; it refers not to one's surroundings as they exist in the physical world, but to the perception of those surroundings as mediated by both automatic and controlled mental processes."

Moving from the literature, ways of knowing addressed in this section will be related to the collective understanding of the necessities, processions, material and functional qualities, and contexts of the objects, events, or tasks encountered in the virtual space.

Before starting with the analysis, I want to clarify my usage of the word 'codings'. The knowledge addressed in this section, as a holistic term, consists of what I call *codings*, referring to the mental and embodied connections formed by an individual between certain situations, signifiers, know-hows and if-thens. To be more concise, codings are bits of interdependent information, sometimes gained from an outside source and other times formed through one's own experiences and efforts, that link circumstances and elements encountered to their respective, accepted, and expected outcomes. They were eventually vital in determining the approach and execution of bodily actions throughout the study. Furthermore, it would be accurate to say that it goes both ways. Just as knowledge directs actions, their outcomes and implications provide feedback that molds it. These codings could be bodily, cognitive, or both within the possible actions and interactions found in the game world of Arizona

Sunshine. For these reasons, the first section will keep its scope on the ways knowledge is reflected on the embodied gameplay experience.

The findings of the study regarding ways of knowing can be analyzed under three headings. The study showed that being an embodied practice, VR gaming makes use of various sources of information from which the players can shape and direct their own experiences. This can happen both before the first time an individual interacts with VR hardware, and during. In the game, players get the chance to conjure up their established body capital along with their knowledge capital to accomplish the tasks of the game. The mechanics of it will be presented in Part 4.1.1.

Naturally, such a complex and multifaceted interaction has its own challenges. Due to the logic behind the design of games in general and the stylized formation of the game levels, graphics, and sounds, the actual gameplay does not always coincide with the elements of real life. These occurrences will once again be addressed as *discrepancies*; ruptures and the overall disjointedness among the players' capitals, expectations and the events within the game. The conditions in which the knowledge and capital of the players present discrepancies will be explained in Part 4.1.2.

After experiencing the virtual space for the first time, the players go through a phase where their capitals are tested and either verified or falsified. If the latter happens, it urges them to explore and experiment with new ideas and absorb new data with their senses and cognition. The dimensions and occurrences of those explorations will be the subject of Part 4.1.3.

4.1.1 Pre-formed Capital

In this part, I will be addressing the methods of acquisition of knowledge capital before the gameplay session, and the influence of pre-acquired knowledge or experiences, both embodied and cognitive, on the experiences of participants in virtual space. The contents of said capital in this section will mostly include general knowledge about games and the VR hardware acquired from other games or outlets.

The section begins by listing the main sources of transfer for the participants according to the interviews, and then will be revolving around how this 'game knowledge' shapes the experiences, expectations, reactions, and the infrastructure of them in the contexts of orchestration of gameplay, and interactions with the controllers and the headset.

VR gaming inevitably involves, or necessitates a certain type of know-how both for the hardware and the games that can be played on it. Although different VR systems work in more or less the same way since they are designed in a similar fashion and accommodate the same layout for their buttons, each game can be fundamentally different from each other according to the genres they belong in. Arizona Sunshine is a first-person shooter game, so in order to play it how it was meant to, the players have to incorporate their past knowledge on this genre of games, or have to figure out the rules and logic of the game themselves throughout their sessions.

Due to Arizona Sunshine being a game for VR, another dimension of knowledge was present, compared to general game knowledge that could apply to many other games available on various systems and hardwares such as PCs and game consoles. The actions and tasks completed in a VR game are done so by the physical bodies of the players. Therefore the other dimension that comes on top of general game knowledge is figuring out how to shoot a weapon, how to move, how to interact with the game world itself by correctly exercising the sequences of motions and movements. The interviews have shown that the majority of the players knew what kind of experience they would have, or at least what to expect prior to coming to the venue. Even those who had had very little experience with Arizona Sunshine or any other game for that matter, were informed to a certain extent. This pre-existing knowledge about the game or the hardware itself comes to life in two ways; having played games before and through prior research.

During the interviews, a number of participants stated that they have done their own research through various sources such as the internet or their social circles. For some, it happened unintentionally, and they saw a video some time ago, but others tried to

gather as much information as possible before coming to the venue. For example, Participant 6 (Q1) explains:

> [Quote 1] Participant 6: We may have watched a lot of videos (laughs), what people are doing, similar mistakes… So that we do not fall.

This participant and a number of others stated that they specifically watched gameplay videos on sites like Youtube to observe how the players are accomplishing in-game actions. By doing so, they have prepared themselves for the game and laid a mental foundation about the course of the game. So instead of blindly going into the virtual world and coding everything from the start both in terms of embodied interaction and game progression or game sense, they tried to get into the virtual world with a grasp on the basics upon which they would be able to build during actual gameplay.

The second way participants gained knowledge before playing the game was through observing, engaging in conversations with, or exposure from their own social circles. Those who had experience in playing VR games provided their knowledge and acquired practices to the participants during daily interactions. According to Participant 3 (Q2), being exposed to gameplay thanks to her social circle playing games a lot trained her in games in terms of capital.

> [Quote 2] Participant 3: Yes, I have watched [games] a lot. I mean since my cousins, and my boyfriend are the 'gamer' type, I have watched them play a lot. I know how the game is played, but I cannot manage when it comes to doing it myself.

Since the game was played as duos by all participants but one, the transfer of knowledge capital sometimes happened right before the session while the participants were waiting for their turn to get fixed up with the equipment and talking to each other, in the case that one person among the duos had knowledge to share. They instructed their less knowledgeable partners.

Even though the control schemes of VR games are fundamentally different from those in regular games, which are usually played with keyboard and mouse or with controllers, they are still games. So, some general rules and affordances regarding the genre of the game remain the same. A few examples would be, red barrels being explosive in countless other action games if shot at and wreaking havoc within the radius of the explosion, the guns running out of ammunition and needing to be reloaded, the player having a health bar or counter that depletes with damage sustained, and collecting certain items that can replenish health or can be used to complete a task to progress further in the levels. Arizona Sunshine contains all of those examples. So, the players who play games regularly or witness them being played proved to be able to resort to that knowledge capital when it comes to figuring out what to do, where to go, and what to look for in-game. Participants 11 (Q3) and 22 (Q4) exemplified their game knowledge and practices as:

> [Quote 3] Participant 11: Oh, those are ancient game stuff [rules]. There are always exploding red barrels and such, found in games.

> [Quote 4] Participant 22: I have about six or seven thousand hours in games. So for that reason, I know that they hid this here for example, there is that over there, they made it secret on purpose etc…

A big part of Arizona Sunshine is finding and using guns to kill zombies. As they do in real life, these weapons have to be aimed and the trigger has to be pulled to shoot. They run out of ammunition and need fresh magazines to be inserted. Therefore the specific practice of marksmanship has a material past attached to it, an embodied foundation. Whenever the practice is exercised, this foundation, which can be attained by both doing it and witnessing the practice, has to be summoned. For this reason, the participants instinctively and rapidly assumed the well-known posture for aiming and shooting the gun. According to Participant 15 (Q5) the same basic understanding was ready to be applied.

> [Quote 5] Participant 15: I mean aiming, the basic logic and the motions are more or less the same.

The hardships they encountered and the inconsistencies with real life will be discussed in the following parts, but their initial approach towards the re-enactment of the practice was consistent and shared.

4.1.2 Discrepancies Related to Ways of Knowing

The game and the VR hardware enabled players to borrow knowledge from pre-existing capitals and practices or urged them to form new ones using those. However, there were cases where inconsistencies between the requirements of the game and the knowledge or embodied capital of the players occurred. I will term these *discrepancies,* to implicate the inconsistencies, or rather the mismatch among body capital, prior knowledge, materiality of the game space, and the hardware. Not only did those discrepancies disrupt the feeling of realism, but also created confusion and even panic among the participants. An example is given by Participant 17 (Q6) as below:

> [Quote 6] Participant 17: It turns out there was a thing like, when you press the grab button, it let go of the gun and picked up the next one. I figured this out later but it was not a situation directly applicable… I mean in the heat of the moment, it gets difficult to drop this one and get that one.

However, this led to a reproduction of game practices and new ways of embodiment, since some elements of the game enable them to replicate and utilize their established capital while others contradict them, resulting in experimentation and exploration for the players to understand how to react and interact with their body. The discrepancies observed were related to the absent mapping of button functions and locations, the complexity of in-game actions, the management and tracking of game data (ammunition, health, mission objectives, etc…), the built system for navigation, affordances regarding object interactions, and accurate interpretation of the virtual world through senses.

As mentioned earlier, each button on the controllers has a function assigned to them. Even though the players are aiming, reaching for objects and looking around the game world with their own physicalities and bodily movements, every action can only be completed by either pressing or releasing a button. Therefore the embodied capitals of the players only helped them through only part of their intended movements. The players had very little issue getting their appendages close to the objects they were aiming to interact with, and managed this first part naturally and fluidly for the most part, but their coordination and fluidity started to falter heavily when the assigned button had to be pressed. In such cases, the practice has to be *coded* in a new way, for example by press when reaching for objects, which is a new way of knowing and doing a practice. So that 'reaching out' needs to be both learned and exerted in this new way. Participant 3 (Q7) explained how she tried to *code* the new knowledge:

> [Quote 7] Participant 3: I used the hand grenade and that was hard too. I think that is the hardest weapon to use. Because the part of pulling the pin and throwing it is hard. I forgot how it was done now for example. Which button to press to pull the pin… I guess we were pressing the magazine reload button, pulled the pin and then threw. Now that I remember, the bomb falls next to your feet if you try to swing it from above.

This specific issue of not being used to coding and matching actions to buttons made it a difficult experience for some players. The existence of button presses for certain actions is common practice for regular gamers since each game on a console or PC is played with hardware containing buttons, yet VR gaming was an experience that even non-gamers wanted to try and as such, almost half of the participants stated they had very little experience with games. Participant 17's (Q8) take on the issue was:

> [Quote 8] Participant 17: I realized I did not pull the pin and just threw (the grenade). Then, when the grenade did not go off, I picked up again from the ground, put it on me, but could not find it later.

The most prevalent influencer of VR gaming which is their embodied capital, suddenly starts to let the players down and creates disruptions. The players have to learn which button to press to get something done, where the buttons are no longer visible once they put the headset on. In the game, they only see their empty 'hands' where in reality, they are holding the controllers that contain many buttons under at least three fingers on each hand. So one of the most important sensory tools we use for acquiring information on our surroundings, which is vision, becomes unreliable and even deceptive. Therefore a process of re-learning, re-exploring and re-coding has to occur through trial and error for even the simplest of humanly physical interactions, and some of these interactions do not make sense for the players due to their 'hows' being irrelevant with their real-life counterparts.

So according to the observations and the answers given to the questions regarding the difficulties experienced by the interviewees, because the knowledge of how to exercise these simple interactions of pulling the pin from a grenade, changing magazines on a gun, and handing an object to their partners are continuously being reconstructed, those actions that do not require such a complex cognitive process are easier for them to replicate in the virtual world. In other words, the process of coding lengthens according to the complexity and unfamiliarity of the required action. Well-known and practiced bodily sequences of actions can quickly turn into unknown, fuzzy interactions.

On the other hand, there are situations where there is no established, accurate knowledge to be utilized by the participants. The players in these situations are almost a blank slate in terms of that specific practice, and can construct the codings of the practice themselves throughout their experience in the virtual space. Forming the VR way of knowing was observed to be significantly easier for these players, compared to those who had to break down the codings of the physical world. Participant 21 (Q9) who had never shot a real gun before reports the ease in accepting the new codings as:

> [Quote 9] Participant 21: I started changing magazines reflexively after a while, very comfortably… There were instances where I never looked, just changed by pressing X and moving it closer to my waist.

The ways of knowing do not only come from real world experiences in this instance. Knowledge and capital about games in general play a large part as well, as mentioned in the previous sections. For players not familiar with games, it adds another layer of information to be formed and coded. During gameplay, the players have to keep track of how many bullets and how many health points they have left, how level design in games work, and how certain colors can be used as signifiers for objects of importance such as red barrels being explosive. Some of the non-gamer participants had difficulty figuring these out and some even mistook the visual cues shown to them due the way it was shown closely resembled another element in their knowledge capital. The remaining health points out of a hundred are shown on a wristwatch, and Participants 10 (Q10) and 11 (Q10; Q11) misinterpreted this as well as some other gameplay elements as follows:

> [Quote 10] Participant 11: There was a watch showing the health thing.
>
> Participant 10: Oooh, I thought that was heart rate or something.
>
> Participant 11: No, it showed the health thing.
>
> [Quote 11] Participant 11: Well, I thought there were red bullets and they were explosive, and we were supposed to shoot at them, hit them. I did not realize you shot the barrels.

The last type of discrepancy regarding formed capital and knowledge was the disconnectedness found in certain practices in the game world that are actually coded and related with each other in the real world. These cognitive categorizations of movements include practice pairs such as eating-drinking, walking-turning around, and opening a car door-sitting inside. Participant 4 (Q12; Q13) questioned the lacking parts of these pairs as:

> [Quote 12] Participant 4: If we can eat meat, why can't we drink the water? We take the meat to our mouths and eat it. I also tried to open the cap, the cap of the water bottle.
>
> [Quote 13] Participant 4: Ok, but look, they don't allow me to walk, I use teleport. Why would I turn myself?

In some parts of the game, these pairs worked differently from each other, or one was completely missing which induced confusion when their expectations were not met by the affordances of the game.

For walking and turning around, the game offered two possible ways of accomplishing both. The players could walk themselves for a short distance, as much as the walls of the game room allowed them to, or they could teleport. Similarly, they could either rotate 180 degrees around themselves to look back and turn around, or they could pull the thumbstick towards themselves to turn back instantly.

Overall, these contradictions resulted from mental categorizations of certain practices and rendered the experience less intuitive or 'real' for the participants as reported by Participants 10 (Q14), 21 and 22 (Q15):

> [Quote 14] Participant 10: It [teleportation] was a bit weird. I mean I couldn't adapt at first because I had to look around. I sometimes could teleport to an unintended location and it made it harder to see the zombies behind me.
>
> [Quote 15] Participant 21: Sometimes, umm…, I had to turn. It was not sensible to use teleportation to turn.
>
> Participant 20: I was rotating in place, that is what I did at last.
>
> Participant 21: Exactly, you have to turn in place, I also discovered that later. You move forward unintentionally, it happens reflexively in my opinion and is a bit related to human nature.

In addition, it is just common sense if a person is in sufficient proximity to a number of objects to interact with them physically, he or she would be able to interact with every single item within that area without exceptions. To put it more clearly, if your

arm or leg can reach it in the real world, you can touch and interact with it, whatever that thing may be. Therefore every 'virtual' object in the game world, including the zombies themselves feel like they are manipulatable through physical contact. That is why some players tried to pick up every object and questioned themselves when they failed to do so, as in the case with Participant 20 (Q16), or resorted to pushing or hitting the zombies with their own hands when they got too close and floundered after seeing it had absolutely no effect whatsoever.

> [Quote 16] Participant 20: I was curious about if I could use all of them [objects]. For example, why were those cans there?

In addition to the problem of not being able to see the controller itself to check if they were pressing the correct button, their visual experience created more severe ones. For instance, in the physical world, we see the obstacles, paths, and other people around us to figure out where we can go and how we will go there. This defined role of vision works the same way in the game with one major difference. It did not tell the truth about the physical space the game is played in. The player saw a vast terrain, an open space which urged him or her to stroll forwards when it was not possible. Although they are aware of this situation and mostly use teleportation to cover large distances, their embodied capital, informed by what they are seeing, forces them to move their own bodies and take a few steps to reach something a meter or so away from themselves. This results in unexpected and sometimes violent collisions with the wall as described by Participant 7 (Q17) and Participant 18 (Q18):

> [Quote 17] Participant 7: Even if I was in a confined space, since there was no confinement in the game, I constantly hit the wall.

> [Quote 18] Participant 18: Ok yes, I mean you can move easily with the help of the controller and see the direction you are going, but in the game, within the context of the room, I suddenly felt the urge to run myself. I wish I was clear out in the open so not to hit the wall.

When it comes to hearing, some participants stated a few problems. Sound is directional and enables us to pinpoint the location of something even when we cannot see it such as when something approaches us from behind. During the field study, it could be observed the majority of the players remained indifferent to the zombies behind them, while still being able to hear their grunts and growls. There is a possibility that this could have happened due to the headphones not fitting correctly and snuggly therefore allowing sound from outside sources to be heard, or due to them being low quality and not transmitting sounds clearly. Another discrepancy taking place related to sound was that a few of the participants experienced in firing real-life weapons found the sound they were making as not realistic and stated they do not sound as they should according to what type of handguns they are. Specifically, Participant 14 who had immense experience with firearms stated that although the aiming and shooting was satisfactory enough, the sound just did not match. These are all indicators that, when something becomes an embodied capital or embodied practice, it happens by the incorporation of almost all of the bodily senses and cognitive processes; inseparably.

4.1.3 Experimentation and New Codings

When there is no capital to borrow from, or when the pre-existing capital regarding certain bodily actions and widespread practices do not work as they should, new codings are inevitably in order. The players are required to form new connections among their bodies, hardware, sensual information, space etc…, either by their own exploratory efforts of trial and error during the gameplay or by conversing with their partner to build a new foundation of knowledge. In addition to this, the players are entering a new, artificially constructed world, so they explore the limitations of the new world and to what extent they can use their own bodies.

The observations and the interviews demonstrated that the exploration of the new world starts with exploring and reforming foundational knowledge about the self. In the physical world, our actions and movements are always parallel to our physical

dimensions, the position, reach, and strength of our limbs. Therefore on entering the virtual game space, the first thing the majority of the players did was to check their hands and bodies. In spite of the fact that the game was using a genderless, generic model that wears a balaclava that covers the whole face to represent the player, the majority of the players were using the pronoun 'I' when describing their experiences during gameplay. This was a strong sign that even though they were not able to see themselves and their own facial features, which probably makes up a large portion of the notions of self-image and identity, the existence of symbolic limbs and the ability to use their own physicality made it real enough for them that they were able to associate themselves fully with their in-game avatar. Furthermore, the players actively searched for a reflective surface, like a mirror, to take a look at themselves, but unfortunately they could not find one due to the game lacking that feature to increase hardware performance. The exclamation of Participant 18 (Q19) was revealing in this sense:

> [Quote 19]: Participant 18: I really wonder how I looked, but can we access that information? Because Mesut was terrifying.

We can see that the participant is talking about the avatar as herself in 'I' language and is also curious about her self-reflection. More precisely, it can be inferred that the participants were embodying their 'selves' within the game world. Due to this high level of self-association, their way of experimentation was closely tied to their existing knowledge about the things they can manage to do with their bodies in the real world.

The second stage of acquiring knowledge was associating themselves with the new, virtual environment and exploring its qualities, conditions and affordances through their senses. This goes hand in hand with the exploration of the self since our experiences and interactions are dependent on both our own bodies and the physical space around ourselves. During the stage where one of the players is assigned as server admin and manages the settings of the game such as the player count and difficulty, that player is situated in a motorvan where there is a tv screen that displays

the settings. After setting up the game, that first player waits for the second player to join the room so that they can start the game up. During this brief time period, all of the participants tried to interact with the various items scattered on the floor and the shelves of the motorvan. They tried picking up cans of food, throwing them, crouching and jumping. What they were trying to do was essentially forming by testing out, both in terms of spatiality and physicality their preformed embodied and knowledge capitals in the virtual world and exploring to what extent they could use those to navigate and perform inside the game. The players bodily and cognitively find themselves in a new system with major resemblance to the real world and come to being once again.

A general, reflexive attempt in many participants was trying to kick stuff laying around. After checking out their arms and having grabbed a few objects, the participants formed a new code that impelled them to think they could use all appendages because their embodied capital dictated that whenever there is a physical involving the body, it involves the entirety of it. The players were actually aware that they had not worn any piece of hardware on their feet, and that there were no cameras or outside detectors aside from those on them, they still tried to use their feet instinctively. During their interview, Participant 18 (Q20) stated her disappointment with the results of this attempt:

> [Quote 20] Participant 18: I tested this by the way in my free time. It was not possible to hit with your feet, I felt a bit sad about it. I tried to interfere with the basketball with my feet but could not. I mean I really tried, extended my foot but nothing was on the screen.

The cognitively embedded functions of the feet presented itself further when some participants came face to face with the main danger in the game, the zombies. The reflexive bodily actions for pushing something away are normally transmitting force by hands or by feet as in kicking. The observations coupled with the interviews indicated that the players were in search of more complex bodily interactions with the virtual environment; a full-body experience. Participant 19 specifically, tried to

hurt the zombies through physical means (Q21), even after seeing there was no feedback in the game regarding the consequence of that action. This shows how deeply our embodied capital and knowledge about the physical world are rooted, and how it keeps manifesting in situations that do not coincide with its foundations.

> [Quote 21] Participant 19: The mummy [zombie] slapped me, he hit me without giving me the opportunity to reload. I began strangling him. I literally assaulted him.

Even though it has been established that the existence of oneself in virtual reality is essentially a physical and bodily inquiry, most of the actions require the player to interact with the hardware itself. For shooting, grabbing objects, and changing magazines when the gun is empty, players need to press or hold the assigned buttons. Those players who had prior experience with PC or console games knew this well, and after the owner of the venue explained which button did what, they had very little trouble translating that information to their gameplay. However, those not proficient in the practice of gaming had to build that capital from scratch. For that purpose, the majority of the participants tried what each button did before trying to progress in the level. They tried reaching for objects and grabbing them, throwing them by releasing the 'hold' button, changing magazines even though the magazines were not empty, firing a few shots into the distance etc… These individual attempts were explained by Participant 3 (Q22) and Participant 7 (Q23) as:

> [Quote 22] Participant 3: I checked to see if the magazine would fall since I wasn't sure of the button.

> [Quote 23] Participant 7: I first tried to use the motor controls I have in PC. I mean as I said, since I play a lot of games on PC, my motor controls are a little advanced, at least I believe so. I tried to repeat that here, but I was trying to think too button based. Meaning this button did that, that button did that, and so.

Navigation, meaning displacing their in-game bodies and moving around the map using the combination of hardware and their bodies was a novel interaction for all of the participants since the teleportation mechanic only exists in a VR game. Therefore

all of the participants had to re-code the basics of navigation, a fundamental practice every individual performs daily. In regular games, the player moves around using the 'WASD' buttons on a keyboard, or by pushing the thumbstick in various directions that results in continuous displacement, meaning that for the whole duration the stick is pushed forward, the character is going to continue moving forward. This is not the case in Arizona Sunshine. To move somewhere else, the player has to push the thumbstick forward which brings up an indicator marking a specific point on the ground. By moving the thumbstick around, the player adjusts the position of the indicator. When the thumbstick is released, the player instantly teleports onto the designated spot. This alien governance on one of the most dominant and repeated bodily practices one can think of, inevitably turns walking into a practice reproduced within the context of virtual reality, and one that builds and *codes* its own ways of knowing. Participant 15 (Q24) explained his initial experimentation with navigation as:

> [Quote 24] Participant 15: For example when I first put on the goggles and was entering the room, I did something like this. I firstly walked. Walked with my own feet, and saw that it moved.

Also, Participant 3 (Q25) stated how unnatural and alien it felt to navigate within the virtual space with the help of teleportation, since there was no prior knowledge directly applying to this method of navigation and she was in search of one familiar to her..

> [Quote 25] Participant 3: Walking did not come naturally to me for example. Because I was teleporting. Maybe if we displaced ourselves like in normal games [continuously pressing the button], it would have been more realistic.

Here, it should be noted that the exploration of such interactions is significantly in close proximity with ways of doing as well as ways of knowing but forming the initial knowledge upon which the players can act comes first. How they contribute to ways of doing will be discussed and analyzed in the following sections.

4.2 Ways of Doing

This section focuses on ‘ways of doing’ regarding the practice of VR gaming. In the beginning of the previous chapter, it was argued according to the literature that what we call ways of knowing and ways of doing are just the two ends of the duality that generates practices and the notion of embodiment. Although it is not possible to separate ways of knowing and doing from one another, for purposes of analyzing the details of the interaction, and to dissect moments and nuances of embodiment, it is appropriate to treat them as separate ingredients of practice. So, in this section, how the preformed embodied and knowledge capitals, or those acquired during gameplay translate and manifest into the actions themselves will be analyzed. In addition, the hardships and conflicts faced while trying to execute bodily tasks and sequences of movements will be presented with their reasons.

In its most generalized sense, two ways of dealing with the ‘doings’ were observed. The first ‘way of doing’ for this embodied practice was obviously through capital transfer. The types of capitals discussed in the previous sections were directly translated into means of gameplay by the participants. The way they moved their bodies while navigating through both the open and enclosed areas, interacting with the wide range of objects and contraptions found in the game, and solving the operation of weapons were all influenced by their existing capital. When the capital did not exactly match the way of doing intended and designed in the game, various discrepancies emerged. These discrepancies created confusion and a sense of being lost for the participants and disrupted the experience significantly. However, it led to another cognitive process, which was *adaptation*. Throughout the gameplay sessions, *adaptation* and modification of the existing capital became a crucial exercise for the players for coming up with more efficient ways of doing stuff, or for enabling themselves to complete tasks.

In this section, first the workings and processes of capital transfer will be presented. The effect and the sources of those capitals will be addressed and in what ways it influenced the gameplay will be laid out. Then the discrepancies and their reasons

will be explained by comparing the real-life versions of the problematic actions with their counterparts in the game. Finally, for *adaptation*, the inventive and personal ways the players utilized to increase their efficiency and ease of executing actions will be exemplified.

4.2.1 Capital Transfer

In this part, I will be describing the modes and contexts the participants could effectively transfer their embodied capitals to interact with the virtual space and the objects contained within akin to the real world. The VR hardware and the design of the experience enabled the participants to borrow a great deal of movements and doings in various categories such as locomotion and navigation, physical interactions with functional objects, reflexive motions, game capital, and individual past practices such as shooting for those actively engaged in the practice.

In real life, we constantly form new connections with the material world around us through cognition, perception and memory. While experiencing something for the first time, whether it be a new situation or a practice, we take mental notes about its nature and make it a part of the accumulated knowledge about and the relationship we have with materiality. We then fine tune our practices through repetition and enable them to become embedded in our embodied capital. From then on, each time we encounter a similar interaction, condition or practice, we can have a strong sense about how to deal with it. According to the observations and the interviews, the same phenomenon also presents itself in VR gaming. That is the essence of capital transfer analyzed in this section.

The first transfers of capital naturally happened the minute the participants found themselves inside of the virtual world. They immediately took a few steps forward and back and tried to get a feeling about how much they have moved within the virtual space. After realizing the image they are seeing also moves according to their movement, the primarily preferred method of displacement remained to be

physically walking, instead of using the teleportation function. For the players, using their own feet to walk was naturally more familiar than pushing a small stick. Although it was not possible to walk for more than about two meters due to the physical constraints of the game room, the players continued to resort to their bodily capital whenever they could as walking is one of the most fundamental embodied practices we adopt at early ages and continue to do throughout our lives. An example for how the players utilized walking would be when the players wanted to check what was inside a drawer on the other side of the room they were in. They used teleportation to move into the general vicinity of the drawer, and then took a step or two towards it to get to a point where they could reach the handle. The same situation happened in every moment of interaction; opening doors and car trunks, and picking up game resources such as burgers and ammunition. The tendency to do this was explained by Participant 3 (Q26) as follows:

> [Quote 26] Participant 3: While I was searching [for burgers] in that tent, the area being small, it felt like teleportation would be difficult. Then I decided to walk myself since we were in a room anyway.

The game did an outstandingly good job on enabling the players to use the same motions they do in real life every single day for the basic physical interactions such as opening doors, drawers and car trunks. First and foremost, all VR controllers place the button that is assigned for grabbing and holding objects in games under the middle and ring fingers, in a comfortable and natural position to press. The natural motion of squeezing the hand to apply pressure on the object intended to be held works and feels the same way in VR. In the case of Arizona Sunshine, the players needed to go through the same sequence of movements as they would in the real world to successfully open a drawer or a door. They had to look at the handle, assess the distance and overlap their hands with the handle through sight, tighten their hands (and so press the grip button) to grab it, pull them towards themselves in a swinging motion while holding the button, and releasing the button when happy with the object's position, finalizing the interaction. Similar sequences can be detailed in numerous other interactions such as picking stuff up from the ground, and throwing

grenades or other small objects. Due to the successful and detailed implementation of these fundamental everyday physical interactions into the game, the players were able to almost automatically gain proficiency and efficiency in executing those movements by directly transferring and reaffirming their embodied capitals.

For more complex and specialized practices such as firing a gun, some variation in ways of doing and how the players utilized their capitals could be observed. The issue was, there happened to be two different sources of capital for the participants to transfer from. For those who actually used guns in real life and do it on a regular basis, it already became an embodied practice and capital. They were used to its weight, recoil, coolness or warmth, the alignment of the eye with the rear and front sights while aiming, changing magazines and where and how to press the button for its release, etc… However, those who did not even hold a gun in their hands before, let alone fire it, also possessed capital about it. It was not exactly embodied capital per se, as they never experienced it with their own bodies, but they saw it being fired countless times in games, movies, tv shows; heard and read about it. So essentially, they instead had an established understanding to borrow from and the approach of these two groups towards gun usage was seen to be different.

Handguns have a very distinct way of utilization. In the practice, the shooter carefully aligns his eye with the rear and the front sights, and the target he intends to hit. While pulling the trigger, he has to have a solid stance to prepare for its recoil. To minimize sway, he exhales slowly, decreases his heart rate and holds his breath during the shot. The management and mastering of these small but crucial aspects make gun usage a heavily embodied practice. During gameplay, the way proficient gun users held their controllers up and the stance they adopted to shoot the zombies were observed to be significantly different than those devoid of such capital. Firstly, regular practitioners prepared for a longer period before firing their weapons compared to inexperienced players. Also, they were putting one foot slightly in front and leaning towards the gun as if they were physically getting ready for a violent kickback. Some of them stated that they closed one eye and aimed only using the other, as they would in real life. Even though there was a laser pointer attached in

front of the gun that helps the players to more effectively visualize where they were aiming, Participants 15 (Q27), and 17 (Q28), explained how they used the other hand to support the shooting hand, and how they replicated the same sequence of actions for shooting as:

> [Quote 27] Participant 15: Normally, I think I can aim more accurately while shooting a gun when I support my hand.
>
> [Quote 28] Participant 17: I usually preferred to shoot extending my arm. Other than that, I tried to do things like breath control, and keeping the hands steady.

An important finding was that the capital regarding using a gun, overcame others regardless of whether it comes from practice or solely knowledge. For one of the female participants (Participant 16), it was actually easier to aim in Arizona Sunshine using her own physicality, compared to aiming in shooter games played on PC, using mouse and keyboard. Participant 16 had no experience with real guns and a bit of experience with PC games, but she specifically stated that she could aim well in Arizona Sunshine, which also surprised her since she always had trouble aiming in others. It was because her formed capital regarding guns came from watching others do it and movies. Moving a mouse around does not match the capital, and becomes a fundamentally different practice. On the contrary, it was consistent with her bodily transfer in Arizona Sunshine.

The final direct transfer of capital was the implementation of game capital, acquired by some of the participants who were avid gamers and had the chance to experience many games belonging to various genres. It was argued before that although embodied interaction forms the backbone of VR gaming, rules and design elements belonging to the world of games still apply. Familiarity with regular games presented a few outcomes. In console games played with a gamepad, the character moves around with the thumbstick that is also present on the VR controllers. Therefore any gamer who has used this thumbstick could directly transfer the same hand motion to Arizona Sunshine, since the function and the utilization of the thumbstick is exactly

the same. Move it around to displace your character. Participant 1 (Q29) explained why it was easy for her to move around the game world as follows:

> [Quote 29] Participant 1: [...] Since you already use these [fingers] actively like this (demonstrates the motion) while playing on Playstation.

What participants borrowed from regular games was not limited to how they moved. Their past practice also affected where they decided to move towards and when. Experienced players proved to have built an extensive game capital regarding level design. These players focused more on progressing through the level as efficiently and rapidly as possible, without spending much time on exploring every corner of the virtual world. They realized where they had to go and what they had to do after taking a quick glance around and listening to the implicit instructions disguised as dialogues related to the story of the game. Participant 22 (Q30) explained how he approached the game in a task-oriented manner:

> [Quote 30] Participant 22: There was a path in a designated route and we proceeded on there. It [the game] required us to search and fiddle with the surroundings to find ammunition, in certain things. Since I played games a lot, I was thinking of quickly searching every corner.

For experienced gamers, the game expertise influenced their orchestration and prioritization of doings within the interactive virtual space. By leaning more towards their objective-oriented mindset, these players associated being in the virtual space with specifically being in a ‘game space’, therefore significantly reducing the time they spent on pursuing an embodied phase of spatial exploration.

4.2.2 Discrepancies Related to Ways of Doing

In this section, discrepancies caused by established ways of doing will be presented. As in ways of knowing, the influence of embodied and knowledge capital was once again the primary cause of discrepancies in ways players interacted with the virtual world and the hardware. Following the situation presented in the previous section,

all players were inclined to transfer and repeat what their capital dictated, since it was a heavily embodied experience and the line between Arizona Sunshine being a game and a physical experience became blurred so easily. These attempts towards directly transferring capital resulted in discrepancies in four major areas or aspects of the interaction; navigation, use of body (guns and the lack of melee strike), panic inducing moments, and feedback problems regarding certain actions.

The most prominent problem every single player who has never experienced virtual reality was related to locomotion and navigation. In our daily interactions, navigation involves several aspects: spatiality, information about spatial dimensions, and feedback from the environment regarding material elements of the environment, distances, coordinating our own body within the given constraints etc... It also involves some form of locomotion, either by walking or driving. So it is a dynamic experience that relies on constant information flow from our environment to our bodies, to our senses and brain. Walking using our legs, and measuring distances through vision are practices so deeply rooted in us that even though the players were aware of the fact that there were walls surrounding them, they abided by what their vision told them. While dealing with the elements of the world for the first time such as the objectives and the threatening presence of zombies, the players stopped consciously thinking about the duality of spaces and almost unknowingly carried out actions with established capital. This resulted in frequent collisions with the walls, the unintentional punching of them and the inability of backing away when surrounded by zombies.

It became significantly more tedious to finely adjust where to teleport in enclosed areas of the environment because the players wanted to be in exact locations such as directly in front of cupboards, drawers and doors. Therefore they tried to take small steps. When they got too close to the walls of physical space, the blue net warned the players. Although, the sudden appearance and vanishing of an element not instantly comprehensible to the players, and seemingly not belonging to either world, constantly caused the players to struggle accommodating the notions of spatiality.

Participant 7 (Q31) explained the urge to use his own body to move and how he stopped himself as follows:

> [Quote 31] Participant 7: I physically wanted to go, which was when I noticed the most that it was a game at the beginning of it. In spite of that, I wanted to go myself. Then what stopped me was the blue squares honestly.

Evidently, having to replicate spatial codings already instilled and defined in their embodied capitals through other fundamentally different means such as buttons, is grounds for a disruptive and potentially hazardous experience. The players assigned more agency to their ordinary senses instead of the knowledge of being in a confined space, and embodied ways of doing in this case were ahead until new codings could be formed. On the other side of this and for the same reason, the players also could not understand where they actually were inside of the game room, since what they saw or heard gave no information on their whereabouts. After coming into contact with the wall once or twice, the players became aware of this and were significantly more cautious and trepidant in their movements. They had to re-code the spatial dimension of the practice. Participant 23 (Q32) for example was visibly confused and when asked about it he said:

> [Quote 32] Participant 23: In Arizona, it confused to me to move forward both by walking and jumping [teleporting], or I could not keep in mind which corner of the room I was at, if I was close to the edge or the middle.

A few discrepancies were also present in the use of weaponry, and own physicality as a melee weapon. Regarding weaponry, two things specifically confused the players and were hard to accomplish or code. In the actual practice, gun users eject the empty magazine by pressing a button located on the side of the weapon. Then they grab a new one with their non-dominant hand and load it in the weapon. The way they do it is by bringing the magazine towards the gun they are holding in their dominant hand, not the other way around. However in the game, the players ejected the magazine again with the button, which was still problematic due to the location of the button, but the actual problem was that they had to bring the gun close to their

waists without ever interacting with the new magazine. They stored the magazines they found in the game world on their belts which just increased the displayed number of bullets, and the magazines disappeared afterwards. Since reloading a gun by bringing it to the waist and it being automatically reloaded is a completely different way of doing, many of the participants had major trouble while trying to do it. They often forgot how it worked during the first minutes of the game, and had to direct their attention away from their surroundings in order to focus only on the reloading sequence. Participant 7 (Q33) mentioned the conflict between real life and the game during their interview as such:

> [Quote 33] Participant 7: I began confusing the buttons with the release lever, as if it was a real gun. What's more, something else happened somewhere… I mistook the magazine release button for the grab button and dropped the magazine three or four times.

Similarly, Participant 11 (Q34) had this to say about how difficult it has been for him to code this new way of doing presented by the game:

> [Quote 34] Participant 11: I forgot to drop the magazine, I mean when it's empty, you press the button to drop it and move it toward your waist. After that, I tried to reload without dropping the magazine by bringing it to my waist again and again but it did not reload.

When the players ran out of ammunition or for some other reason could not fire their guns to fend the zombies off, they got too close. Instinctively, most of the participants who found themselves in this situation tried to punch or push the zombies. This was a natural, predictable and understandable way of doing towards self-preservation, but in the end it resulted in confusion. Up until that point, the players were using their own physicality to interact with everything in the game world. However the same appendages they used to pull doors, throw objects, and collect things, suddenly became useless. The players were seeing on the display that their hands should have been making contact with the zombies, but no effect could

be seen. The hands were just passing through the zombies. Participant 3 (Q35) expressed her disappointment by saying that she really thought it could be done.

> [Quote 35] Participant 3: [...] I should be able to push the zombie off of myself I mean. There is no such thing but you still do it as if there was.

This unexpected inconsistency regarding the capabilities of the hand, forced the players to abandon their most basic, instinctive doings, and caused them to question the extent of their physicalities in that newly introduced world. It resulted in a puzzled state of panic.

Speaking of panic and trying to hit the zombies, how strong our capitals were in directing our interactions was once again proved by the sudden changes in the decisions of the participants in danger. When an event so unexpected and sudden happened, such as turning around and coming face to face with a zombie without realizing it was there, all of the newly formed codings and trained ways of doing were disregarded and the players resorted to actions that may make sense in the real world, but has no successful outcome in the game. This may not be a discrepancy directly related to ways of doing, but rather a discrepancy in the successful completion of game objectives since its occurrence often resulted in the death of the in-game character. In the case the players had to react extremely quickly to something happening in the game such as having to reload when surrounded by zombies or when they got too close, making it hard to shoot, every bit of new coding and especially those that did not match the way of doing in the real life, were suspended. Teleportation and reloading were the first two new actions that were abandoned. The players almost forgot how to use the thumbstick, or that they had to bring their gun to their waists to reload, even though having done those for more than half of the game session. This uncontrolled, panic-induced reversion could be explained with the processes of embodiment and formation of embodied capital. Embodied practices require repetition to become reflexive. It simply did not have the time to happen in the single hour the participants interacted with the hardware and

the game world for the first time. When there was no danger and the players could stop and think about what to do next, this problem did not exist.

The fourth type of discrepancy is found in what I characterize as a ‘cycle’ of expectation, feedback and result. When we conduct an action in the real world, we expect the results of that action to be consistent with both our intentions and the physical laws. The ways of doing things naturally are shaped by this cycle. To give an example, when we throw a rock to a wall, we expect a few things to happen in definitive succession (expectation). The rock is swung, and its weight is felt in the hand, we open up our hand and feel the rock leaving it, we see it fly and hit the wall (visual, tactile, aural feedback), some particles may fly off and there definitely is sound. In the end, the rock falls to the ground again, possibly leaving a mark on the wall (result). Only and only if we see, hear, and feel all these elements do we know we successfully completed the action. During the interviews two of the participants complained about how in certain instances, the cycle was broken and there was something amiss in the way they did things. Participant 22 (Q36) specifically complained about the lack of feedback, resulting in the inability to take corrective action, and Participant 15 (Q37) shared his discomfort in how one link in the chain of throwing a grenade took away the realism for him.

> [Quote 36] Participant 22: [...] I also cannot see where the bullet goes, I mean I will adjust myself accordingly. I shoot and there is a ‘ring’ sound. Did it go behind, did it ricocheted from the shoulder, did it go left, right?

> [Quote 37] Participant 15: [...]In the simplest terms, you really want to let go while throwing the grenade but also have to squeeze, this motion feels really off. You throw by squeezing and cannot understand. You want to let go.

4.2.3 Adaptation

In the previous section, I explained what I call *discrepancies*, the cases when the body capital of the players did not match the execution or feedback of a certain practice. In this section I will be building on this observation by suggesting that users *code* new ways of doing or reproduce practices in cases of discrepancies. I observe that they *adapt* their ways of doing, by forming new links between their bodies and the materiality of the game. The players came up with inventive ways to reproduce the relationships and practices according to their own interpretations of the qualities and affordances of the virtual space, the physical space and the hardware. These adaptations were observable in the categories of spatiality, navigation, embodied interactions, and manipulation of objects.

The observations suggested the process of adaptation took place gradually and it happened simply by inventing approaches that made use of both the participants' capitals, and the requirements and conditions of the game. The participants borrowed key aspects from the working portion of their embodied capitals that could be used freely in the game, evaluated and got accustomed to the affordances of the game world itself, and cognitively combined them. The outcome of this adaptation process was different for each individual, even for the same particular motion or interaction. Also in rare cases, the players found it more suitable to abandon the usual and natural ways of doing, and form a specialized interaction only applicable to this specific game.

To begin with, the players were constantly hitting the walls during the first few minutes either with their hands or heads, and they realized immediately that they had to come up with a different way of moving their bodies. The players started by paying more attention to the blue net that appears on the screens when they are getting too close to a wall. When they saw the blue net, due to the room being a square, they figured out that taking two steps directly backwards would take them closer to the center. So all of the participants were beginning to more or less place themselves in the center of the room and tried to carry out movements without leaving that initial

spot as much as possible. Towards the end of their gameplay sessions, they were using the teleportation function much more frequently than their own feet. The few times they stepped in any direction were if they happened to be in immediate danger and moved reflexively, or in the absence of the blue net when the object they wanted to interact with was approximately half a meter away from them, making it impractical to either bend forward or try to teleport. During the interviews Participant 7 (Q38) explained how he took precautions and Participant 17 (Q39) stated the necessity and compulsion towards staying stationary for spatial coordination/navigation as a practice :

> [Quote 38] Participant 7: In the game, I constantly tried to place myself in the center of the room by finding reference planes. I tried to steer myself like, I am not at the center currently and if a zombie attack happens I will hit the wall, then I should move towards the center.

> [Quote 39] Participant 17: I mostly tried to stay stationary at the center so that I would not hit the walls and not see that blue screen. I guess I conditioned myself.

To make sure their hands would not make contact with the wall in the case they had to extend their arms, the players felt around them using their hands to create a mental image of their positions in the room before engaging in the intended interaction. After making sure their physical location provides enough space, they proceed. Participant 22 (Q40) shares the way of doing he invented as:

> [Quote 40] Participant 22: I can understand where I am approximately, by placing a hand on the wall. If I reach a corner, I take a few steps backwards.

The physical constraints of the room not only caused the participants to hesitate while reaching out for objects, but it also forced them to restrain the urge to literally walk or run forward in an open area in the game. Even though they could not walk, they could freely look around as it was proved that any physical movement could be done if the player stayed safely at the same spot. Interestingly there were two different approaches adopted by the players towards combining the action of looking around and moving to a different location in-game. The first method a portion of the

participants, Participant 15 (Q41) being one of them, decided on was to use the thumbstick only for teleporting forward. When they wanted to teleport to a different location, they pivoted around the same spot and pushed the thumbstick forward once happy with the direction they were facing. By doing so, they invented a new way of doing that merges the rules of the physical world and the methods provided by the game.

> [Quote 41] Participant 15: For instance, I did the turning motions directly with my body, and the walking with the controller.

The second group of participants came to the conclusion that this was a game, and they would increase their efficiency and success if they abandon their tried-and-true methods of doing and instead, switch almost fully to the methods the game provides. These participants realized pulling the thumbstick towards themselves made the in-game character turn around 180 degrees and following this, completely stopped turning their bodies around. They would still move their heads, but only for gazing towards the limited cone of vision available in front. Participant 4 (Q42) even argued that turning around this way was quicker, less tiring and more efficient.

> [Quote 42] Participant 4: Ok but look, that controller turns instantly. Like this (turns her body), you turn slower and can't turn as much.

Another dimension of adaptation, in addition to navigation, was the breakdown and re-coding of practices and embodiment inside virtual reality. The participants made conscious changes in how they accomplished bodily actions in well-known practices and therefore created personalized interactions and ways of doing suitable for the conditions present in the virtual game world. An example of these new ways of restructuring practices could be the changes in the methods of interaction with the game objects, guns included. Due to the game requiring the players to shoot frequently, how they altered their cognitive repertoire whilst aiming and shooting was a good point to move from. The overwhelming majority of the players played the game with an assisting laser pointer mounted to their guns. Because of this comforting assistance, how they would aim and shoot in the real world under the

physical conditions presented by the material arrangement behind the practice differed significantly. The participants preferred not to exert themselves by holding the controllers at eye level and adopted a stance that was more relaxed. To put it more clearly, they ensured the intended outcome would happen through visual feedback, modified their physicality towards a more suitable and natural state for that outcome, and finally executed the action parallel with the newly formed codings of the game.

For other interactable objects such as doors, drawers, cans, grenades and rocks, the players had to mentally sever the ties between two worlds in terms of materiality. The dismantled system was then rearranged in a way that would better accommodate the ways of doing in the virtual world, while still containing traces of the physical world. In the previous chapter, a factor of discrepancy I called the "cycle" of expectancy, feedback and result was presented. When one element of the chain was missing, it resulted in a rupture. The rupture present in the handling of objects was that even though the players grabbed and 'released' certain objects such as grenades and handles in-game, they were holding on to the controllers throughout the course of those interactions. Even then, Participant 4 (Q43) could say this about her interaction with the hardware:

> [Quote 43] Participant 4: You get used to it later actually. It becomes like a part of your body. I, uh, I know it is a pointless action, but grabbing and holding things were excellent in this game.

Adaptation in the bodily ways of interacting in this case was not possible, the controllers were strapped to the hands of the players and there was practically no method to be invented that would eliminate the constant tactile feeling of the controllers. Still, the players could turn their experience into a reality through a mental process. They coded the irrevocable existence of the controllers in their hands as a constant of the game world, overlooked their tactile senses continuously trying to break that chain, and redefined the lifelong function of opening and closing of the hand completely to the pressure applied on the button by two fingers.

4.3 Immaterial to Material Experiences

In the introduction and theoretical framework chapters, it was argued that calling virtual reality immaterial is inaccurate. It is true that the world the players were placed into is virtually constructed in its very core. The events witnessed on the displays are not 'real' if we consider the word in its most literal sense. They have no tangible direct impact on the physical realm if we separate the two realities. However, as VR gaming sends sensual stimuli and invites the player to react bodily, using its very physicality, it is a very material, 'real', bodily interaction. The field study showed that VR gaming actually contained more material interaction as its name suggests. In this section, I will first explain the one remaining dimension of those material interactions that were not underlined in the previous sections; the role of senses in the natural and bodily processes of embodiment and materialization. Then, I will analyze the matching of capitals as it has a strong influence on the masked materiality of VR gaming practices. The following two sections are closely related to each other and the sections above, sharing similar traits. Therefore I am aware that it may be fallacious to divide this dimension of the analysis in two headings since the main driving influence behind both of them involve senses, but I will do my best to differentiate the implications.

4.3.1 Embodiment and Materialization through Senses

In the part dealing with capital transfer, how the embodied and cognitive knowledge regarding the doings of a real-world practice were transferred into the interactions of virtual reality were analyzed. The participants replicated what they already possessed as a way of doing directly to the game world in virtual reality. A significant enabling factor for that was the ability of virtual reality hardware stimulating the bodily senses of the players in a fashion extremely close to real life. So in this part, I will be analyzing the influence of senses on the perception of materiality through examples of fear and panic responses exhibited by the players.

Primarily, bodily data accumulation and the formation of embodied capital happens through the bodily senses as established in the literature. The initial knowledge which then coordinates the action comes from the senses. These senses include ordinary senses such as vision, hearing and touch as well as proprioceptive senses such as spatial and bodily awareness. These senses are constantly stimulated wherever we are, and we analyze the aspects of our surroundings and our location by putting trust into our senses. The ordinary senses, mainly vision and hearing acted as agents of isolation inside or transitioning into the virtual world.

Technologies used for gaming, except for virtual reality systems, typically involve a screen and speakers between the hands of the player if they are hand-held consoles or on a surface such as a desk if they are game consoles or PCs. Therefore the sensory stimuli coming from the hardware and the real world are usually constantly intertwined. Contrarily on VR systems, primary senses we use to interpret the environment around us such as vision and hearing are isolated to only the virtual world, and are accurate. The headphones enable directional hearing and the existence of two separate screens showing different images for each eye enables perception of depth. In addition, the controllers are always providing the feeling of touch and eliciting the action of grip. This isolation and stimulation of senses in a life-like manner results in a state of acceptance of the virtual world as the legitimate reality by the users. The examples of this phenomenon observed during gameplay could be presented in the previous sections as ways of doing, but due to the highly primitive and instinctive aspect of them, they were more logical to discuss in this section.

At certain points in the game, the players ran out of bullets or missed a few shots, which usually resulted in being surrounded by zombies. The zombies attacked the players by swinging their arms at them while making disturbing vocalizations. Almost all of the participants who found themselves in this type of situation tried to cover their faces, push the zombies or back away until they hit the walls of the game room. Some of them even screamed. When asked about why they did those, the

participants 3 (Q44) and 21 (Q45) could not exactly tell their reasoning other than fear, only that the game made them feel like they had to do it.

> [Quote 44] Participant 3: You get carried away, like you really get scared and back away when a zombie comes at you. The boundaries don't come to mind at that moment. I hit the wall a few times like that.
>
> [Quote 45] Participant 21: I was jumping back when a lot of stuff came at me.
>
> Participant 20: Because I felt as if I really had to move away.

As they are physically interacting with this constructed world they also respond through their embodied capital in their reactions.

In the real world, we instinctively and reflexively raise our hands in front of our faces to protect it from an incoming object or person capable of harming us. We do this to minimize the risk of injury. Moreover, we can take a few steps back or lean backwards a bit if we want to put a bit of distance between the danger and ourselves. It was exactly the same type of fear and danger response that was observed throughout their experiences. As evident, it had a lot to do with their bodily senses. Their vision and hearing were constantly stimulated and telling them that they were in immediate danger. The information they received through their senses, which work in the same fashion in real life, rendered the virtual events of the game material enough that it triggered such deep and 'real' physical responses.

Moreover, the visual experience in the game summoned phobias in some of the participants and put them under visible stress during the observations. One participant was afraid of enclosed spaces, and one was afraid of heights. To their luck, the game contained both of those conditions within the levels. Participants 15 (Q46) and 19 (Q47) reported their distress facing those conditions as follow:

> [Quote 46] Participant 15: Well, especially at the end where we entered the tunnel it was dark, it distressed me. When it became even more lowery, I sloughed the game off completely.

> [Quote 47] Participant 19: I was puzzled big time back there, it took me a while to get used to it [...] I was dizzy coming down from there [stairs on a cliff].

These examples proved how much agency we place on our bodily senses. The information we acquire from our senses govern the way we perceive and interact with the environment whether it be the physical world or the 'virtual' world.

4.3.2 Materialization through Existing Codings

Continuing from the previous part, it was observed that the level of physicality corresponding to real life practices increased when the pre-acquired ways of knowing and ways of doing matched the interactions found within the virtual space. The same material relationships participants formed in the real world were still valid and translatable, resulting in deeper perceptions of realism, materiality and immersion. Coupled with the sensual feedback being loyal to the participants' expectations, two examples were predominantly influential; manipulation of the virtual objects parallel to everyday life, and specific bodily practices such as eating. The processes of capital transfer by the participants regarding these practices were thoroughly analyzed in the respective section (See Part 4.2.1.), but in this section I will be briefly arguing the effect this opportunity had on the experience of the participants in terms of material-immaterial dilemma.

The first example includes how we interact with certain common objects in everyday life such as doors and drawers. To start with, it was observed that the materiality of the interaction with everyday objects in virtual reality went both ways, meaning that the practices of the physical world and the virtual interactions of the game were intertwined with, and affected each other throughout the sessions. In the cases where players had to open a door to go inside a building or to check the insides of a car for resources, they replicated the same sequence of movements to accomplish the action as it was presented before. However, something much more natural and instinctive also happened. While holding the handles and getting ready to carry out the natural swinging motion, the participants stepped away from the apparent trajectory of the

doors, or leaned back while opening car trunks as if to prevent a collision. Of course, there was nothing material in the real world that corresponded to the seen image of the object and therefore no possible contact to be made.

The fact that the players executed the practice in this way was indeed fed by the pre-existing physical codings acquired through a lifetime of physical interaction. Following the initiation of a mundane routine from the physical world by the game, the players allowed their habitual practices to take over, and completed the routines in their entirety and by incorporating all parts of their bodies even though the virtual space did not require them to do so. More interestingly, the absence of some of the expectable sensory inputs due to hardware limitations such as weight, still was not enough to disrupt the habitual behavior. In this sense, these interactions and situations were definitely closer to the definitions of materiality, more so than those of immateriality.

The second example was observed during the players' interaction with the healing item designated in the game, the burger patties. The game required the players to take bites out of the patties they could find lying around the map and inside of refrigerators, which refilled their lost health points. This action was carried out by grabbing the patties and bringing them closer to the mouth area. When close enough, the in-game character automatically bit it. When the players first found the patties and tried eating them, some of them actually opened their mouths and chewed as if they were really eating something, and even exclaimed that they looked delicious. After hearing the question regarding the patties, Participants 17 (Q48) and 18 (Q49) stated they felt surprised that they were actually attempting to eat them.

> [Quote 48] Participant 17: There is such a level of realism that I tried to eat smacking my mouth as if I was eating a real piece of meat. Ya öyle bir gerçeklik var ki [...] hani normal et yermişçesine ağzımı şapırdata şapırdata onu yemeye çalıştım.
>
> [Quote 49] Participant 18: I did the chewing motion with my mouth as well, I was ruminating under the huge goggles.

Moving from these two similar examples for how the physical and conditional *codings* we form, it was evident that the experience in the virtual world possessed the incentive to trigger real-life emotions and bodily responses. Such an embodied experience and existence is not easily observed in other forms of gaming, if at all. Ultimately, the observations proved that virtual reality gaming and the involved interactions with the computer-generated spaces in this sense, are in no small measure the immaterial and fictive ventures the word ‘virtual’ may initially suggest.

CHAPTER 5

CONCLUSIONS

5.1 Thesis Overview

In this research I set out to uncover the material and bodily interactions of VR gaming. To do that, this thesis approached VR gaming as an embodied practice with its own doings and sayings in Schatzki's terms and was hypothesized to be a material interaction more so than an immaterial one. In bringing out the materiality of VR gaming, this study aimed to provide a background for analyzing the material and bodily interactions to help designers understand and address VR gaming better.

Chapter 1 presented the background information regarding virtual reality and framed the aim and the focus of this thesis. The research questions this thesis aimed to answer were also presented in this chapter.

Chapter 2 presented the theoretical framework that informed the thesis. Various definitions of virtual reality were discussed along with the notions of immateriality and materiality. The notions of immateriality and materiality were examined through the lenses of games, phenomenological embodiment, and embodied interactions. Then the chapter went on to discuss the definitions and nuances of practice theory and the ways in which VR gaming can be taken as a practice. Reproducible, and therefore individualistic properties of practices related to bodily ways of doing and knowing were also presented.

Chapter 3 presented the methodology of the research. The necessity of adopting a qualitative approach involving observations and semi-structured interviews due to the individual experiences contained in the practice was explained. A thorough justification was made regarding the two phases of the study. Also, the chapter presented the details of the hardware used, the context and environment the study

was conducted in, and the game played, along with the selection processes and justifications of all three. Finally, the transcription of the interviews, and the coding and synthesization stages for the collected data were reported.

Chapter 4 presented the categorized and classified analyses of the complex bodily interactions of virtual reality gaming. The chapter focused mainly on three dimensions of embodied interactions found in VR gaming: ways of knowing, ways of doing, and the immaterial-material dilemma. These categories were further detailed in parts referring to the inconsistencies, mental and bodily explorations, bodily senses and exemplified by individual instances.

Lastly, this chapter will present an overview of the thesis, and summarize the analyses centered on the research questions from the first chapter with references to the relevant literature. The challenges and limitations encountered during the study, along with recommendations and projections regarding further research are also listed.

5.2 Revisiting the Research Questions

The answers for the research questions were discussed in detail in the second and the fourth chapters. Nevertheless, I would like to briefly address the research questions asked in the introduction chapter of this thesis one by one by providing conclusive statements informed by the analysis and literary outputs.

> *"How can we conceptualize the interaction within VR gaming in terms of material-immaterial dilemma?"*

It can be said that virtual reality gaming is both material and immaterial depending on the context. The strongest argument regarding the immateriality of virtual reality games could revolve around the lack of material consequences and reflections of in-game actions and events in the real world. However, once again coming from Hansen's (2006) view, seeing all reality as mixed reality, and Meskell's (2005)

argument that materialization stems from the intellectual and cognitive processes of individuals, the proposed immateriality of virtual reality falters.

When we take a closer look at the bodily, spatial and cognitive interactions contained within the practice, we see they are indeed radically material. To begin with, the practices and codings of the physical world can be reproduced within the physical space. The players give meaning to and exist in the virtual world with their own physicalities and effectively transfer their embodied and knowledge capitals acquired through their interactions within the real world, to the game world. Coming from the discussion on materiality in the literature review, objects and events in the game world are assigned material properties, and realized by the players through the same cognitive, sensory processes. Through this materialization, everyday interactions, ways of doing and ways of knowing become valid.

The analysis showed that players materialized the virtual world in two ways. Firstly, they perceived it and interacted with it using their own senses. While the senses of vision and hearing were completely isolated to the virtual world, and were providing the players the essential data to act within the space; the sense of touch and even the proprioceptive senses were stimulated in conjunction with how the interaction would feel like in the real world. By being able to hear directional audio and perceive depth in the image, the players could fully exist and act in the game world. The influence of senses was so dominant, that it awakened phobias in two of the participants and caused frantic defensive motions in an overwhelming majority of them.

When we come to the second way of materialization, it is evident that there are dense connections present to the first way. The players materialized the interactions and the virtual objects in the game through their existing codings. These codings included interpreting the affordances of objects and their own bodies, and practices or conditions co-existing in the real world, such as the sequences of movements in eating, and physical navigation. Under the light of these, it can be concluded that deeming virtual reality gaming as an immaterial endeavor due to the connotations of the word ‘virtual’ would be fallacious and an understatement. Seeing VR as a ‘real’

and material element, therefore, enables researchers and game designers to analyze the elements of VR gaming and the interaction of the gamer with the game components and hardware. Because this analysis provides information on various links among sensory information, existing knowledge categories, existing ways of knowing, and users reaction to new or mismatching stimuli.

The second research question was:

"How does practice theory offer an understanding of the elements of VR gaming?"

Reckwitz defined practice as a "routineized type of behavior that involves bodily and mental activities, use of 'things', background knowledge and understanding, and evokes emotions" (Reckwitz, 2002, p.249). Practice theory informs us that practices contain spatially contextualized doings and sayings. These doings and sayings involve mental and physical rules, links and dispositions consolidating through training and repetition. Therefore, they are carried out by embodied agents. As argued by Schatzki (2012) and other scholars (Schatzki et al., 2001; Shove & Pantzar, 2005), practices are often accompanied with a certain material arrangement that facilitates the practice and is given meaning to by the practitioners of that practice. VR is no different in the sense that the experience and the practice rely heavily on the use of hardware, such as the controllers and the headset. Shared practices can also be reproduced and construed by individuals within certain time frames, often resulting in the birth of novel practices (Shove & Pantzar, 2005) and the reappreciation of objects (Pantzar & Shove, 2010).

All of these insights into the aspects of practices apply directly to the elements of virtual reality gaming as can be expected. In addition to virtual reality games and hardware containing their own doings and sayings, and therefore being parts of a rich practice on their own, they also become conduits of practices belonging to the physical world for VR players. By enabling players to form new codings, exercise existing ones and by providing them with a malleable, material experience, virtual reality gaming becomes a melting pot for many bodily practices. Therefore, to examine the embodied interactions found in VR gaming, it is fruitful and befitting to

approach the questions from the lens of practice theory. Approaching this phenomenon from the perspective of practice theory enables us to analyze material, bodily, practical, and knowledge related parts of a practice. Breaking up the interaction into these fundamental elements provides analytical tools to understand performance and reproduction of practices.

The third question research question was:

"What are embodied interactions? How are they formed in VR games?"

Embodied interaction is a collective term that encapsulates the ways we give meaning to, interpret, manipulate and exist in the realities we engage with, using our own bodily mechanisms and capabilities. The literature established that it is deeply rooted in human experience and is habitual (Connerton, 1989), making it much more than just momentary physical manifestations. Through a phenomenological perspective, embodied interactions also include the skills, responses and cultural understandings of individuals (Dourish, 2004). Due to the incalculable variations in the experiences of individuals, embodied interactions are ultimately unique.

In virtual reality games, players engage in these interactions by combining their accepted ways of doing and knowing regarding physical interactions with the new codings and ways they invent on the hardware. They adapt to the rules of the game world by forming new codes and relationships between the elements of the game and materiality, and/or make intentional modifications on their standard approaches. These modifications either come into play as embodied tools for overcoming discrepancies, the disrupting inconsistencies between the two spaces, or as the attuned reproductions of the 'virtual' versions of common practices. This complex cyclical process can be diagrammatized and summarized as can be seen in Figure 5.1:

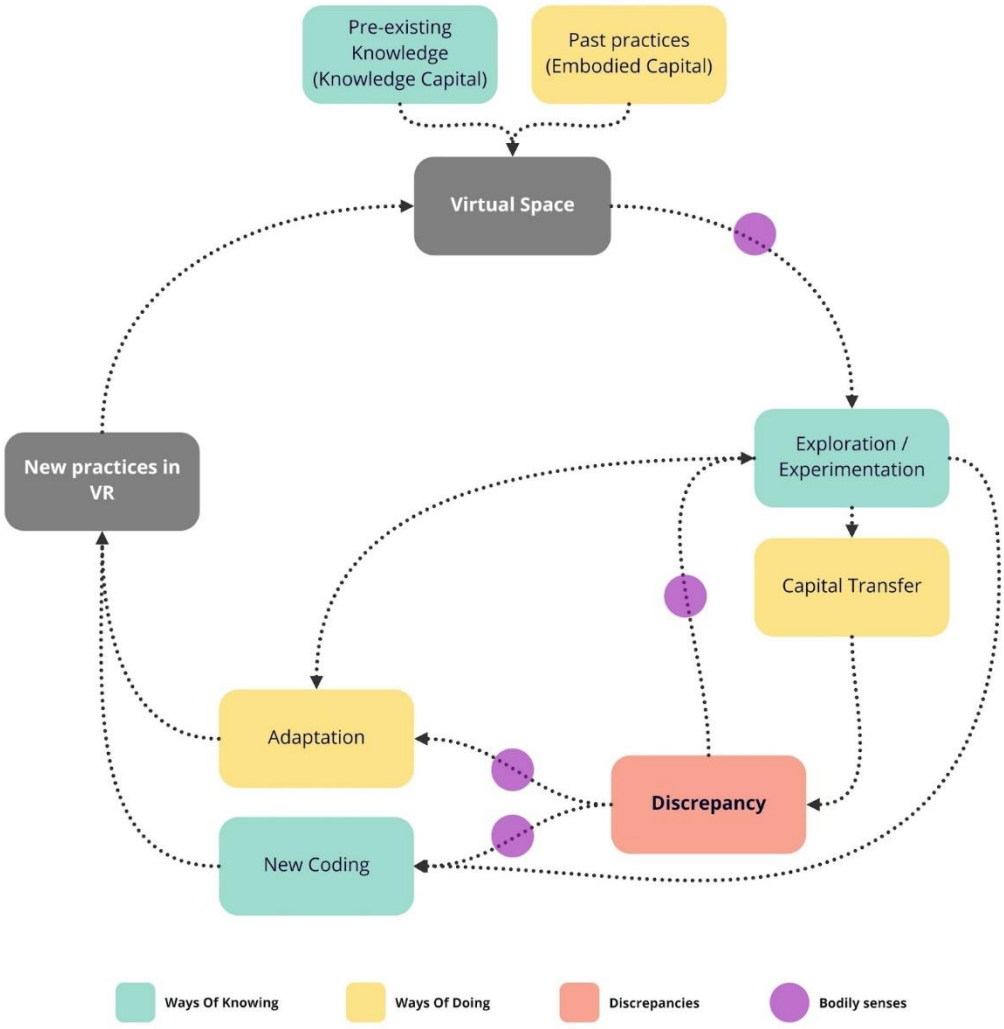

Figure 5.1. The cyclical process of VR interaction.

The last research question was:

> *"How do gamers interact with the virtual, and so immaterial environment? How are body, senses, and bodily movements involved in VR gaming interaction?"*

As the literature established, we use ways of knowing and ways of doing to connect with realities physically and mentally around us. These ways are aptly named as embodied capital, bodily memories or collective memory by various scholars. Players interact with the virtual environment using their embodied capital and senses. This capital involves a 'cycle', as I am calling it, of expectation, feedback and result. The pre-coded ways of doing and knowing from the physical world dictate this cycle,

forcing players to try reenacting their real-world practices with specific expectations regarding interactions, which is followed by the evaluation and interpretation of the feedback transmitted by the hardware. If the result is consistent with their initial expectations and the feedback from the hardware, that specific interaction becomes coded by the participants in the specific way executed. In the cases when it does not, the players begin to ponder more on the feedback and result parts of this cycle by performing experimentative actions. In the end, they formulate internally consistent clusters of ways and perceive them as the 'realities' of the virtual space.

Senses, practices, and embodied capital were the common denominators in every interaction encountered within the game world, as presented many times throughout the study. This still remains to be the case in the cycle I mentioned in the previous paragraph. It was argued in the literature that motor functions bridged the gap between the real self and the virtual self. This argument was verified time and time again during the interviews, where the participants fully associated themselves with their in-game avatars or characters. Senses, being the most governing of the bodily factors, were the main drive behind this association with the new, virtual environment and the exploration of its qualities, conditions and affordances. Of course, it should once again be noted for good measure that bodily practice and senses can never be separated.

The aim of this thesis, as discussed in the first chapter, was to uncover the complex and embodied nature of VR gaming in order to provide professionals such as game and hardware designers with valuable inputs to consider. The subsequent qualitative analysis has indeed demonstrated that the interactions found and performed within the virtual space are deeply rooted in the daily lives of individuals, and they are highly embodied in a very similar manner to real life where they are understood and experienced through bodily senses.

Unfortunately, there were not many works, if any, that focused on these fundamental aspects and strong suits of VR gaming. The medium and methods of interaction found in virtual spaces are what distinguish VR gaming from the practice of

traditional gaming on personal computers and game consoles. Moreover, the game designers and studios that produce the experiences for VR systems in the form of games, tended to oversee them and approach the design process in a very similar fashion with regular, traditional video games. Therefore, with this study, I tried to present a framework on which designers can build upon for the upcoming projects. The argument to be taken from the conclusion of this work is that the approach towards designing the games to be played on VR systems, and the design of the hardware itself should include this understanding to ensure richer, more intuitive, more immersive and deep experiences. The technological capabilities of today's VR hardware allow it.

5.3 Challenges, Limitations and Recommendations for Future Studies

Because the field study of this research was conducted in a commercial setting, I encountered certain uncontrollable situations and factors that may have affected the course of the observations and the interviews. First and foremost, it proved to be impossible to work with a select sample group since I had very little influence on who could come and specifically play the game that was to be studied in this research. So, the participants coincidentally belonged to a single age group (19-32). Furthermore, the overwhelming majority of the players were first time users and the few exceptions were not experienced either as it was their second time at the most. Although working mainly with first time users was instrumental and fruitful for gathering data on the transfer between different domains, the observed interactions naturally could have been different with experienced, frequent VR users.

Moreover, all of the participants were informed before the game session about what to do inside, and what to expect from the game by the owners of the venue the field study was conducted in. This inevitably intervened to a certain extent with the participants' ability to freely explore the game world and the possible interactions it offers. They were influenced to act on a source of information unrelated to their own efforts, research, and experience. Another limitation inevitably caused by the same

owners was that the participants had the opportunity to shout for help as the owners had to keep watch all the time in case something goes wrong during the gameplay. In some of the instances the participants were confused or had trouble with executing an intended motion, they shouted for help and the owners had to answer their questions as the participants were paying customers. This could have resulted in loss of data to a certain extent since the participants did not overcome those specific situations among themselves.

It should once again be noted that this study was conducted with only one game and one device for the reasons presented in the third chapter. While being designed with specific, non-divergent functionalities in mind, VR systems of different brands can vary when it comes to the number and placement of buttons, weight, screen resolution, connectivity (wireless or wired), and sensitivity to movement. In addition, VR gaming is becoming more popular as the technology advances and the number of games available to play using these systems increase exponentially every day. As can be expected, there are countless approaches towards designing games and each game can offer or require different interactions according to their genres and narratives. It can be said that each game offers the players another new world to experience, another reality. The genre, the difficulty, and the setting of the game dictates how it ideally should be played, and also the emotions and responses it can trigger. The qualitative data acquired and analyzed in this research could have varied if it was conducted in a different setting, with other hardware or games, and seasoned users. Therefore, to build upon or test the conclusions this thesis yields, it would be within reason to study the interactions present in other games and applications. Also, the process of embodiment in virtual reality could be further detailed by studying long-time users.

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APPENDICES

A. Informed Consent Form (Turkish)

Mayıs 2022

ARAŞTIRMAYA GÖNÜLLÜ KATILIM FORMU
(Maddi Olmayanın Maddeselliği: Sanal Gerçeklik Oyunculuğunda Bedenleşmiş Etkileşim)

Bu araştırma, ODTÜ Endüstriyel Tasarım Bölümü Yüksek Lisans öğrencisi Burak Kök tarafından Dr. Öğr. Üyesi Damla Tönük danışmanlığındaki yüksek lisans tezi kapsamında yürütülmektedir. Bu form sizi araştırma koşulları hakkında bilgilendirmek için hazırlanmıştır.

Çalışmanın Amacı Nedir?

Araştırmanın amacı, sanal gerçeklik sistemlerinde oyun oynayan kullanıcıların oyun sırasında donanımla ve sanal oyun dünyasıyla kurdukları bedensel ve zihinsel etkileşimin detaylarını ve mekanizmalarını incelemek, daha sonrasında ise buna bağlı olarak sanal gerçeklik alanında kullanılabilecek tasarım girdileri elde etmektir.

Bize Nasıl Yardımcı Olmanızı İsteyeceğiz?

Araştırmaya katılmayı kabul ederseniz, araştırmacı oyunu oynadığınız süre boyunca sizi gözlemleyip oyun dünyasıyla kurduğunuz etkileşimler ve çeşitli aksiyonları yapma biçiminiz hakkında notlar tutacaktır. Bu süre içerisinde görsel ya da sesli herhangi bir kayıt alınmayacaktır veya size herhangi bir müdahalede bulunulmayacaktır. Oyun süreniz bittikten sonra ise araştırmacı ile önceden hazırlanmış sorular doğrultusunda, yaklaşık yarım saat sürecek bir görüşme yapmanız beklenmektedir. Bu görüşmede içerik analizi ile değerlendirilmek üzere görüşmenin ses kaydı alınacaktır.

Sizden Topladığımız Bilgileri Nasıl Kullanacağız?

Araştırmaya katılımınız tamamen gönüllülük temelinde olmalıdır. Çalışmada sizden kimlik veya kurum belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamamıyla gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir. Katılımcılardan elde edilecek bilgiler toplu halde değerlendirilecek ve bilimsel yayımlarda kullanılacaktır.

Katılımınızla ilgili bilmeniz gerekenler:

Bu çalışma, genel olarak kişisel rahatsızlık verecek sorular veya uygulamalar içermemektedir. Ancak, katılım sırasında gözlemden, sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz görüşmeyi yarıda bırakıp çıkmakta, ya da gözlemin sonlandırılmasını istemekte serbestsiniz. Böyle bir durumda çalışmayı uygulayan kişiye çalışmadan çıkmak istediğinizi söylemek yeterli olacaktır.

Araştırmayla ilgili daha fazla bilgi almak isterseniz:

Çalışma sonunda, bu çalışmayla ilgili sorularınız olursa cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Endüstriyel Tasarım Bölümü öğretim üyelerinden Dr. Öğr. Üyesi Damla Tönük (E-posta: dtonuk@metu.edu.tr) ya da yüksek lisans öğrencisi Burak Kök (E-posta: burak.kok@metu.edu.tr) ile iletişim kurabilirsiniz.

Yukarıdaki bilgileri okudum ve bu çalışmaya tamamen gönüllü olarak katılıyorum.

İsim Soyad Tarih İmza
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B. Interview Guide (Turkish)

Mayıs 2022

Maddi Olmayanın Maddeselliği: Sanal Gerçeklik Oyunlarında Bedenleşmiş Etkileşim

Katılımcı Mülakat Soruları

S1. Daha önceden sanal gerçeklik deneyiminiz olmuş muydu? Olduysa ne sıklıkla sanal gerçeklik oyunları oynarsınız? Olmadıysa nasıl bir beklentiniz vardı?

S2. Neden sanal gerçeklik oyunlarını oynuyorsunuz? Diğer oyunlarla karşılaştırıldığında farklı olan ne var?

S3. Neden bu oyunu tercih ettiniz? Herhangi bir beklentiniz var mıydı?

S4. Buraya gelirken herhangi bir hazırlık yaptınız mı?

S5. Oyun içinde vücudunuzu nasıl kullandınız?

S6. Oyun içinde karakteriniz nasıl hareket ediyordu?

S7. Oyun süresince elinizdeki kontrolcüleri nasıl kullandınız?

S8. Oyunda kapıları ve çekmeceleri nasıl açtınız?

S9. Oyunda silah kullanmanız gerekiyordu. Daha önceden silah kullanmış mıydınız? Oyunda bu nasıl yapılıyor, nasıl alıştınız?

S10. Oyundaki farklı silahları ve cephaneyi nasıl kullandınız? Birbirlerinden farklılar mıydı?

S11. Oyunda can doldurmak için yemek yemeniz gerekiyordu. Bunu nasıl yapıyordunuz?

S12. Oyunda en rahat hangi hareketi yapmaya alıştınız?

S13. Oyunda tahmin ettiğinizden zor yaptığınız bir şey oldu mu anlatabilir misiniz?

S14. Oyunla ilgili daha iyi olabilirdi dediğiniz bir şey var mı?

S15. Kullandığınız kontrolcüler ve donanım için daha iyi olabilirdi dediğiniz bir şey var mı?

C. Interview Guide (English)

May 2022

Materiality of the Immaterial: Embodied Interaction in Virtual Reality Gaming

Interview Guide

Q1. Did you have any experience with virtual reality before? If so, how frequently do you play VR games? If not, what kind of expectations did you have?

Q2. Why do you play VR games? What is different when you compare it to other games?

Q3. Why did you prefer this game? Did you have any expectations?

Q4. Did you do any kind of preparation before coming?

Q5. How did you use your body in the game?

Q6. How did your character move in the game?

Q7. How did you use the controllers in your hands during gameplay?

Q8. How did you open the doors and the drawers in the game?

Q9. You had to use firearms in the game. Do you have any experience with firearms? How is it done in the game, how did you get used to doing it?

Q10. How did you use different weapons and ammunition in the game? Were they different from one another?

Q11. You had to eat in the game to refill your health. How did you do that?

Q12. Which movement or action was the easiest for you to get used to?

Q13. Was there anything harder to do than you anticipated? Can you talk about it?

Q14. Is there anything you think could be better in the game?

Q15. Is there anything you think could be better about the hardware and the controllers you were using?

D. Ethical Approval

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
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14 NİSAN 2022

Konu : Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi : İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Dr. Öğr. Üyesi Damla TÖNÜK

Danışmanlığını yürüttüğünüz Burak KÖK'ün "Maddi Olmayanın Maddeselliği: Sanal Gerçeklik Oyunculuğunda Bedenleşmiş Etkileşim" başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülmüş ve **0185-ODTUİAEK-2022** protokol numarası ile onaylanmıştır.

Saygılarımızla bilgilerinize sunarız.

Prof.Dr. Mine MISIRLISOY
İAEK Başkan

E. Original Interview Quotes

[Quote 1] Participant 6: Birazcık da bolca video izlemiş olabiliriz (gülüyor), insanlar neler yapıyor, aynı hataları… düşmeyeyim diye.

[Quote 2] Participant 3: Haa izlemişliğim çok var. Sürekli hani benim kuzenlerim olsun, erkek arkadaşım olsun, hepsi 'oyuncu' tipler oldukları için yani onları çok izledim. Oyunun nasıl oynanacağını biliyorum ama kendim yapmaya geldiği zaman olmuyor.

[Quote 3] Participant 11: Onlar çok eski oyun şeyi ya. Oyunlarda hep kırmızı variller patlayan olur falan.

[Quote 4] Participant 22: Ya altı yedi bin saatim falan var oyunlarda. Hani o yüzden şeyleri biliyorum aaa buraya bunu saklamıştır şurada şu vardır bak burayı bilerek gizli yapmışlar falan.

[Quote 5] Participant 15: Ya nişan alma, hani temel mantık ve hareketleri aynı aşağı yukarı.

[Quote 6] Participant 17: Şöyle bir olay varmış, tutma koluna bastığın zaman öteki silahı bırakıp diğerini alıyormuş. Ben bunu sonradan çözdüm ama bu oyun içerisinde pek kullanılabilecek bir durum... ya o anki heyecanla hem şeyle onu bırakayım, diğerini alayım falan biraz zor oluyor.

[Quote 7] Participant 3: El bombası kullandım. O da zor. O bence kullanılan en zor silah o. Çünkü şeyi zor bir kere, hani pimi çek, at kısmı çok zor. Onu unuttum mesela şu an nasıl yaptığımı. Hangi tuşa basıp pimi çekiyor... galiba şarjör değiştirme tuşuna basıp pimi çekiyor sonra atıyorduk. Şimdi bunu hatırladıktan sonra pimi çekip de yukarıdan atmaya çalışırsanız ayağınızın dibine düşüyor.

[Quote 8] Participant 17: Hani pimini çekmemişim (bombanın) direkt attım. Sonra tekrardan bomba patlamayınca ben o bombayı tekrardan yerden aldım, yakama koydum ama bombayı bulamadım.

[Quote 9] Participant 21: Bir ara refleksif yapmaya başladım şarjör değiştirmeyi, çok rahat yapmaya başladım… Hiç bakmadığım direkt değiştirdiğim oluyordu işte direkt X'e basıp belime götürerek.

[Quote 10] Participant 11: Saat vardı bir tane de sağlık şeyini gösteriyordu.

Participant 10: Haaa ben onu şey zannettim ya gerçek kalp atış ritmi falan zannetmiştim.

Participant 11: Yok sağlık şeyini gösteriyordu.

[Quote 11] Participant 11: Ha ben şey zannettim, orada kırmızı mermiler vardı, onlar bomba, onları atıyoruz vuruyoruz falan diye. Varilleri vurduğunu anlamamıştım.

[Quote 12] Participant 4: Et yiyorsak suyu niye içemiyoruz? Eti ağıza götürüp yiyoruz, ben o kapağı da açmaya çalıştım suyun kapağını.

[Quote 13] Participant 4: İyi de bak adamlar beni yürütmüyor ki, teleportla yürüyorum niye ben kendim döneyim yani?

[Quote 14] Participant 10: [ışınlanma] biraz değişikti. Yani ilk önce adapte olamadım ben, çünkü sağıma soluma bakmam gerekiyordu, ışınlandığımda bazen farklı bir yöne ışınlanabiliyordum ve arkamdaki zombileri görmemi zorlaştırıyordu.

[Quote 15] Participant 21: Bazen, ııı dönmek gerekiyordu, dönmek için teleport atmak çok mantıklı olmuyordu...

Participant 20: Kendi yerimde dönüyorum, en son öyle yaptım artık.

Participant 21: Aynen kendi yerinde dönmek gerekiyor, onu ben de geç keşfettim. İlerliyor insan ister istemez, refleksif oluyor hani bence biraz insanın doğasıyla alakalı.,

[Quote 16] Participant 20: Ya hepsini kullanabiliyor muyum diye merak ettim yani mesela o kavanozların orada amacı neydi?

[Quote 17] Participant 7: Her ne kadar kısıtlı bir alanın içerisinde olsam da oyunun içerisinde kısıtlı bir alan olmadığı için sürekli duvara çarptım zaten.

[Quote 18] Participant 18: Evet tamam yani konsol yardımıyla çok rahat ilerliyorsun yönünü de görüyorsun falan ama oyunun içerisinde, oda çapında da söyleyecek olursam ben gayri ihtiyari hani kendim koşma hissiyatına kapıldım bir anda. Hani keşke önüm açık olsaydı da duvara toslamasaydım.

[Quote 19]: Participant 18: Ben nasıl göründüğümü çok merak ediyorum ama o veriye ulaşabiliyor muyuz? Mesut çok ürkütücüydü çünkü.

[Quote 20] Participant 18: Ben şeyi test ettim bu arada boş anımda. Ayakla vuramıyormuşuz ona üzüldüm biraz. Basket topuna ben ayakla müdahale etmeyi denedim olmadı. Yani denedim gerçekten öne uzattım ama hiçbir şey yoktu ekranda.

[Quote 21] Participant 19: Mumya [zombi] bana bir tane tokat çekti, mermiyi değiştirmeye fırsat kalmadan o bana bir tane vurdu ben onun boğazına yapıştım. Bildiğin tekme tokat giriştim orada.

[Quote 22] Participant 3: Şarjör tuşundan emin olmadığım için basınca şarjör düşecek mi diye baktım.

[Quote 23] Participant 7: Ben öncelikle bilgisayar sisteminde yaptığım motor kontrolleri kullanmaya çalıştım yani. Yani dediğim gibi çok oyun oynadığım için bilgisayar üzerindeki motor kontrolü biraz gelişmiştir benim, yani öyle inanırım en azından. Burada da onu yapmaya çalıştım ama çok işte, tuş bazlı düşünmeye çalıştım. Hani şu tuş bunu yapıyordu bu tuş bunu yapıyordu.

[Quote 24] Participant 15: Mesela ben [...] ilk gözlüğü taktığımda böyle odanın içine giriyorum, o zaman şöyle bir şey yaptım. İlk yürüdüm. Kendim ayaklarımla yürüdüm, baktım gidiyor.

[Quote 25] Participant 3: Yürümek doğal gelmedi bana mesela. Çünkü ışınlanıldığı için. Belki işte normal oyunlardaki gibi ilerletsek [sürekli basılı tutarak] kendimizi daha gerçekçi olabilirdi diye düşünüyorum.

[Quote 26] Participant 3: O çadırın içinde [hamburger] ararken şimdi alan da küçük olunca teleport sanki zor olacakmış gibi geldi. Ben de nasıl olsa bir odanın içindeyiz diye yürüyeyim dedim.

[Quote 27] Participant 15: Ben hani normalde de silahla şey yaparken destek aldığımda daha çok isabet verebileceğimi düşünürüm, ettiğini düşünürüm.

[Quote 28] Participant 17: Ben genelde kolumu uzatarak ateş etmeyi tercih ettim. Onun dışında tabi hani böyle nefes kontrolü, işte elimizi titretmemek gibi şeyleri yapmaya gayret ettim.

[Quote 29] Participant 1: Zaten Playstation oynarken de şunları aktif olarak şöyle (parmaklarıyla hareketi yapıyor) kullandığın için.

[Quote 30] Participant 22: Belli bir güzergahta bir yol da vardı orada ilerliyorduk. Çevrede ara işte.. alabildiğince mermi vesaire bulmak için etrafı aramamızı kurcalamamızı istiyordu, belirli bazı şeylerde. Ben tabi çok oyun oynadığım için her türlü köşeyi hızlıca aramayı düşünüyordum.

[Quote 31] Participant 7: Fiziken gitmek istedim, ki oyunun başında en fazla oyun olduğunu farkettiğim anlardı yani normalin aksine. Ona rağmen kendim gitmek istedim. Sonrasında beni durduran şey o mavi kareler açıkçası.

[Quote 32] Participant 23: Arizona'da hem yürüyüp hem zıplayarak ilerlemek benim bayağı kafamı karıştırdı, veya ben çoğu yerde odanın şu anda hangi köşesindeyim, kenara yakın mıyım yoksa ortada mıyım bu hiç aklımda değildi.

[Quote 33] Participant 7: Ben onu gerçek silahmış gibi o tuşları şarjör manivelasıyla karıştırmaya başladım. Hatta şey oldu bir yerde, tutma tuşu ve şarjörü karıştırıp sürekli üç dört kere şarjör boşalttığım oldu ard arda.

[Quote 34] Participant 11: Şarjör düşürmeyi unutmuşum, yani şarjör bitince tuşa basıp şarjör bırakılıyor, ondan sonra bele götürülüyordu. Ondan sonra ben şarjör bırakmadan doldurmaya çalışıp elimi sürekli belime götürdüm ama dolmuyordu.

[Quote 35] Participant 3: [...] zombiyi üstümden ittirebilmeliyim yani, öyle bir şey yok ama o varmışçasına insan hani şey yapıyor.

[Quote 36] Participant 22: [...] kurşunun nereye gittiğini de görmüyorum yani ona göre kendimi ayarlayacağım. Ben ateş ediyorum 'çın' diye ses geliyor. Ya arkasına mı geldi omzuna mı sekti kafasının sağından mı geçti solundan mı geçti?

[Quote 37] Participant 15: [...] en basitinden bombayı atarken böyle hani insan bırakmak istiyor ama sıkman gerekiyor, çok böyle ters düşüyor bu hareket. Böyle sıkarak fırlatıyorsun anlamıyor insan. Bırakmak istiyor yani.

[Quote 38] Participant 7: Düzlem referansı olarak alıp, hatta kendimi sürekli odanın ortasına yerleştirmeye çalıştım oyun içerisindeyken. Ha odanın ortasında değilim şu anda ya ben zombi saldırısı olursa mesela bir yere çarparım, o yüzden ortaya geçeyim diye kendimi sürekli mesela yönlendirmeye çalıştım.

[Quote 39] Participant 17: [...] böyle şey yapmaya çalıştım, duvarlara çarpmayayım ve bana o mavi ekran gelmesin diye daha çok ortada sabit duracağım diye kendimi şartladıysam herhalde.

[Quote 40] Participant 22: Kendim bir duvara elimi koyup da nerede olduğumu üç aşağı beş yukarı anlıyorum, eğer bir köşeye denk gelirsem birkaç adım arkaya geliyorum.

[Quote 41] Participant 15: Mesela dönme hareketlerini doğrudan vücutla yapıyordum, yürüme hareketlerini konsolla.

[Quote 42] Participant 4: Ya tamam da bak o (kontrolcü) aniden dönüyor. Sen böyle (vücudunu döndürüyor) hem yavaş dönüyorsun hem de onun kadar dönemiyorsun bak.

[Quote 43] Participant 4: [...] sonradan alışıyorsun aslında. O da senin bedeninin bir parçası gibi oluyor. Ben şey ya buzdolabı açmak, gereksiz bir hareket biliyorum ama bir şeyleri tutma bence bu oyunda mükemmeldi.

[Quote 44] Participant 3: […] insan kendini kaptırıyor mesela yani zombi üstüne geldiği zaman korkup kaçıyorsun gerçekten. O sırada sınır falan hiç insanın aklına gelmiyor, duvarlara falan çarpmışlığım var o şekilde.

[Quote 45] Participant 21: Çok fazla şey üstüme gelince ben kendimi geriye doğru atıyordum.

Participant 20: Sanki gerçekten kendim çekilmem gerekiyormuş gibi hissettim çünkü yani.

[Quote 46] Participant 15: [...] ya en son özellikle tünele girdiğimizde karanlık, zaten karanlık bastı. İyice basıklaşınca artık oyunu da saldım tamamen.

[Quote 47] Participant 19: Ben orada bayağı bir afalladım alışmam biraz zaman aldı.

[...] oradan inerken başım falan döndü benim.

[Quote 48] Participant 17: Ya öyle bir gerçeklik var ki [...] hani normal et yermişçesine ağzımı şapırdata şapırdata onu yemeye çalıştım.

[Quote 49] Participant 18: Ben kendi ağzımla da çiğneme hareketi yaptım yani [...] koskoca gözlüğün altında geviş getiriyordum.