ENHANCING USER EXPERIENCE IN VIDEO GAMES: INTEGRATING PSYCHOLOGICAL PRINCIPLES FOR OPTIMAL ENGAGEMENT

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ABSTRACT

In our daily lives, technology seems to be the core of the experiences we go through. In this digital landscape, the video game industry appears as a dynamic and evolving realm, driven by an increased focus on immersive experiences. In its traditional meaning, UX design aims to ease the accessibility, usability and emotional satisfaction of a digital product. When speaking of video games, the objective shifts towards the creation of experiences that seamlessly integrate with the gameplay through adaptive systems, to finally cater players' preferences. This gap allows psychology to play a role in shaping a new gaming experience. Which is why we decided to delve into the role of integrating cognitive, emotional and behavioural psychology principles into UX design to enhance player engagement in video games.

Through a mixed-method approach, we aim to identify what psychological principles can be integrated into UX design to enhance player engagement and how the industry can implement these insights effectively. Our research revealed key insights from both gamers and industry professionals. Based on their psychology, gamers can be clustered in groups, allowing the industry to create personas to better address their needs. We advise designers to use these personas as references in their daily work. Gamers also expressed a need to be heard by the industry, a need that the industry should fulfil by an integration of User Research in their game development process.

In conclusion, it is essential to advocate for a widespread adoption and recognition of UX design within the video game industry. We believe the potential of UX design and psychology in enhancing player engagement is underutilised. Ultimately, this shift will not only benefit players but also contribute to the long-term success and innovation within the industry.

KEYWORDS

Video games, UX design, cognitive psychology, behavioural psychology, emotional psychology, engagement, motivation, user research, technology, immersion, game design, game development, usability, experience, satisfaction, players

Please note that we decided to use the Harvard referencing system for the quotes and citation of this paper.

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EXECUTIVE SUMMARY

This master thesis explores the importance of integrating principles of psychology (cognitive, emotional and behavioural) in the UX Design of video games to reach optimal engagement for the players. The primary objective of this research is to better understand the players' motivations and expectations as well as the opportunities and constraints of the video games industry to enhance the overall gaming experience.

Introduction, background and objectives

When speaking of digital products, video games always stand aside; UX Design has only very recently been considered as crucial by the industry. Putting the user first offers new opportunities for creating immersive gaming universes and experiences. However, understanding and integrating the principles of psychology in the video games' design remains challenging. By investigating the impact of integrating psychology principles (cognitive, behavioural and emotional) into the UX Design of video games, our study aims to offer actionable insights to optimise player engagement, satisfaction, and overall gaming experience.

To do so, we will assess the current use of psychology in the UX Design of video games. Then we will identify key challenges for a further implementation and the eventual benefits and limitations. Finally, we will try to provide recommendations for best practices in the UX Design of video games incorporating psychology principles.

Methodology

This study is using a mixed-methods approach, combining a quantitative questionnaire (with 119 respondents) with qualitative interviews (six respondents).

The quantitative method is used to collect data from the gamers with the objective of understanding their needs, motivations, psychology and expectations, through the following

research question: What psychological principles can UX design leverage to enhance the cognitive, behavioural and emotional engagement of gamers?

The qualitative one consists of six in-depth interviews with professionals from the industry. The objective is to explore their reactions and opinions on our findings from the quantitative approach. Our goal is to answer this research question: How can the video games industry implement the principles of psychology relative to cognitive, behavioural and emotional psychology, to improve the UX of its products to reach optimal engagement for the players?

Findings

Through our research, we gathered valuable insights from both the gamers and the professionals from the industry. Concerning the gamers, here are the most notable findings:

- Different types of players will have different motivations, so we can group the players and create personas that can be described as typical players.
- Emotion - wise, we noticed common feelings amongst players after a gaming session, but also significant disparities depending on the type of the game that they play.
- Interestingly, personalization is not something crucial in creating and maintaining players' satisfaction and motivation.
- Players are seeking innovation in gameplay mechanics. They think that this type of innovation can improve their engagement level.

On the professionals side, here are the most important findings:

- UX Designers think that User Research is crucial in a game's development process, but not used enough currently (they are limited by time and budget constraints). This finding is supported by significant disparities between professionals and gamers responses on the same topic.
- Players engagement is measured through retention while players satisfaction is measured through play tests (when the game is not published yet) or through active monitoring on social media (when the game is released).
- Game design should not aim at removing frustration; it should aim at managing it properly to enhance players engagement. One key solution is to have an efficient and thought-through rewards system.

We also discovered shared findings amongst our two pools of respondents:

- The variety of player types must be taken into account when designing video games, through the strict use of persona. However, immersion is experienced through the same elements of the game (being the sensory and aesthetic aspects).
- Two things should always be considered when designing a game: provide the gamers with different choices and respect their moral values.

Discussion, conclusion and recommendations for future research

With these key findings, we can now provide actionable insights to optimise player engagement. We recommend frequent use of User Research and personas, to make sure game designers are working towards players needs. We also recommend to include Level Designers in the design process from end to end, they can provide useful insights on how to maintain gamers immersed in the game. When designing a rewards system, designers and developers should make sure that various types of rewards are included. Finally, we want to highlight the players' appeal for renewed experience, but sometimes less is more. So we recommend small and impactful innovation supported by familiarity and simplicity. We would like to conclude on the need for the video games industry to acknowledge the importance of UX Design.

For future research in that field, we recommend enlarging the research to an international audience that would also include rookie gamers. We also recommend exploring the use cases of AI and VR in the UX Design of video games to reach optimal engagement for the players.

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I. Introduction

Part 1: Context

In the last 50 years, the video game industry has seen a massive growth, with revenues exceeding those of other entertainment sectors such as music and film industries (184 billion U.S. dollars (Newzoo, 2024) versus 28.6 billion for the music industry (IFPI, 2024) and 72.3 billion in the cinema industry (Statista, 2024) worldwide in 2023). This expansion is due to factors like technological innovation, the rise of online gaming platforms, and the availability of gaming devices. A video game is a special kind of interactive software because its goal is "to make the player feel good when playing it" (Daly, Zapata and Paz, 2017) and not just to apply tasks. When discussing video games, it's important to differentiate between different types, such as online, mobile and console games. Online games are played over the internet and especially on a computer, often with other players from around the world, while mobile games are played on the phone and console games are typically played on gaming consoles like PlayStation, Xbox, or Nintendo Switch.

The number of video game players worldwide is estimated at around 3 billion in 2022 (Statista, 2023). Even if it's hard to have an exact number, data from various gaming platforms offer some insights: there are about 116 million Nintendo gamers, 108 million active PlayStation gamers, 100 million Xbox users, and 1.7 billion PC gaming enthusiasts, especially due to the popularity of e-sports. E-sport is defined as structured gaming tournaments where participants from around the globe compete for an ultimate prize (Himmelstein, Liu and Shapiro, 2017). However, mobile gaming emerges as the dominant force, with an impressive 2.5 billion active users.

More than ever, companies in the video game industry are competing with each other in this world of perpetual innovation. As a result, they seek to provide the best new techniques to gain the upper hand and offer games that are ever more fun and engaging to their users. For example, Nintendo's success in the video game industry (with a $12.042 million revenue in 2023 (Statista, 2024)), is based on its ability to innovate and place the user at the heart of its strategy. Unlike other competitors, Nintendo does not simply follow trends, it sets new standards. An emblematic example is the Wii console, launched in 2006. At a time when the video game industry was obsessed with realistic graphics and cutting-edge technical performance, Nintendo took a radical turn by focusing on the user experience. The Wii revolutionised the way people interacted with video games by focusing on movement and proved that user-centred innovation can create engaging experiences.

How does the video game industry tackle competition? What strategies should be implemented for increasingly engaging and high-performing video games?

The French psychologist Célia Hodent emphasises the critical importance of implementing UX design strategies in video games. She defined User experience (UX) as “person’s perceptions and interactions with a product or software (such as a video game) and the satisfaction and emotions elicited via this interaction.” (Hodent, 2016). UX design focuses on optimising this interaction between users and the gaming interface, ensuring seamless navigation and effortless engagement. This includes designing intuitive menus, clear instructions, etc. Creating a successful video game is challenging and UX design should cover every aspect of a player's journey, from initial discovery to navigating menus and progressing through gameplay. By adhering to UX principles, developers can create higher-quality games that meet business objectives while staying true to their artistic vision.

However, to create an engaging game, Célia Hodent highlights that developers also need to take into account the various limitations of the gamer’s brain (perception, memory and attention), as well as players' emotions and motivation (Hodent, 2016). By integrating these psychological aspects into game design, developers can create more engaging and satisfying gaming experiences for players. To identify and measure this impact, we would like to look at how UX design can use principles of psychology to better understand the gamer's brain and enhance its gaming experience.

Part 2: Research Background

We have both had a passion for video games since childhood, having explored a wide range of consoles (Tamagochi, Gameboy, Nintendo DS, Nintendo Switch, online games). Our interest in video games led us to participate in the OneID association at SKEMA Lille, where we aimed at promoting new technologies and video games to fellow students. In 2023, we both enrolled in the MSc Product Management and UX Design program. We learned how to enhance digital products by making them more engaging, high-performing, and guided by UX strategies. This is how we naturally oriented our thesis project towards the UX of video games.

As we began researching this topic, we realised that there was a lot of information available on UX in video games, but this was not always accompanied by an in-depth analysis of the psychological aspects inherent in these games. We were motivated to explore this gap to show that the engagement of a video game is closely linked to its ability to integrate and apply certain psychological principles. We are convinced that understanding these principles and their influence on player behaviour is crucial to the development of more engaging, immersive and rewarding video games.

We have therefore decided to direct our research in this direction, focusing on how UX design can use principles of psychology to better understand the gamer's brain and enhance its gaming experience. In the first part of our study, we will set out to identify and explain these psychological principles, exploring how they can be used effectively in video game design.

We will then focus our research proposal on investigating the interplay between psychological factors and video game engagement. Our aim is to understand gamers' motivations and preferences through surveys, and to gather insights from industry professionals on how psychological principles are applied in video game UX design to enhance engagement.

Part 3: Research aim and research question

Research aim

This study aims at understanding how UX design can use principles of psychology to better understand the gamer's brain and enhance its gaming experience.

Research question

How can the video games industry use the principles of psychology to improve the UX of its products to reach optimal engagement?

Engagement is the balance between construction, destruction, discovery and socialising that keeps the player entertained and hooked up to the game (Schoenau, 2011).

Part 4: Expected outcomes

This research aims to provide practical guidance for game designers, developers and managers within the gaming industry. We aim to offer actionable insights by examining how integrating psychology principles into video game UX design can impact player engagement. Improving usability and player satisfaction can lead to increased player retention and loyalty, which is crucial for maximising the success of gaming products. The findings of this study can inform strategic decisions regarding development and interface design, giving gaming companies a competitive edge in a rapidly changing industry.

II. Literature review

Introduction

In order to provide the best possible answer to our research question, we decided to seek a better understanding of *psychological principles in video game design*, their impact and how game developers can use them in their UX strategies. We therefore used the resources presented in the literature review to question the use of these psychological principles to improve the UX of video games to reach optimal engagement.

Part 1: Psychological foundations in video games

In this section, we aim at a rigorous examination of the psychological foundations inherent in video games. We will delve into user interface design in video games and players' cognitive, emotional and behavioural responses to provide some key elements to the understanding of the player's psychology.

1) Psychology and user interface in video games

As individuals, we are drawn to video games for several reasons: to change our mind after a long day, to improve our knowledge, test our own limits and exchange and cooperate with other players (familiar or unfamiliar).

While early research on video games primarily focused on evaluating their potential for violence and addiction, we now understand that gaming offers valuable playing opportunities. Each player's experience is unique, with different opportunities for acquiring skills such as multitasking, collaboration, organisation, resilience through trial and error, as well as strategic planning. This acknowledgment has led to a shift in research focus towards exploring the potential of video games for skill acquisition, learning enhancement, and behaviour modification. Psychology plays a pivotal role as "psychologists can help in explaining the compelling appeal of digital entertainment games, designing better games and exploring the potential of serious games in learning and behaviour change." (Boyle et al., 2010).

What makes the integration of psychology into video games particularly exciting is the realisation that different game categories will have a distinct effect on individuals. Boyle et al. (2010) explained "action games have a positive impact on visuo-motor coordination and spatial representation, iconic skills and visual attention. [...] Games offer dynamic and captivating experiences that stimulate the mind, evoke intense emotions, demand intricate cognitive processing, present challenges, and hold the potential to facilitate learning, skill development, and shifts in attitudes and behaviours, therefore justifying the implementation of cognitive psychology into game design." (Boyle et al., 2010).

Cognitive psychology is not the only domain relevant to understanding in-game player behaviours; behavioural psychology also needs to be considered. Skinner conducted research on reinforcement principles and their influence on behaviour (1969). By incorporating "the reinforcement schedules" (Skinner, 1969) into game design, designers can encourage specific player behaviours. For instance, a game employing a "fixed-ratio schedule" (Skinner, 1969) would reward players after completing a set number of tasks and/or challenges, while a "variable interval schedule" (Skinner, 1969) would provide rewards at unpredictable time intervals. These schedules can be intertwined within a single game to reinforce desired behaviours and enhance player engagement.

2) Foundations of psychological principles in video game design

In this section, we aim to explore how video game studios can foster player engagement and encourage repeated play. We will dive into the psychology of gamers to understand the underlying motivation that drives gameplay. How cognitive, emotional, and behavioural psychology influence a player's experience towards a game? As stated by Celia Hodent "Motivation is paramount for survival because it directs our behaviour to satisfy drives and desires." (Hodent, 2017).

The main theory around needs-based motivation was developed by Abraham Maslow (1943, 1970). He provided a framework for understanding human motivation and explained that people are driven to meet a series of needs in a specific order: physiological, safety, social, ego, and self-actualization. According to Maslow, higher needs emerge only when the previous ones are satisfied.

When applied to video games, the needs they can respond to are located on the fourth layer, individuals must fulfil all the needs from the three previous layers (physiological, safety and social) before becoming gamers. However, the recent rise of multi-player games has positioned this gaming category inside the third layer of Maslow's hierarchy of needs as they are providing an answer for social needs through fostering a sense of belonging in the digital community. This may explain why all the recent releases in video games are integrating a social dimension to their gameplay, to be one layer lower in Maslow's hierarchy of needs (1943, 1970), and make people play video games before satisfying other needs. So, gaming studios are working on lowering video games; the lower they get in Maslow's hierarchy of needs (1943, 1970), the sooner gamers are motivated to play.

Benti and Stadtmann conducted a case study (2021) on how *Animal Crossing: New Horizons*, released by Nintendo in 2020, can fulfil needs outlined by Maslow's pyramid (1943). As this game was released during the Covid-19 lockdown, they stated "Virtual platforms become vital to making new friends and dealing with the feelings of isolation caused by the lack of social interactions and support." (Benti and Stadtmann, 2021). In this context, video games have become the easiest way to fulfil the social needs of Maslow's hierarchy of needs. As the social needs are fulfilled, the player moves on to the fourth layer, the needs for esteem, which *Animal Crossing: New Horizons* also respond to as "The opportunity to set their own goals has a lasting motivational impact and results in higher confidence levels" (Benti and

Stadtmann, 2021). The player is now moving to the ultimate layer of Maslow's hierarchy of needs (1943, 1970), which is self-actualization needs. *Animal Crossing: New Horizons* has implemented customization features attracting "a large professional audience. Collaboration and networking opportunities opened up." (Benti and Stadtmann, 2021), extending beyond the virtual world and enhancing real-world professional prospects for players.

The fundamental aspiration for every individual is to achieve self-determination, but one needs motivation to attain this goal. While Maslow's hierarchy of needs is providing valuable insights on the process, other theories explore how motivation can be based on other psychological needs like competence, relatedness (connecting with others) and autonomy.

The Self Determination Theory (SDT) introduced by Ryan and Deci in 1985 is built on two core assumptions: human beings strive for growth and internal sources of motivation are essential. Self Determination Theory suggests that human beings have three fundamental psychological needs: autonomy (feeling in control), competence (feeling capable), and relatedness (feeling connected to others). When these needs are satisfied, individuals are more likely to experience "intrinsic motivation" (Ryan and Deci, 1985), originating from within and leading to greater fulfilment and well-being. This is opposing "extrinsic motivation" (Ryan and Deci, 1985), driven by external rewards, fear of punishment, or other external factors. Overall, SDT highlights the importance of supporting individuals' autonomy, competence, and relatedness to foster intrinsic motivation and psychological well-being.

Through their research, Oliver et al. suggested that "manipulating aspects of gameplay had significant positive effects on heightening feelings of autonomy and competence (as a function of the motion controller) and relatedness (as a function of the presence of other gamers)" (Oliver et al., 2015). Their idea was to understand how the gaming industry could implement SDT to improve players' enjoyability when they play games. Their research proved that "an important intrinsic motivation for playing video games might be found in their ability to satisfy basic psychological needs" (Oliver et al., 2015). They stated that if a game can make the player feel in control, connect with others and progress in terms of skills, then the gaming experience will be more enjoyable, and they are more likely to play this game again. They concluded saying players want to "embrace a more humanistic experience that frequently focuses on prolonged and sustained user immersion and involvement into a complex and emotionally rich narrative space" (Oliver et al., 2015). This proves the

importance for the gaming industry to dive into psychology to improve the UX design of their games.

3) Impact of psychological principles in video games

In the 1970s, Csikszentmihalyi experimentally worked on the flow and his research revealed that the relationship between an individual's skill level and the difficulty of a task influences their cognitive and emotional states.

Flow theory (Csikszentmihalyi, 1975) describes a state of optimal experience characterised by a complete immersion and deep concentration in an activity. Individuals fully engage in an activity that challenges their skills and abilities at an optimal level. In this state, the individual experiences a sense of effortless action, losing track of time and self-consciousness as they become fully immersed in the task. Flow is usually associated with feelings of enjoyment, fulfilment, and intrinsic motivation. This state of flow happens when this individual has clear goals, gets immediate feedback, and feels in control of what he is doing (Csikszentmihalyi, 1975).

When applied to video games, flow theory (Csikszentmihalyi, 1975) suggests that gamers are most engaged when they fall in the state of flow. In 2011, Sharek and Wiebe conducted research on how Flow Theory, could be used to design video games as an experimental stimulus to measure player engagement. They started with the following assumption: "Flow Theory provides a strong theoretical framework for manipulating skill and challenge" (Sharek and Wiebe, 2011). In video games, flow is all about finding a balance between boredom and frustration. Boredom appears when the task is too easy compared to the gamer's growing skills and frustration appears when the task is too difficult compared to the gamer's skills. Sharek and Wiebe (2011) established through their research that "manipulating game challenge can affect skill development and optimal feelings of Flow […] the inclusion of a scoring system can also motivate players to score as high as possible thus creating more of an interest in the game." (Sharek and Wiebe, 2011). To maintain player engagement, games must align with the principles of flow theory. The gameplay should adapt to the gamer's skill level. Developers have to incorporate different difficulty levels and gameplay mechanisms to provide a sense of progression, allowing players to feel they are continuously improving. They are aiming at making the gamer feel he is improving, and, as a consequence, making the

player stay in this state of flow. By tailoring the game's challenge level to match the player's abilities, developers can foster engagement and enhance the overall gaming experience.

Reaching a state of flow generates a sense of enjoyment for players, although this experience varies from player to player. Nicole Lazzaro categorises enjoyment into four types in her Four Keys to Fun model: hard fun, easy fun, serious fun and people fun (Lazzaro, 2004).

- **Hard fun** involves overcoming challenges and achieving goals. Games embody this Key balance "game difficulty with player skill through levels, player progress, or player controls. In Mario Kart the difficulty of the challenge matches the skill of novice and advanced players (if you can't drive, you can at least throw stuff); plus it offers emotional opportunities from cooperative and competitive gameplay" (Lazzaro, 2004). Initially, this type of game design can trigger frustration, but it is followed by pride upon success and potentially boredom due to repetition (Lazzaro, 2004).
- **Easy fun** focuses on relaxation and enjoyment without stress (exploration, chatting, …). Lazzaro (2004) describes it as "Easy Fun maintains focus with player attention rather than a winning condition. The Immersion Key awakens in the player a sense of curiosity."(Lazzaro, 2004). In games like Mario Kart, elements such as visual displays and obstacles create a sense of wonder and curiosity, leading to immersion (Lazzaro, 2004). The gamer's emotions triggered by this Key are very likely to be wonder, awe and mystery (curiosity due to immersion).
- **Serious fun** involves emotional engagement caused by dramatic moments in gameplay. Lazzaro (2004) explains that "games with this Key stimulate the player's senses and smarts with emotion from compelling interaction. For example, Mario Kart combines rich visceral graphic and audio stimuli, intriguing concepts, and behaviours to create wildly fun emotions in the player."(Lazzaro, 2004). This can trigger intense emotions like excitement and relief, often enhanced by the game's background music.
- **People fun** centres on social interaction, whether through cooperation or competition. Lazzaro (2004) states that "games that offer both cooperative and competitive modes offer a wider variety of emotional experiences. For example Mario Kart's multiplayer mode allows two to four players to sit and play together providing performance opportunities and plenty of spectacle for anyone watching."(Lazzaro, 2004). Emotions triggered by the Social Key include amusement, fun over the misfortune of a rival, and pride (Lazzaro, 2004).

In summary, Lazzaro's Four Keys model (2004) offers new perspectives for game developers, guiding them on how to create player experiences that evoke emotions (on purpose or not) and trigger player engagement and enjoyment during gameplay.

In conclusion, we saw that the integration of psychological principles into video game design is essential for enhancing player engagement, motivation, and overall enjoyment. By leveraging concepts such as flow theory, self-determination theory, and the Four Keys to Fun, game designers can create experiences that resonate deeply with players on cognitive, emotional, and social levels. In the next section, we will explore how these psychological principles are applied in UX strategies to enhance gaming experiences.

Part 2: Integrating Psychology into Video Game UX Design

This section will explore the relationship between psychology and video game UX design through the diverse strategies implemented to enhance user experience in video games. Through a case study approach, we will analyse Fortnite's success to understand which design choices and UX strategies have been impactful and then examine how tailored gaming experiences can enhance player engagement.

1) Strategies to Enhance User Experience in Video Games

We have seen that understanding the psychological aspects of player-game interaction is essential to creating engaging gaming experiences. We now need to focus on strategies that game developers can use to enhance the user experience in video games.

First, it is essential to conduct User research in order to improve the user experience in video games. While UX and usability traditionally focus on facilitating user interactions, it's imperative to delve deeper into what truly makes games fun for players (Aker et al., 2016). The term 'usability' can be replaced by 'playability' to emphasise how much fun a game is to play, and also 'user experience' (UX) by 'player experience' (PX) to better reflect the fact that players are not simply users, but active participants in an interactive game. Playability is also defined as "a set of properties that describe the Player Experience using a specific game system whose main objective is to provide enjoyment and entertainment, by being credible and satisfying, when the player plays alone or in company" (Sánchez et al., 2009).

User research plays an essential role in understanding gamer behaviours, preferences and needs. The case study conducted by Zapata et al. in 2017 is a pertinent example for highlighting the indispensable role of user personas, scenario analysis and iterative usability testing in game development. The aim of this case study was to create a video game to motivate high school students to learn more about Mariano Melgar, a poet who played a significant role in the history of Peru's independence. First, they defined Personas and Scenarios to gain a better understanding of the target users. Four student profiles were identified, with a different perspective on the game: high-achieving students, disinterested students, gamers, and non-gamers. Furthermore, during the development process, a usability test was conducted with four iterations that involved "User Assessments" (Zapata et al., 2017) to evaluate how users engage with the game. User assessments were focused on their gaming experience, such as their ability to play with the character movements and their comprehension of the objectives of the game. Each iteration revealed issues: confusion related to movements, difficulties in understanding path directions and they sometimes perceived the game boring because of an unlimited number of lives. As a result, the case study helped to identify specific issues related to the user experience in the video game. Thanks to this identification, some improvements were made during the development process. In conclusion, it demonstrated the importance of considering user preferences and needs to create a better user experience in a video game.

In addition, improving the user experience in video games also requires the use of player profiling techniques to segment the player base and identify distinct player archetypes. A popular framework used for player profiling is Bartle's typology (1996), which classifies players into four main types: achievers, explorers, socializers and competitors.

1. **Achievers** are users who like to achieve their goals, to succeed in challenges. They love mastery and competition. Earning badges, completing levels and gaining recognition makes them fulfilled.
2. **Explorers** are curious and like to discover new features, content and hidden elements. What makes them fulfilled is the novelty of discovery and the whole process of exploration that a game can offer.
3. **Socializers** are gamers who enjoy social interaction and connection. Engaging with others and forming alliances are what they look for in a game.

4. **Competitors** are players who like to beat others. Challenges and competitions drive them. They like to see leaderboards, head-to-head competitions and always compare themselves with their peers.

According to Bartle in *Player Typology in Theory and Practice* (1996), understanding the preferences of different types of players allows game designers to create game mechanics, objectives and social interactions that correspond to the needs of each group, or even reach several categories at once. For example, in the popular online multiplayer game "World of Warcraft," game designers have thought about different features that refer to each player type. Achievers try to obtain rare and powerful equipment to engage in prestigious challenges. Explorers meanwhile, immerse themselves by exploring the entire map in search of hidden locations. Socializers can create strong social bonds in the game by joining guilds and taking part in group events. And finally, competitors can engage in intense battles between players, with the aim of being recognized as the best player by others.

Finally, game designers need to leverage the principles of cognitive psychology, such as meaningful learning and memory retention, in their designs. Célia Hodent (2017) explores how neuroscience, user experience, and psychology come together to create more engaging game experiences. She suggests that video games should align with principles of cognitive psychology to enhance players' learning and memory (Hodent, 2017). She states: "if the material to learn is meaningful and if the environment helps in the memorization of it, such as by repeating the material in different contexts and increasing the depth of processing, this will positively impact the rate that players forget it." (Hodent, 2017). In other terms, when you create a game, you have to make sure that the elements of the game mean something to the players and provoke deeper thinking. By using insights from neuroscience and psychology, game designers can deliver more memorable and engaging gaming experiences.

2) Successful UX Integrations in Video Games: Fortnite's success

In her book *The Gamer's Brain: How Neuroscience and UX Can Impact Video Game Design* (2017), Célia Hodent uses her personal experience of working on the game Fortnite to explain to game designers how important it is to adopt UX strategies linked to psychological principles when developing a game. Fortnite is a free online survival game, developed by Epic Games, where players compete to be the last to remain on an island. Playable solo or as a team, the game is appreciated for its cartoonish drawing style. Players can parachute onto a

gigantic map, search for weapons, build forts and fight until only one survivor remains. Since its launch in 2017, the game has amassed 500 million users in March 2023 (Statista, 2024), and has become a global phenomenon with millions of daily players. On 2023 November 4, Fortnite even recorded 44.7 million simultaneously connected players when the original version of its online game Battle Royale was republished (Kerr, 2023). These figures illustrate the enormous success and cultural impact of Fortnite since its inception. According to Célia Hodent (2018), "My contention is that the success of *Fortnite* is linked to the efforts of the team in adopting a UX strategy." The Fortnite team had a well-defined vision and worked closely with the user experience team (her team) to develop the game.

According to Célia Hodent, two stages in the development of *Fortnite* contributed to its success:

- **Understanding the player's brain**

Knowing our brain's main capacities and limitations is essential for anticipating how players will experience a game. Indeed, brain capacities are influenced by factors like our genetics, education, and cultural background and each individual perception is subjective. So it's important to carry out UX tests during the game development to make sure the design is accurate. In the case of *Fortnite*, the tests used are mainly surveys. For example, in 2013, game designers tested a game prototype with users to see how they interpreted the icons. The icon (designed to represent traps) had been misunderstood by players. Given the significance of traps in Fortnite's gameplay, it became imperative to change this icon (Hodent, 2018).

Another essential cognitive process is Memory. When you learn something that doesn't make sense, you risk losing around 70% of the content you've learned (Ebbinghaus, 1885). This is rather annoying in the context of video games, since they generally take place over several months or even years. What tactics can be used to prevent players from forgetting crucial information over time? Game developers apply many strategies, such as repeating information. However, the most effective one is to reduce memory load. The more information there is for players, the less there is to learn and remember. That's why a HUD (heads-up interface) has been implemented in Fortnite to help players remember key game information over a long period of time. The HUD constantly displays information such as control keys and objectives. This allows gamers to concentrate on the game without having to remember specific details (Hodent, 2018).

Finally, our attentional resources are quite limited. When we try to multitask, we miss out on a lot of information. Many games challenge players' attention, which is very engaging when the game is well known. However, game developers need to be careful when players learn something new, as this requires even more attention. In Fortnite, when players learn new game mechanics, unnecessary distractions are eliminated (Hodent, 2018).

- **Follow a game UX framework (usability and engagement guidelines)**

To anticipate the frustrations players may have during a game, Célia Hodent (2018) adds that there are two main UX pillars to use in games: Usability and Engagement. Usability is “the ease of use of the game, taking into account human limitations in terms of perception, attention and memory”(Hodent, 2018). To guarantee good usability, several usability heuristics must be used. The best-known list of usability heuristics was drawn up by Jakob Nielsen (1993). In the context of video games, here's how to adapt them according to Célia Hodent :

- Signs and feedbacks: Draw player's attention to particular elements (inviting signs, informative signs) and be able to give feedbacks after every action
- Clarity: All information conveyed must be perceived as intended and text must be legible.
- Consistency: Interactions and game elements must be consistent throughout the game.
- Minimum workload: Player actions should be simple and straightforward
- Error prevention / Recovery: minimise players' errors and allow them to recover easily in the event of a mistake.
- Flexibility: The game must offer customization and accessibility options to meet the needs of different types of players.

In Fortnite, these heuristics were used during the development to ensure that the game's menus and controls were intuitive and easy to use, reducing players' frustrations in navigating and interacting with the game (Hodent, 2018).

Finally, engagement is essential to keep players interested and keep them playing. According to Célia Hodent, 3 pillars are used by Fortnite.

1. **Motivation**: Players must be motivated to play the game, either by external rewards (called “extrinsic motivation”), or by the intrinsic pleasure of playing (“intrinsic

motivation") (Ryan and Deci, 1985). In Fortnite, when players win a certain number of games or eliminate a set number of opponents, they can receive in-game rewards, such as cosmetic accessories for their characters ("extrinsic motivation") (Ryan and Deci, 1985). Conversely, exploring the island or collaborating with other players provides an internal source of motivation that encourages players to keep playing for the sake of participating in Fortnite's immersive experience (Hodent, 2018).

2. **Emotion**: Emotion in gaming primarily revolves around what she describes as the "feel of the game," (Hodent, 2018) which refers to the overall sense of enjoyment and engagement derived from interacting with it. Fortnite focuses on the fluidity of controls, the quality of graphics and animations, and the variety of characters and environments to create a captivating visual experience (Hodent, 2018).
3. **Game flow:** A game needs to provide both stimulation and challenge to players, achieving a balance in difficulty to ensure it remains engaging without becoming too easy or too hard. This is what she calls "Game Flow" (Hodent, 2018), a term she coined after Csikszentmihalyi's theory about flow (1975). Game flow is also about rhythm: you need both intense and more relaxing moments. For example, Fortnite offers different game modes, such as Battle Royale or Creative mode, which offer varied experiences and difficulty levels tailored to players' preferences. Moreover, Fortnite regularly updates its content with new seasons, game modes, live events, offering players new opportunities (Hodent, 2018).

To conclude, Fortnite's success is due to its integration of UX strategies linked to psychological principles, as Célia Hodent (2018) points out. Game developers have understood players' cognitive processes, offering immersive gameplay and constantly providing new content. By following the rules of usability and engagement, with clear information, intuitive design and minimal cognitive load, Fortnite has kept millions of people engaged worldwide.

3) Personalization in video games

Personalization involves tailoring content, products, and services to individual users' unique characteristics and preferences (Xiao & Benbasat, 2007). This approach is appreciated by users as it reduces cognitive load by automatically providing services that align with their interests and needs (Chin, 2007). Personalising the player's experience to enhance

engagement is an essential approach in video game development. This personalization can be achieved in a number of ways.

- **Personalization of the gaming performance (the degree and rate of player achievement/ progression)**

Nobody reacts the same way to a video game, and one player may find it hard to finish a level, while another will get there very quickly. One way of personalising players' experience is to adjust the game according to their performance. This is known as “Dynamic Difficulty Adjustment (DDA)” (Silva et al., 2017), a technique whereby the game dynamically adjusts itself by offering challenges that suit the needs and skills of each player. According to Hunicke (2005), the game can be adjusted using the appropriate algorithms, not only in terms of level, but also in terms of narrative, maps, etc. According to Andrade et al. (2005), there are three requirements for difficult dynamic adjustment. Firstly, players' skills must be identified automatically by the game, and quickly. Secondly, player improvements and regressions must be monitored by the game, as it must maintain equilibrium. Finally, players must not perceive this adaptation process explicitly, so that game states remain consistent (Andrade et al., 2005). For example, in the game Super Mario Bros, if a player struggles with a level repeatedly, adjustments can be made such as slowing down enemy movement or providing more power-ups to help him.

- **Personalization of a game by letting players customise their experience**

Personalising a game also means letting players customise their experience. “Customization is about providing direct control of a system to the user.” (Adinolf and Turkay, 2011). Customization allows players to create their own path through the game, giving them the freedom to choose their characters, skills or even routes. Adinolf and Turkay distinguish two types of customizations in video games:

Type I: Customization concerns adjustments that have a direct impact on game dynamics. In the World of Warcraft game, for example, customising talent trees affects what a character can do in the game. By modifying his talents, a player can change his skills, strengths and weaknesses, and this will have a significant impact on his overall gaming experience.

Type II: Customization concerns adjustments that do not directly affect the dynamics of the game. For example, customising an avatar. Although this type of customization doesn't

directly affect gameplay, it can influence players' enjoyment of the game. Character customization allows players to choose their physical appearance, clothing, accessories, etc., and thus identify more with their character and make him unique to them.

- **Personalisation by experience (i.e., how players emotionally and cognitively respond while playing)**

Another type of personalisation is the experience-driven personalisation, which involves adjusting the game according to the player's experience. It takes into account emotional reactions, game preferences and past interactions, to create a more immersive game experience. We also called them “adaptive games” (Mateas and Stern, 2000) when the game design adapts to the needs of players and their changing characteristics just in time during gameplay (Schrader et al., 2017). Adapting your game to the player's emotional state can improve the player's attitude to continuing to play. ‘‘Emotions are seen as a continuously progressing player characteristic that interacts with the game design and that changes during the time of gameplay” (Schrader et al., 2017). To capture different types of data about the player’s experience during a game, Yannakakis and Togelius (2011) proposed an approach, called “experience-driven procedural content generation” (EDPCG). The EDPCG approach combines three different types of data: data expressed by players through questionnaires, data obtained from realtime recordings of physiological signals, and data obtained through the interaction between the player and the game (Yannakakis and Togelius, 2011).

But even with different ways of adapting to the player's experience, sometimes game developers can't anticipate all the interactions players will have. Implicit rules are unspoken rules created by the gaming community, which are then applied by all players without the game designers necessarily having thought of them. More than regular explicit rules, the implicit are actually cultural conventions (Wolf and Perron, 2023) adopted by experienced players and taught to new players. “Playing a game means submitting to the authority of the magic circle, which includes the cultural conventions expressed through implicit rules” (Salen and Zimmerman, 2003). In fact, these implicit rules can enrich or impoverish the gameplay compared to what the designers had initially imagined. In Mario Kart 8, for example, players discovered the existence of a meta in the game that enhanced their performance. Over time, this information spread, and Mario Kart e-sport races were only choosing Waluigi in Wiggler karts with red rollerblade wheels. This implicit rule can lead to frustration for players, who feel forced to choose this set-up to remain competitive, making their gaming experience less

diverse, personalised and then less engaging. Game developers should consistently pay attention to player feedback by conducting ongoing user experience research. This ensures that player experiences remain engaging and enjoyable throughout the game over time.

In this second part, we have seen how integrating psychology into the design of video games user experiences can improve player engagement. Through concrete examples such as Fortnite, it has become clear that the use of effective UX strategies, based on an understanding of players' behaviour and preferences, as well as tailored experiences, can significantly contribute to a game's success. In the final part, we will explore the challenges and opportunities faced by game designers in creating innovative user interfaces based on these psychological principles.

Part 3: Challenges and future prospects

This section will mainly focus on the challenges designers may encounter when crafting innovative psychology-based user interfaces for video games. We will explore various ethical issues relative to design, focusing on the player but also on its background. Finally, we will discuss how implementing psychology into video games design can benefit from emergent technologies and societal change to engage more players and to engage them better and deeper in the games.

1) Challenges in Implementing Psychological Principles

Implementing psychological principles at the core of the design process requires adopting a user-centric approach and mindset, sometimes at the expense of business objectives. However, the video games industry is fiercely competitive and the business goals must be met for the studio to survive. Therefore, studios must balance ethics with profitability, ensuring that the game's content respects players and aligns with moral values. Developers and designers should keep in mind that ethics is always a delicate topic, as things are never completely white or completely black, it is a matter of choices and balance.

- *Dark patterns (Brignull, 2010)*

In digital platform design, one must take into account the eventuality of thousands of different users, with their individual preferences, using the same interface. As Hartzog (2018) stated, “the realities of technology at scale mean that the services we use must necessarily be built in

a way that constraints our choices." The point of Hartzog is when design is used to manipulate user interaction, it should be done transparently and without negative intent. A.E Waldman defines the designer role as "They give people the illusion of free choice while architecting the menu so that they win, no matter what you choose." (Waldman, 2019). The last part of this statement raises ethical considerations.

One key ethical consideration is to avoid dark patterns (or deceptive patterns), as first identified by H. Brignull (2010), when designing a game. Dark patterns are "Common design patterns that create unintended behaviour or unexpected negative experiences […] user interfaces that are intended to trick people" (Zagal et al., 2013). In UX design, dark patterns include specific behaviours such as disguised ads, fake scarcity, fake urgency, … (Brignull, 2010). Even if dark patterns were first implemented in websites and mobile applications to trick and manipulate users into taking actions they did not intend to (Brignull, 2010), some of them can be found in video games design, especially in mobile games. Indeed, these patterns exploit psychological vulnerabilities and cognitive biases to influence user behaviour in ways that benefit the business. However, this often comes at the expense of user experience and can potentially harm users.

However, discerning between dark patterns and legitimate gameplay mechanics requires considering player consent (Zagal et al., 2013). For instance, horror games are designed to trigger negative emotions through their gameplay, and when looking at the success of the two Last Of Us opuses or The Witcher 3, we must admit that this cannot be called a dark pattern. In video games, a mechanic is considered a dark pattern when used "without those players' consent." (Zagal et al., 2013). To go even further, Zagal et al. (2013) explain that when designing a video game, the user must be challenged during all his gaming time. To create in-game challenges, designers will use some unconventional and unfair tools, such as boosting the AI opponent to make the match harder for the player (Zagal et al., 2013). As it is in the player's best interest, it cannot be a dark pattern either.

In video games design, the definition of dark patterns is nuanced compared to its broader application in digital platforms. To provide some guidelines, Zagal et al. (2013) decided to list the most prevalent dark patterns observed across various video games. They categorised these patterns into three domains based on where player deception occurs: "time, money and social capital." (Zagal et al., 2013).

- In the time category, practices such as grinding (excessive time investment for progression) and harvesting (returning on the game at specific hours to collect resources under threat of loss) are prevalent.
- Under the money category, players may encounter pay-to-skip (purchasing advancement options, generally tied with grinding), pre-delivered content (additional payment post-purchase is required to access all the content) and pay-to-win (acquiring competitive advantage through purchases).
- Lastly, the social capital category is gathering pyramid schemes (inviting friends to play to have in-game advantages) and impersonation (the unauthorised uses of a player's alias for in-game interactions, in tutorials for instance).

They conclude their research defining dark patterns in video games as "dark game design pattern is a pattern used intentionally by a game creator to cause negative experiences for players which are against their best interests and likely to happen without their consent." (Zagal et al., 2013). These dark patterns force players to prioritise their in-game activities over real-world life, when it should be the opposite (Zagal et al., 2013).

Furthermore, implementing cognitive and behavioural psychology principles into the game design present a potential ethical dilemma, as it could eventually become a dark pattern. This issue is currently viewed as a grey area, explaining the need to discuss both the benefits and ethical implications of these practices.

- *Cultural and Individual Differences*

In video games design, it's essential to underscore the significance of cultural differences. Psychology principles may not apply universally, as cultural differences play a significant role in shaping our cognitive and behavioural responses and biases.

Cultural norms, values, and beliefs influence how individuals perceive and interpret moral dilemmas depicted in games. What is considered enjoyable or engaging gameplay in one culture could potentially be perceived as offensive or inappropriate in another.

In 2014, Zagal and Torudo conducted a study comparing game appreciation in Japan versus in the United States of America (USA). Through the analysis of multiple reviews of the same games, they aimed at uncovering disparities in user preferences. Their research was motivated by the vast cultural difference existing between Japan and the USA, as proven by their

preferences in gaming. While Japanese players are known to enjoy role play in a single player mode, American gamers are more likely to prefer multiplayer sports and action games (Zagal and Torudo, 2014). They concluded their study stating “preferences of the users in the two cultures are generally similar [… but] they are sensitive to different aspects” (Zagal and Torudo, 2014). They explained “Japanese players place more emphasis on story, their overall appreciation of a game is strongly dependent on the quality of its narrative. […] Japanese users may be less tolerant of games with technical issues [whereas] American players tend to emphasise replay value in games.” (Zagal and Torudo, 2014). These findings prove that cultural differences can have a strong impact on game design, emphasising the need for designers to ideate and create the game to accommodate diverse cultural preferences and sensibilities.

While various social groups contribute to the ideation and the design of video games, white male remain the most represented group and have a significant influence in the decision-making process. This dominance often leads to the manifestation of their biases in game designs, which can reinforce feelings of exclusion among underrepresented groups (Zagal and Torudo, 2014). For instance, black women are rarely portrayed as the main character in mainstream games, as the majority of human-like protagonists are white males (Mario, Assassin’s Creed, Call of Duty, Overwatch, …). And this despite the success of Japanese studios like Nintendo and Bandai Namco in the industry, and video games being generally associated with Japanese culture. Still, “The global appeal that many Japanese videogames enjoy may be due to the fact that they’ve been carefully designed and developed to be culturally neutral, rather than particularly Japanese.” (Zagal and Torudo, 2014), and cultural neutrality translates as applying Western norms to design, like creating white male main characters (Mario or Link), proving the urgent need for diversity and inclusion.

These cultural differences are reinforced by our individual and unique personalities as they affect the way we behave in-game and we approach every aspect of game design (cf Bartle’s typology, 1996). By acknowledging and respecting cultural and individual differences, designers can create more inclusive and ethic-friendly games that would appeal to a wider audience. Not only will this approach contribute to a greater success of the game (as the connection between players and games is stronger and deeper) but it will also contribute to the promotion and sensibilization of cultural differences within the gaming industry.

2) Ethical Considerations in UX Design for Video Games

We have seen that implementing psychology principles into video games can be very challenging for developers. Apart from the challenges, some ethical considerations have to be taken into consideration.

In this section, we will cover the implementation of gambling mechanisms in free-to-play mobile games focusing on their ethical and psychological consequences. Free-to-play mobile games are games that can be played for free for a certain time. Afterwards, the player has to choose between two paths: the first one is to continue the game as it is, using only in-game currency; the second one is to make in-game purchases using real world currency to boost the player's progression within the game. This is called the "freemium model" (term coined by Jarid Lukin, former Marketing VP at Alacra), resulting from a contraction of "free" and "premium". At first, this model could be found in software or internet services, but it has become prevalent in the mobile gaming industry.

However, the in-game purchases using real-world money can be packs of in-game currency, or specific boosts related to the gameplay, but it can also be loot boxes, also known as gacha mechanisms (the term originates from Japan and is derived from the Japanese "gachapon" that refers to toy vending machines). These loot boxes are virtual containers (generally treasure chests) that contain random items or rewards. The scarcity of the reward is directly linked to the price of the chest. This is how gambling has made its way into the mobile gaming industry (Aagaard et al., 2022). The connections between gambling, psychology and technology are even stronger now that technology and access to the internet are present in every home "Technology is providing convenience gambling" (Griffiths et al., 2005).

As a consequence, similar behaviours as in traditional gambling can be found in free-to-play players "The present situation of stimulating gambling appears to be mirroring the previous initiations of other socially condoned but potentially addictive behaviours like drinking (alcohol) and smoking (nicotine)" (Griffiths et al., 2005). Because of loot boxes, some players become what is called "whales", "dolphins" or "minnows" (Moore, 1991). Moore has worked on consumer behaviour in front of a new market, and especially on how new technology has shifted how consumers behave. He stated "what defines a high-tech market is the tendency of its members to reference each other when making buying decisions, this is absolutely key to successful high-tech marketing" (Moore, 1991).

Then elaborating on that, Moore created three different categories of consumers: the minnows, the dolphins and the wales.

- The minnows are the smaller consumers that generate less revenue individually, but collectively can contribute to the success of the company.
- The dolphins are mid-sized consumers that are significant in the company's revenues, but not significant enough to invest in them.
- The whales are the largest consumers that spend a lot on the product and support the company's revenues, they are rare to attract but very important to retain.

In the context of free-to-play mobile games, a whale is a player that spends a significant amount of real-world money in in-game purchases, generally motivated by loot boxes. They are the financial support but represent less than 15% of the players (Lundy et al, 2024).

For a player, being a whale is being addicted, so we can discuss here all the psychological implications of an addiction. However, for a gaming studio these players are key to their business, so they want to attract them and could even motivate this type of behaviour. But this is ethically controversial: whales are psychologically fragile individuals. This behaviour could damage their health (physical and mental), deteriorate their real-life social relationships, and accumulate significant debts since they would be trapped in the vicious circle of addiction (Griffiths et al., 2005). Video games provide a space, at home, far from other human beings, where some people can feel at ease to start gambling, "This is particularly true for women who may feel uncomfortable going out on their own, unemployed people, and retired people." (Griffiths et al., 2005). We notice here that the people targeted are generally the ones that feel judged by society for every move they make, so they need some kind of safe space to engage in behaviours that society condemns. This can even lead to depression or worse, and at this point it is legitimate to question the consent of the player. Indeed, the act of buying another loot box can be the result of a conscious manipulation from gaming studios, by occasionally offering great and unique items to generate more revenue.

Now getting out of the dystopian point of view and comparing with offline gambling, some vulnerable individuals—such as children, teenagers, and gambling addicts— would not be allowed to play in the real world (in Las Vegas for instance). But so far, there is no restriction to online gambling. "These are all serious concerns that both regulatory authorities and Internet gambling service providers will have to take on board" (Griffiths et al., 2005).

Gaming developers can implement some tools to avoid this type of behaviour by using the same mechanisms as the ones for gambling or scratch card games (preventive and warning messages via targeted ads), or by blocking the player's accounts in case of excessive buying behaviour (as it is already the case on Steam to avoid scammers).

But it is very important to mention that up to this day, the whale monetization strategy is the most efficient for mobile games (Griffiths et al., 2005). So it seems an utopy to get rid of this revenue stream. Indeed, gaming studios remain normal companies with profitability objectives. If those objectives are not met, jobs are threatened, so it is all about balance and/or innovation to find more ethical monetization tools.

3) Future prospects and emerging trends

Given the evident risks associated with introducing cognitive and behavioural psychology principles into video game design, which may result in manipulation and exploitation of users, it is relevant to explore alternative perspectives for the evolution of video games.

Considering the current landscape in 2024, the integration of Artificial Intelligence (AI) emerges as a promising direction. The goal for every developer is "to find a balance in creating a game that is both immersive and enjoyable to play" (Fraser et al., 2018). Addressing the issue of improving the interaction with Non-Playable Characters (NPC), the focus has shifted towards making NPC dialogues less linear and awkward to maintain user immersion in the game (Fraser et al., 2018). Fraser et al. (2018) conducted research investigating the integration of the Alana Conversational AI (an advanced AI system designed to engage in natural language conversations with users by employing an emotional model analysis) to generate NPC dialogues. Their study aimed to assess how implementing a conversational AI system, relying on emotional analysis, affects player engagement compared to the emotional impact of traditional dialogue menus. Their findings demonstrated "that a spoken conversational interface augmented with emotional processing is more engaging (measured in terms of time spent talking with the NPC) for players than one without the emotional dialogue capabilities, while players found that the emotional speech dialogue interface was enjoyable to use" (Fraser et al., 2018). These findings are paving the way for a broader integration of AI systems, especially emotional processing ones, into video games' design to enhance player engagement (Fraser et al., 2018). As a consequence, these insights

are fostering limitless creative possibilities. Recently, Netflix's 2018 release, *Black Mirror: Bandersnatch*, embodies this trend through its interactive science-fiction movie. In this film, viewers dictate the protagonist's choices, leading to diverse outcomes and a personalised viewing experience. This paradigm shift suggests a potential future trajectory for video games, where AI-generated scenarios dynamically adapt based on players' decisions. This culminates in unique and tailored gaming experiences that are deeply influenced by individual psychology and cognitive processes.

Continuing with technological advancements, the emergence of Augmented Reality (AR) and Virtual Reality (VR) are reshaping the future of video games. Pallavicini et al. (2019) conducted research to investigate the emotional response of gamers in a virtual game compared to the one in a desktop game. They summed up their findings in one sentence: “Results showed that the video game experienced through virtual reality was associated with stronger emotional responses when compared to the video game played on the desktop display” (Pallavicini et al., 2019). Questions arise on the longevity of traditional gaming hardware: Will there still be consoles in a hundred years? Scenarios related to the Metaverse emerge: Will people live in it, making the virtual game their whole reality, as depicted in the 2018 science-fiction movie *Ready Player One* produced by Steven Spielberg? This prompts contemplation about the potential for virtual worlds to become integral aspects of individuals' realities. Within this context, the role of psychology in the development of Metaverse games becomes a pertinent consideration, raising inquiries about how psychological principles will shape immersive virtual experiences and influence users' interactions within these digital realities. As stated by Pallavicini et al., “Virtual reality video games represent one of the major novelties in the contemporary gaming world. At the same time, it still presents an open challenge for developers and game designers” (Pallavicini et al., 2019), so stakeholders of the video industry must work on immersion and emotion to remain competitive.

On the other hand, the dystopia can reveal elements related to an utopia. Psychology, when applied wisely and with nuance, holds the potential to create positive societal change. In 2015, the Me-too movement opened up a space for discussion about patriarchy and gender roles (Sweeny, 2020). In this context, the video games industry emerges to be at a crucial turning point, with discussions gravitating around the representation of women in video games (Boyle et al., 2010). For instance, consider the challenge of recalling the name of a female character who transcends the archetypes of princesses and who is not Lara Croft. Consider also the challenge of recalling the name of one that is the main character of the game (again, except

from Peach and Lara Croft). While these characters hold significance, diversifying representations is imperative. Boyle et al. (2010) have worked on this issue, highlighting that limited female representation perpetuates gender stereotypes and impedes women's engagement with gaming, resulting in an under-representation of women in technology-related careers. They stated “It is clear that males are more attracted to violent games than females are. Analyses of game content have shown that there are few female characters in computer games and that these characters have very restricted roles. This has raised concerns that playing these games will promote stereotyped attitudes to males and females and lead to problems with gender identity. The finding that playing action games facilitates visual perceptual skills has also raised concerns that in playing games, males are acquiring greater expertise in visual spatial skills than females at an early age, and this will have an enduring impact on disciplines selected at school and subsequently on the selection of more lucrative, technology-based careers.” (Boyle et al., 2010) This example displays the deep psychological impact of game design on players, proving the potential of video games to make the society more inclusive and equitable because of deliberate intervention within the game design.

Going even further on this theme, the focus of this master thesis can be reframed to acknowledge the reciprocal relationship between psychology and video games. While video games can benefit from the integration of psychology into their design, psychology can as well benefit from the integration of video games in its practices and methodologies (Boyle et al., 2010). By leveraging the interactive nature of video games, psychologists can innovate in their experiments to explore human behaviour and better understand the human brain. “It has also been suggested that as well as psychologists helping to study games, games provide a new tool or methodology for testing psychological theories. (…) It seems likely that games could also be used as a tool to test psychological theories in other areas such as perception and complex decision making.” (Boyle et al., 2010). This symbiotic relationship underscores the accuracy and pertinence for the two fields to work together, as this could result in significant advancements in both fields.

Conclusion

In conclusion, the exploration of psychological principles in the video game industry offers profound insights into improving user experience and achieving optimal engagement. Through in-depth analysis, it becomes clear that the integration of psychology into video

game design not only shapes user interactions, but also influences the cognitive, emotional and behavioural aspects of player experiences.

Moreover, the successful integration of psychological frameworks into game design is illustrated by notable games such as Fortnite, which integrates UX principles into its game development while understanding players' cognitive processes. Furthermore, the personalization of game experience through adaptive gameplay, customization and difficulty adjustments highlights the keys to achieving optimal engagement.

However, integrating psychological principles into video games also presents challenges, especially concerning ethics and user engagement. Balancing commercial goals with player well-being remains a critical issue. Ethical concerns arise from mechanisms like dark patterns and gambling elements, impacting mental health and gamers' behaviours. Despite these challenges, the emergence of technologies such as artificial intelligence and virtual reality offers opportunities to create more immersive games. Moreover, addressing societal issues such as gender representation in games highlights the potential of video games to bring positive change. Collaboration between psychology and game design offers innovative solutions to enhance the gamer experience and advance both fields.

III. Methodology

Part 1 : Introduction

We gathered valuable insights through our literature review on how games like Fortnite effectively use psychological principles to captivate players, for example by incorporating elements such as gameplay adaptation and personalization. This influences not only player interaction, but also their cognitive, emotional and behavioural experiences. However, even though these psychological principles seem promising in theory, it's important to test their real-world impact through practical study.

The main aim of our empirical research is to understand how the video games industry can use the principles of psychology to improve the UX of its products to reach optimal engagement. We seek to:

1. Identify the game design elements that captivate player attention.
2. Understand players' motivations and preferences.
3. Gather game designers' views on the application of these principles to game design.

To answer this research question, we decided to adopt a mixed-method approach, combining a quantitative questionnaire with qualitative interviews. Our goal is to gather insights from both the players and the professionals of the video games industry.

To guide our research, we decided to break our research question into two secondary research questions.

- Our qualitative study will try to answer the first one: what psychological principles can UX design leverage to enhance players' cognitive, behavioural, and emotional engagement?
- With the insights gathered from the quantitative study, we will approach the professionals with qualitative interviews. Our goal through that qualitative study will be to seek answers to the following research question: how can the video games industry implement the principles of psychology relative to cognitive, behavioural and emotional psychology, to improve the UX of its products to reach optimal engagement for the players?

The insights gathered from both studies and compared through a cross-sectional analysis will aim to answer the main research question, helping us understand how psychological principles can be applied in video game design to enhance the user experience.

Part 2 : Research methodology organisation

A. Quantitative study: Understanding players' expectations

Our study begins with a quantitative phase. The main objective is to collect numerical data on players' preferences and behaviour. Through a survey, we aim to identify :

- The design elements most appreciated by gamers.
- The types of in-game elements that keep them engaged.
- How they would like their gaming experience to be improved.

These quantitative results serve as a basis for guiding the rest of our study. They give us an overview of players' habits and preferences, which is essential for structuring the qualitative phase that follows.

B. Qualitative study: Exploring the practices of game designers

Based on the insights obtained during the quantitative phase, we are launching a series of qualitative interviews with game designers from various studios (ranging from small French studios to very large international studios). We prepared the questions for these interviews based on the data collected from the players during the quantitative phase. In this way, the qualitative phase is not simply a general exploration, but a targeted investigation of key questions from the quantitative analysis.

By aligning our qualitative questions with the specific preferences and behaviours highlighted by the players, we are able to:

- Discuss the strategies that game designers employ to meet players' expectations and desires.
- Explore the different motivations, rewards, and engagement methods used within video games.
- Gain insights into how game designers navigate the demands of players while also considering the broader challenges of the video game industry.

These qualitative interviews are essential for conducting our research. By directly linking the questions asked to the game designers to the responses from the quantitative phase, we are able to validate our results, and combine both the gamers‘ points of view and the designers’ expertise.

Part 3: Benefits of a mixed-method approach

We have chosen a mixed-method approach, combining quantitative and qualitative methods, for the following reasons.

- **Different data complement each other**

By combining quantitative and qualitative data, we ensure that each method enriches the other. Quantitative data gives us an overview, while qualitative interviews allow us to

understand the reasons behind the figures. For example, knowing that a design element is popular is important, but understanding why it is popular, through discussions with designers, adds essential depth.

- **Different data to compare and verify our results**

Using different methods to collect data is an excellent way of comparing and verifying our results. If the players indicate a preference for certain aspects in the surveys and the designers confirm the use of these aspects, this reinforces the credibility of our conclusions.

In conclusion, the mixed method is best suited to understanding the complex interactions between gamers and video games. It allows us to quantify players' preferences and also to understand the strategies used by game designers to meet these expectations. This approach enables us to formulate relevant recommendations for the video game industry.

IV. Understanding players's expectations: a quantitative approach

Part 1: Methodology

A. Introduction

a. Quantitative approach presentation

The initial step in our quantitative study was to define a clear and specific research question. Our primary objective was to understand "What psychological principles can UX design leverage to enhance players' cognitive, behavioural, and emotional engagement?" This research question guided the development of our survey and the formulation of the hypotheses we aimed to test.

To address this research question, we chose to use an online questionnaire created with Qualtrics software. We chose Qualtrics because of its ease of use and its ability to create detailed and adaptive questionnaires. The questionnaire was designed to collect data on gamers' playing habits, motivations and experiences. Questions included multiple choices,

like scales and open-ended responses, allowing detailed analysis of different aspects of the gaming experience.

b. Sample selection process

We included participants of all ages, based on the principle that video games are for everyone, and that each age group can provide valuable insights. To facilitate analysis, we segmented respondents into several age categories:

- Under 18 : Young gamers, still influenced by current trends and innovations, with a lot of free time
- 18-24 years old : Individuals who are either still in higher education or beginning their careers, with some free time.
- 25-35 years old : Individuals who are actively engaged in a job, with more disposable income but potentially limited free time
- 36-60 years old : Experienced gamers who have witnessed the evolution of video games, with limited free time
- Over 60 : Older gamers who have seen the entire development of video games, and who can provide insights into how gaming has evolved over decades.

We also divided participants by gender, in order to examine possible gender differences, while remaining inclusive. Four categories were proposed:

- Male
- Female
- Non-binary
- Prefer not to answer

In addition, we collected information on participants' nationalities and occupations, to check geographical trends and determine whether the results can be generalised to an international level.

B. Data analysis

a. Analysis tools and techniques

To address our research question, "What psychological principles can UX design leverage to enhance players' cognitive, behavioural, and emotional engagement?", and to validate our hypotheses, we will employ a two-step analytical approach: descriptive statistics followed by hypothesis testing. Here is how we will conduct the analysis:

- Descriptive statistics: This step will provide an initial overview of our sample. We will examine player demographics, gaming habits, platform preferences, and favourite games to gain a foundational understanding of our participants.
- Hypothesis testing: Following the descriptive analysis, we will conduct hypothesis testing to evaluate the validity of our research findings on player experiences.

To answer our research question, we developed six hypotheses. These hypotheses were designed based on insights from our literature review.

First, the literature review highlights the importance of adapting games to different types of player. Indeed, Bartle's typology of players, which classifies players according to their motivations and playing styles, has highlighted this. Given these diverse motivations, it is essential to offer in-game rewards that are tailored to each type of player. Based on this understanding, we have formulated three hypotheses:

Hypothesis 1: Different types of gamers will have distinct motivations and preferences.

Hypothesis 2: Offering varied types of rewards in a game will enhance player engagement.

Hypothesis 3: Casual gamers and hardcore gamers will not experience immersion through the same elements.

In addition, the literature highlights that managing players' emotions is crucial to avoid negative experiences that can reduce engagement, whatever the game category. To maximise satisfaction and maintain long-term interest, it is important to offer personalised experiences and introduce innovative game mechanisms that keep players engaged, hence our three other hypotheses:

Hypothesis 4: Gaming triggers specific emotions independently of the game category.

Hypothesis 5: Personalising the gaming experience contributes to greater player satisfaction.

Hypothesis 6: Games that offer new gameplay mechanisms are more likely to hold players' attention over the long term.

b. Data collection process

We structured our questionnaire into twenty questions, divided into four sections:

- The first section is personal information. It includes four questions to collect demographic data about the participants (age, gender, occupation, nationality).
- The second section focuses on gaming habits. It has five questions that explore gaming habits, such as session frequency, devices used, and favourite games.
- The third section covers player motivation. This part consists of six questions that evaluate the elements of a game that motivate players, including gameplay mechanics, design, and in-game rewards.
- The final section is video game appreciation, which contains eight questions focused on overall game enjoyment, reasons for quitting a game, and emotions felt after a gaming session.

This structure allows us to analyse how different aspects of game design influence player experience, directly relating to our research hypotheses. Each section of our questionnaire is essential for analysing our hypotheses. The personal information and gaming habits sections allow us to categorise participants, distinguishing between player types like casual versus hardcore gamers, and understanding their gaming preferences. In addition, the motivation and video game appreciation sections gather insights on players' motivations and overall satisfaction with games.

The complete questionnaire is available in the *Appendix 1* and takes approximately 5 to 15 minutes to complete.

Finally, the questionnaire was administered from May 22 to May 28, distributed through various social media channels to reach a diverse player base.

Part 2: Results and analysis

A. Presenting results: data description

a. Sample characteristics

With 119 respondents, the sample of our study consists predominantly of young adults, with 99% of respondents aged between 18 and 35, and 81% within the 18-24 age bracket. The sample is also male dominant, with 75% of participants identifying as male. In terms of nationality, a significant majority (87%) of respondents are French, while 8% come from other European countries, and 5% represent a diverse range of countries including Morocco, Chile, Indonesia, and Thailand. Regarding occupation, 62% of the participants are students, and approximately 10% of them are professionals in IT and digital fields (engineers, IT consultants, data analysts, computer scientists, product managers). Other occupations are also represented (restaurant owners, bakers, nurses, etc.).

To sum up, the typical profile of our sample is a young adult male, aged between 18 and 24 years old, mostly French, and most likely to be a student. If he has a job, it's likely that he works in the digital sector.
To get an overview of the demographic details, see *Appendix 2.*

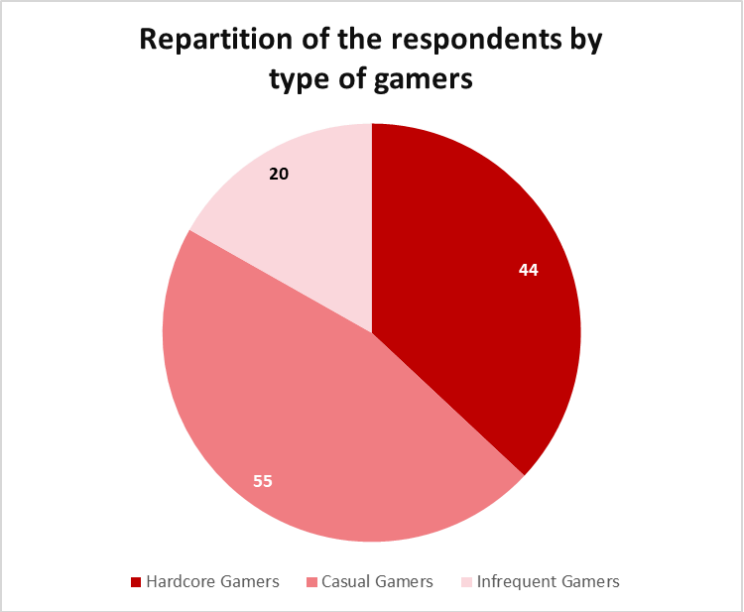
b. Descriptive statistics

- **Frequency and duration of gaming sessions**

Among the 119 participants, 83% engage in gaming at least once a week. Notably, 58% of these participants play more than three times a week.

We define hardcore gamers as those who play “more than 3 times” or “twice a week” or “three times a week” AND “More than 4 hours” or “2-4 hours”. Casual gamers are defined as those who are playing “twice a week”,“once a week”, “more than 3 times”, “three times a week” AND “1-2 hours” or “less than one hour”.

Figure 4.1 : Repartition of the respondents by type of gamers



Based on this segmentation of the sample, there are **44 hardcore gamers** and **55 casual gamers.** Participants who game less than once a week are categorised as **infrequent gamers** (20 individuals). This group has a very low level of engagement and is not considered relevant for detailed analysis in our study.

- **Platform preferences**

Women prefer playing on consoles (43%), with a significant share of them playing on mobile devices (36%) and fewer using PCs (31%). In contrast, men show a strong preference for PCs (52%), with fewer opting for consoles (26%) or mobile devices (22%).

A significant finding is that the majority of hardcore gamers prefer playing on PCs, which may indicate a preference for games with complex mechanics.

- **Favourite games:**

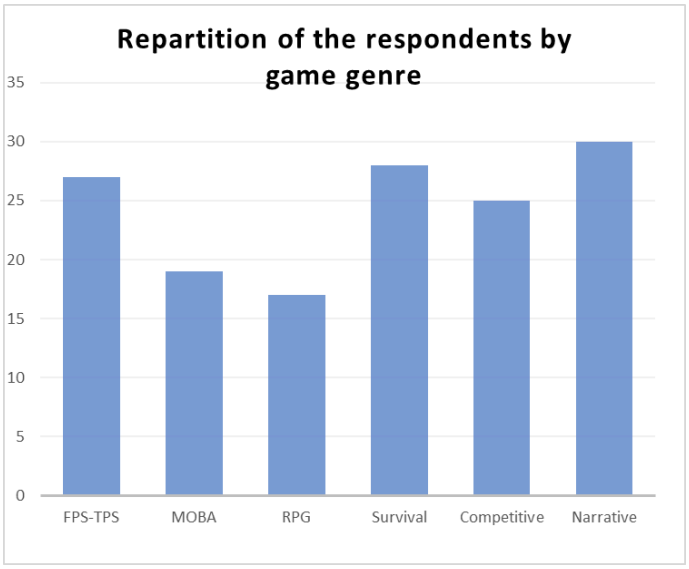
Popular games among participants include League of Legends, Minecraft, Zelda, Mario Kart, Valorant, Assassin's Creed, Pokémon, Fortnite, and Rocket League.

Participants' preferred games enabled us to classify them into different categories:

- FPS-TPS: First-person and third-person shooter games where players focus on combat.

- MOBA: Multiplayer online battle arena games where teams compete to control territory and destroy the enemy's base.
- RPG: Role-playing games where players assume the roles of characters, and complete quests.
- Survival: Games where players must survive in hostile environments.
- Competitive: Games focused on player-versus-player competition, often with tournaments and rankings
- Narrative: Games that emphasise story, where the player's choices influence the plot's progression

Figure 4.2 : Repartition of the respondents by game genre



The distribution of favourite games by genre is as follows:

- **FPS-TPS:** 27 responses (e.g., Red Dead Redemption, Fortnite, Destiny, Valorant, Apex, GTA)
- **MOBA:** 19 responses (e.g., League of Legends, Dota 1, Smite)
- **RPG:** 17 responses (e.g., The Witcher 3, Pokémon, Skyrim)
- **Survival:** 28 responses (e.g., Minecraft)
- **Competitive:** 25 responses (e.g., Mario Kart, Overwatch, Counter-Strike, Rocket League)
- **Narrative:** 30 responses (e.g., The Legend of Zelda, The Last of Us, Assassin’s Creed, Animal Crossing)

B. Data analysis

To explore how psychological principles can be leveraged in UX design to enhance players' cognitive, behavioural, and emotional engagement, we had previously formulated six hypotheses. We will now analyse each of these hypotheses based on the data collected to determine their validity and relevance.

a. Hypothesis 1: Different types of gamers will have distinct motivations and preferences.

To test this hypothesis, we surveyed players to determine what motivates them to keep playing a game. They were asked to rank six key elements that we identified through our literature review:

- Exploring and discovering the game's world
- Game design
- Challenges and rewards
- Narrative and storyline
- New gameplay mechanics
- Customization of the interface

Here are the study results:
Casual gamers prioritise Exploring and discovering the game's world (1st), followed by Game design (2nd), Challenges and rewards (3rd), and Narrative and storyline (4th). These preferences highlight their desire for immersive and engaging experiences.

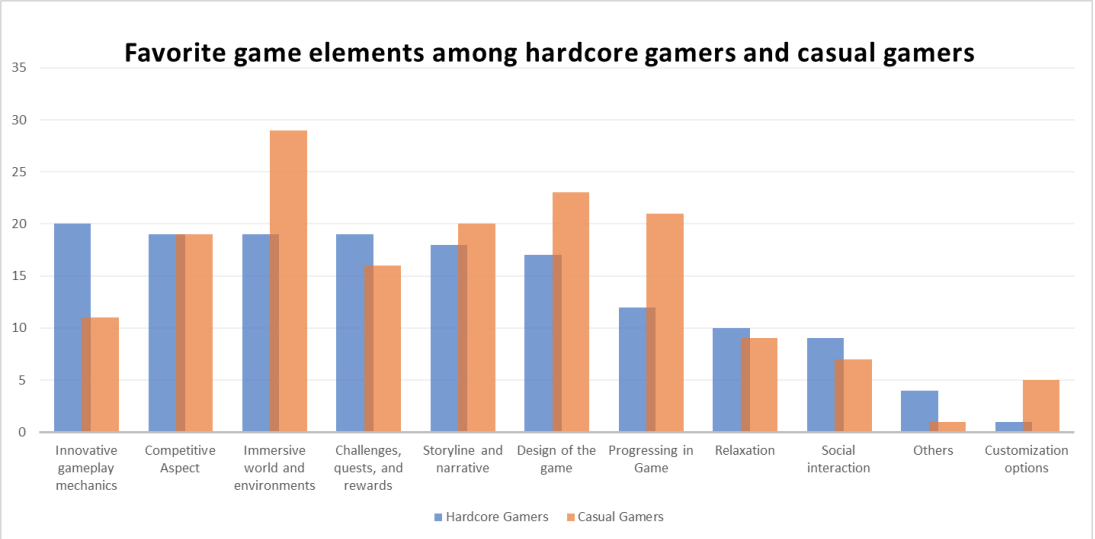
Hardcore gamers, on the other hand, value Game design (1st) the most, followed by Exploring and discovering the game's world (2nd), and New gameplay mechanics (3rd). This indicates that they are driven by the complexity, innovation, and strategic depth of the games.

For more details on the results of the question "What makes you want to keep playing a video game?", see *Appendix 3*.

Additionally, in response to the question "What do you like in your favourite game?", casual gamers favoured Immersive world and environment, game design, and progressing the game, while hardcore gamers preferred innovative gameplay mechanics, competitive aspects, immersive world and environments, and challenges and rewards. This confirms that casual

and hardcore gamers do not always share the same preferences and therefore do not have the same motivations for playing. See *Figure 4.3* for a detailed comparison.

Figure 4.3 : Favourite game elements among hardcore gamers and casual gamers



If we delve deeper into the literature review, Bartle's typology suggests that each player belongs to a specific type. Based on our results, casual gamers could be seen as Explorers, who enjoy discovering the game world, or Achievers, who like to progress in the game. Hardcore gamers, on the other hand, might be classified as Achievers, who focus on mastering game mechanics and earning rewards, Killers, who are driven by competition, or Socializers who build strong connections within dedicated gaming communities.

However, even within these groups, there can be a diverse range of profiles. For example, not all casual gamers are purely Explorers or Socializers, and not all hardcore gamers are Achievers or Killers.

In conclusion, these findings validate Hypothesis 1 by confirming that casual and hardcore gamers have different motivations for playing. The distinct personas that emerge from our results highlight the complexity and diversity within each group. It highlights the importance of considering different player types with the creation of personas when developing a game.

b. *Hypothesis 2 : Offering varied types of rewards in a game will enhance player engagement.*

To test the hypothesis that different types of rewards in a game will improve player motivation, we focused on the question: *What types of in-game rewards do gamers find most motivating?*

Respondents had to choose between the following reward types:

- Tangible rewards (e.g., in-game currency, items)
- Progression rewards (e.g., levelling up, unlocking new abilities)
- Social rewards (e.g., recognition from peers, leaderboard ranking)
- Narrative rewards (e.g., story advancement, lore discovery)
- Other: (write-in)

These categories were defined based on our understanding of the literature review about how different rewards impact player engagement. Tangible rewards offer in-game material benefits, such as currency or special items that enhance the player's experience. Progress rewards reflect the player's advancement and growth, such as levelling up or unlocking new abilities. Social rewards offer recognition and interaction with other players, while narrative rewards enrich the game's story and environment.

We have separated the results for casual gamers and hardcore gamers to get a clear idea of which type of reward motivates them most.

Table 4.1: Most motivating types of in-game rewards for gamers

Type of gamers	**Progression rewards**	**Narrative rewards**	**Social rewards**	**Tangible rewards**	**Others**
Casual gamers	47%	25%	16%	11%	0%
Hardcore gamers	41%	16%	23%	18%	2%

If we look at the results, 47% of casual gamers are primarily motivated by progression rewards. Progression rewards mark achievements in the game and play an important part in giving players a sense of accomplishment. Additionally, 25% of casual gamers value narrative rewards, which enhance the storytelling aspect of the game. Social and tangible rewards are slightly less motivating for casual gamers. Social rewards, which encourage interaction within

the gaming community, motivate 16% of casual gamers. 11% are attracted by tangible rewards, such as items or virtual currency that can be used in-game.

Hardcore gamers also prioritise progression rewards, with 41% of them citing them as the most motivating. However, 23% of hardcore gamers are particularly motivated by social rewards, which reflect their engagement in competitive aspects of the game. Tangible rewards are also more significant for this category of players, accounting for 18% of their motivation. Finally, narrative rewards, although less influential, still motivate 16% of hardcore gamers.

The results highlight that progression rewards are the most effective in boosting player motivation across both groups, surpassing narrative rewards for casual gamers and social rewards for hardcore gamers. This emphasises the importance of incorporating progression rewards to enhance engagement. However, offering a variety of reward types in the same game is still essential to meet the diverse preferences of different player types. Based on these findings, we can now say that Hypothesis 2 is validated.

c. Hypothesis 3 : Casual gamers and hardcore gamers will not experience immersion through the same elements.

To validate the hypothesis that casual and hardcore gamers are not immersed by the same elements, we asked both groups to identify what makes them feel most immersed in a video game by selecting two options from the following:

- Sound & music
- Beautiful design
- Emotions triggered
- Storyline
- Technical innovation (new dynamics, mechanisms, etc.)
- Mastering a game

We chose these elements because they represent a range of factors that could influence immersion, from emotional and aesthetic aspects to technical and gameplay achievements. This approach helps us to understand which elements are most appealing to each type of player.

Table 4.2: Factors contributing to player immersion in video games

Type of gamers	Sound & music	Beautiful design	Emotions triggered	Mastering a game	Storyline	Technical innovation
Casual gamers	23%	21%	18%	16%	15%	4%
Hardcore gamers	23%	19%	22%	15%	13%	6%

For instance, if we look at the results, we see that both groups attach almost equal importance to aspects such as sound and music (23% for both) and visual design (21% for casual gamers, 19% for hardcore). Even the importance of emotions triggered is close, with 18% for casual gamers and 22% for hardcore gamers. Differences in the importance attached to the storyline (15% of casuals vs. 13% of hardcore) and mastery of the game (16% of casuals vs. 15% of hardcore) are minimal.

These results show that the essential elements for immersing a player in a game are appreciated in the same way, whether they are casual or hardcore gamers. Whether a gamer plays casually or devotes a lot of time to a game, sensory experiences such as sound, music and visuals remain crucial for immersing the player in the game world. The emotional impact of a game, often linked to these sensory elements, also plays a similar role for both groups.

In conclusion, the data does not validate the hypothesis that casual and hardcore gamers differ significantly in what immerses them in a game. Whether you are a casual gamer or a hardcore gamer, it's the same sensory and aesthetic aspects that immerse you in the game world. To gain a deeper understanding, it will be important to verify during our qualitative interviews what game designers think about immersive elements in games.

d. Hypothesis 4 : Gaming triggers specific emotions independently of the game category.

To validate the hypothesis that **gaming triggers specific emotions independently of the game category**, we asked participants, "After a gaming session, how do you feel?" The response options were:

- Happy

- Excited
- Frustrated
- Angry
- Satisfied
- Anxious
- Sad
- Tired

Participants reported their emotional reactions after playing different types of games. The results are available in *Appendix 4*.
Here's a detailed analysis:

1. **FPS-TPS (First-Person and Third-Person Shooters):**

FPS-TPS games are shooter games that focus on combat from different perspectives: through the eyes of the character (FPS) versus from behind or above the character (TPS).
The main emotions for FPS-TPS games are satisfaction (reported by 43% of players) and happiness (reported by 25% of them). These games often provide a sense of achievement and success, which contributes to a high level of satisfaction. However, a notable percentage of gamers report feeling tired (reported by 14% of gamers) and excited (for 7% of them). This indicates that the intensity and pace of these games can be both exhausting and overwhelming. In our results, the presence of anger (for 4% of the players) and frustration (for 4% of them) suggests that the competitive aspects of FPS-TPS games can lead to negative emotional reactions.

2. **RPG (Role-Playing Games):**

RPGs are role-playing games where players take on the roles of characters and embark on quests to achieve various goals.
RPG gamers generally experience satisfaction (reported by 41% of players) and tiredness (reported by 24% of them). The immersive and often lengthy nature of RPGs can lead to fatigue. However, players also report feelings of happiness (reported by 18% of players) as they complete quests and develop their characters. Excitement (reported by 12% of them) is less frequent but still notable. It reflects the pleasure of captivating stories and successful gameplays.

3. **MOBA (Multiplayer Online Battle Arena):**

MOBA games are described as multiplayer online battles where teams compete to control territory and destroy their enemy's bases.

For MOBA games, the most frequent emotion is satisfaction (reported by 43% of players). This is linked to the fact that players feel rewarded when they achieve their objectives and win battles. Excitement (for 19% of them) is also an important emotional reaction, and indicates the high stakes of MOBAs. However, a considerable percentage of players feel tired (for 14% of the players) after intense matches, and a small group feel frustrated (reported by 5% of them), probably due to the competitive and sometimes volatile nature of these games.

4. **Competitive games**

Competitive games are focusing on player-versus-player action, with a strong emphasis on tournaments and the importance of being the best on rankings.

Competitive games generate a strong sense of satisfaction (reported by 42% of players) and happiness (reported by 23% of them), as people enjoy the competition. Excitement (for 19% pf players) is also a major emotion, reflecting the often high-pressure environment of competitive games. The lower percentages of tiredness (for 4% of players) and frustration (for 4% of them) suggest that, although these games can be challenging, they provide above all positive emotional outcomes.

5. **Survival games**

When talking about survival games, they involve players trying to stay alive and survive in hostile environments.

Survival games generate high levels of satisfaction (reported by 48% of players) and happiness (reported by 24% of them), probably due to the rewarding experience of overcoming survival challenges. Excitement (for 7% of players) and tiredness (for 7% of them) are less frequent but still present, indicating that gaming can be both exciting and demanding. The low percentage of players feeling anxious (reported by 3% of them) suggests that survival games can induce stress.

6. **Narrative games**

Finally, narrative games emphasise story, where the player's choices influence the plot's progression.

In narrative games, players mainly feel satisfaction (reported by 39% of them) and happiness (for 35% of them). This is linked to the captivating and emotional stories that these games offer. Fatigue (reported by 10% of the players) is also reported, probably due to the sometimes lengthy immersive narrative experiences. Excitement (for 3% of the players) and frustration (for 3% of them) were less frequent, indicating that these games generally offer a more stable and positive emotional experience.
The results reveal that while common emotions such as satisfaction and happiness are prevalent across all game genres, each game type triggers specific emotional responses. FPS-TPS games can lead to frustration and anger, RPGs to fatigue, MOBAs to frustration and exhaustion, competitive games to excitement and satisfaction, survival games to anxiety and narrative games to constant satisfaction and happiness.

Given that Hypothesis 4 states that gaming triggers specific emotions independently of the game category, these findings suggest that the hypothesis is not validated. The emotional responses observed are closely linked to the type of game played, indicating that the impact of gaming is dependent on the genre rather than being independent of it. This insight underscores the need for game designers to consider genre-specific emotional effects in their designs. Therefore, it will be valuable to explore in our qualitative study how game designers approach the management of these specific emotions and incorporate it into their game development processes.

e. Hypothesis 5 : Personalising the gaming experience contributes to greater player satisfaction.

Hypothesis 5 suggests that personalising the game experience contributes to greater player satisfaction. While the literature review indicates that various aspects of personalization—such as tailoring game performance, adapting the game to players' preferences, or creating a character with psychological traits similar to the player—can enhance satisfaction, the results present a more complex reality.

To begin our analysis, we focused on several key factors that might influence a player's desire to continue playing a game. Participants were asked to rank, on a scale of 1 to 6, what motivates them to keep playing. The factors considered were:

- Design

- Exploring & discovering the game's environment
- New gameplay mechanics
- Narrative & storyline & challenges
- Customization of the interface
- Challenges & Rewards

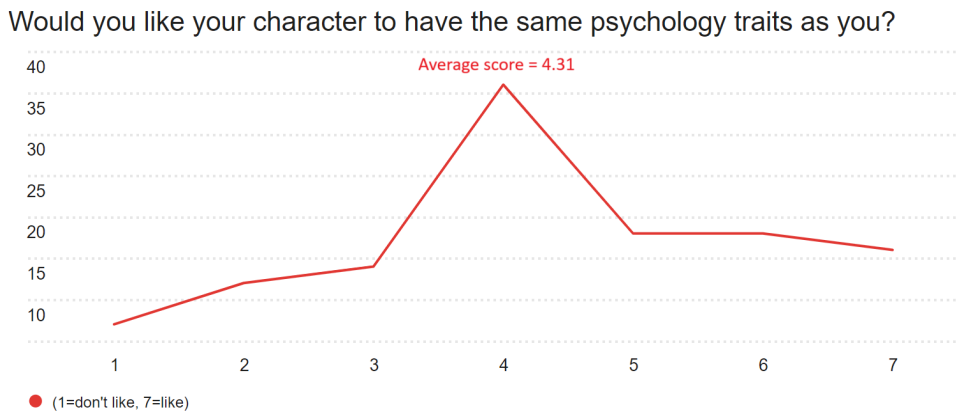
Table 4.3: Elements that motivate gamers to keep playing a video game (1=strong influence on your decision, 7=low influence on your decision)

Rank	Element	Average score
1	Game design	2.79
2	Exploring & discovering the game's world	2.6
3	New gameplay mechanics	3.76
4	Narrative & storyline	3.27
5	Challenges & rewards	3.32
6	Customization of the interface	5.27

It was observed that **interface customization** is perceived as the least important factor out of the six categories. With an average ranking of **5.27 out of 6**, interface customization comes in last, behind **Game design (1st)**, **Exploring & discovering the game's world (2nd)**, **New gameplay mechanics (3rd)**, **Narrative & storyline (4th)**, and **Challenges & rewards (5th)**. This suggests that interface customization does not play a major role in player satisfaction.

To continue our analysis of the impact of personalization in video games, we examined how players respond to the idea of customising their in-game characters' personality traits. We asked participants, "On a scale of 1 to 7, how much would you like your character in-game to have the same personality traits as you?"

Figure 4.4: Would you like your character to have the same psychology traits as you? (1=don't like, 7=like)



The results revealed mixed interest, with an average score of **4.31 out of 7**. Approximately **61%** of respondents expressed a desire for their in-game character to have personality traits similar to their own, while **39%** did not share this preference. This indicates that players are not unanimously in favour of having a character share their psychological traits. It is weakening the idea that personalising personality traits significantly contributes to overall player satisfaction.

Thus, hypothesis 5 does not appear to be fully supported by the results. It seems that personalization is not a determining factor for the majority of players. Therefore, it will be relevant to explore this issue further in our qualitative study by asking game designers about the importance of character personalization and its impact on player satisfaction. Moreover, we plan to investigate other personalised elements, such as level design or dynamic difficulty adjustment (DDA) systems, which may have a more significant impact on player satisfaction by adapting and personalising the experience for each individual.

f. Hypothesis 6 : Games that offer new gameplay mechanisms are more likely to hold players' attention over the long term.

To validate the hypothesis that games with new gameplay mechanisms are more likely to hold players' attention over the long term, we analysed several key variables from our survey.

We began by examining the responses to the opening questions:

- "If you could improve your favourite game, what changes would you make?"
- "Describe the game of your dreams."

The results are available in *Appendix 5 and 6.*

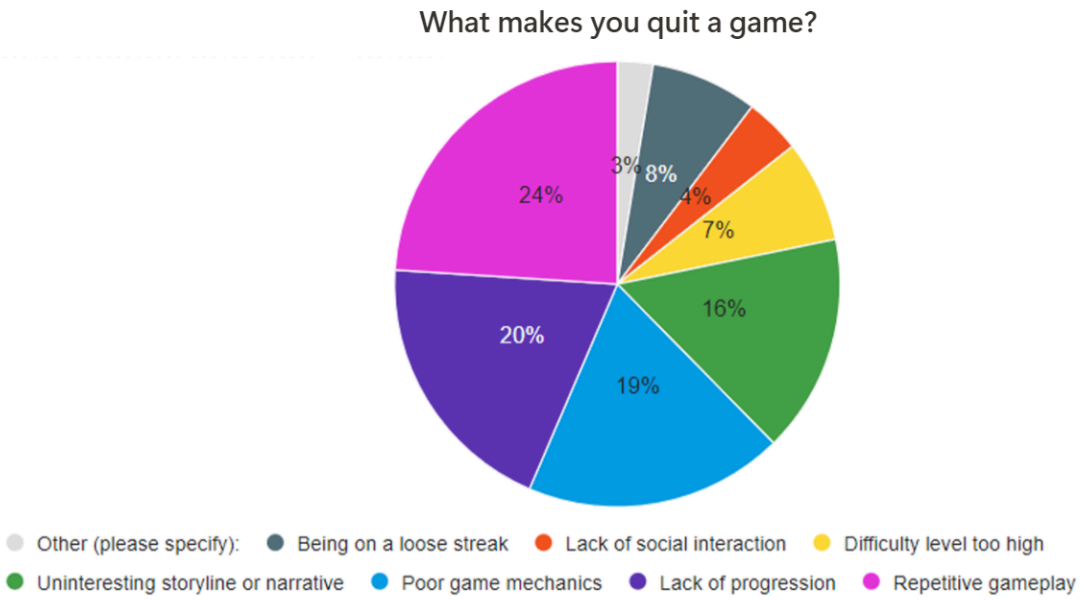
When gathering these responses, the terms "gameplay" and "mechanics" frequently appeared. A deeper look at these answers revealed a strong demand for new gameplay mechanisms and creative game designs. Players have consistently expressed a desire for unique and original experiences that stand out from the existing market. This suggests that games introducing new gameplay mechanics are more likely to engage and retain players over the long term. Other frequently mentioned terms include "story," "storyline," "community," "world," "character," "multiplayer,". Many of these terms connect directly to immersion, as players seek more engaging storylines and more immersive worlds. This demonstrates a strong desire among gamers to feel more immersed in their gaming experiences.

We also asked participants to select the two main factors that make them quit a game from the following options:

- Repetitive gameplay or tasks
- Lack of progression or sense of achievement
- Poor game mechanics or controls
- Uninteresting storyline or narrative
- Difficulty level too high
- Lack of social interaction or community engagement
- Losing streak
- Other (please specify): _____

This question helps us to identify the main reasons why gamers quit games and gives us valuable insights into areas for improvement in game design.

Figure 4.5 : What makes you quit a game?



The findings show that 24% of players quit a game due to repetitive gameplay, 20% due to a lack of progression, and 19% because of poor game mechanics. 14% of players are deterred by an uninteresting storyline or narrative, 8% quit due to a losing streak, 7% find the difficulty level too high, and 4% are put off by a lack of social interaction. These results strongly support the hypothesis. The fact that nearly a quarter of players quit due to repetitive gameplay and another 19% due to poor game mechanics highlights the importance of innovation in gameplay for player retention. Gamers are clearly looking for variety and creativity in their gaming experiences, and when these elements are absent, their engagement decreases. The hypothesis that games with new gameplay mechanisms are more likely to hold players' attention over the long term is validated.

Part 3: Additional insights and conclusion

The survey also uncovered other player desires. Many players expressed the need for developers to listen more to the community and incorporate their feedback. Responding to player feedback is essential in UX Design because it can lead to continuous improvements of the video game and the introduction of new innovative features, which increases player engagement. Additionally, players are calling for greater transparency and fairness in the financial aspects of games, and are asking for trust in game designers. A strong relationship of

trust, coupled with ongoing innovation in game mechanics, seems to be key to sustain long-term player interest.

However, these findings are based on player feedback and need to be complemented by insights from game designers. We will explore these topics further in the qualitative section of our study.

In conclusion, conducting qualitative interviews with game designers is essential to understand how the psychological principles identified can be applied to optimise player engagement in video game UX design. These interviews will explore the challenges of innovating gameplay mechanics, personalising experiences, and immersing players, while also considering practical constraints like feasibility and financial equity in game development. The goal is to uncover how to better meet gamers' expectations and enhance the overall gaming experience.

V. Exploring the practices of game designers: a qualitative approach

Part 1: Methodology

A. Introduction

a. Qualitative approach presentation

Our quantitative research provided us with valuable insights into gamers' psychology, motivations, habits and expectations. Given the results and conclusions drawn from this quantitative research, we consequently decided to compare these expectations with the professional realities of the video game industry. By contrasting the gamers' approach with industry practices, we hoped to uncover areas of convergence and divergence.

b. Collecting data: sample description, interviews process and interview guides

As part of our research, we conducted six one-on-one interviews with professionals from the video games industry, adopting a semi-structured approach. Each interview lasted

approximately one hour and was conducted online due to geographical and practical considerations. Every interview was voice-recorded and then transcribed to ensure accuracy and reliability (*see appendix 8 for the full transcripts*). To minimise personal biases, both of us were present for each interview. One of us took the primary role of conducting the interview, asking the questions from the protocol and guiding the conversation, while the other provided support, by taking notes and ensuring all the key points were addressed. It is important to note that due to scheduling conflicts, only one of us was able to be present with respondent 6. Despite this constraint, we took care to stick to our established protocol and to collect the data consistently.

We selected professionals who are deeply involved in the design of video games.

- Two UX Designers from Ubisoft (T.S and A.A), who provided insights in user experience within a major studio.
- One UX/UI Designer from Sloclap (E.C), who is also a teacher of UX Design, they bring focus on user experience in a smaller studio as well as their expertise as a teacher.
- One Level Designer from Ubisoft (J.DF), whose expertise resides in creating and managing levels and their difficulty.
- One Game Designer and QA Tester specialising in VR games from Albyon (R.D), who brought a different vision of design to the table, given their expertise in VR.
- One Associate Producer from a big studio operating abroad (A.J), who works closely with UX/UI Designers and has a background as a Project Manager, offering a broader comprehension on the relationship between project management and product design.

This diversity allowed us to identify issues, challenges and perspectives specific to each role, enhancing the depth of our findings with valuable insights into our research question: How can the video games industry implement the principles of psychology relative to cognitive, behavioural and emotional psychology, to improve the UX of its products to reach optimal engagement for the players?

We developed a 15-question protocol designed to cover the various roles, studios and professional backgrounds of the respondents we aimed to reach (*see appendix 7 for the full protocol*). This protocol was designed to address a wide range of topics determined by the hypotheses and conclusions of our quantitative research: players' motivation and preferences;

managing players' engagement, experience and satisfaction; immersion, design and emotions; improvement and community. We then adapted this protocol into a 10-question version by selecting only the most relevant question for each interviewee. The next step of the process was the translation of the questionnaire into French, as our interviews were conducted in that language.

B. Data analysis: Coding the data collected in the interviews

We recorded and transcribed every interview (*see Appendix 8 for the transcripts*), to complement the detailed notes we took during each interview. The transcripts, along with the original notes, were used as a reference for coding the data.

To code our data, we designed a detailed rainbow spreadsheet (*see Appendix 9*) providing a quick and comprehensive visual overview of the similarities and differences among the answers of our six interviewees. Then, we conducted an in-depth thematic and manifest content analysis (*see Appendix 10*) to make sure we captured every valuable insight provided by our interviewees. This process implies categorising the answers into thematic clusters and analysing both explicit and implicit content. This rigorous approach was crucial for drawing meaningful conclusions and addressing our research question effectively.

Part 2: Results and analysis

A. Presenting results: data description

As a reminder, the research question guiding this study is: How can the video games industry implement the principles of psychology relative to cognitive, behavioural and emotional psychology, to improve the UX of its products to reach optimal engagement for the players?

More specifically, we aim at exploring the possibilities, intentions and constraints of the video games industry and compare them with players' expectations (based on the analysis and conclusions of our quantitative study). Our objective is to discuss the existence, or not, of a potential method, process, or action to make these two perspectives converge, ultimately reaching a consensus on whether integrating the principles of psychology in the UX Design of video games is the most effective strategy to reach optimal engagement for the players.

Our results will be presented thematically; through an in-depth exploration of our main themes: demographics, motivation and preferences; players engagement, experience and satisfaction; immersion, design and emotions; improvement and community. We will then discuss additional findings and various factors that might influence the results.

N.B: to preserve the anonymity of our respondents, we will use the pronoun “they” when referring to them. All the quotes are translated from French. Also, all the SEQs mentioned below are evaluated on a scale of seven, one being the lowest (negative) and seven the highest (positive).

B. Thematic presentation of the results

a. Demographics, motivation and preferences

i. General presentation of the theme

Literature explained that players can be grouped into four personas, according to their habits, preferences and playstyle (cf literature review II.1). We have also discovered that research around motivation was one of the most broadly applied in video games. As shown in the first chapter of our literature review, motivation is closely tied to one’s desires and needs, so it seems accurate to discuss the implications of motivation in regard to the demographics and the preferences of the players.

ii. Respondents’ opinion: convergence and divergence

In terms of demographics, our respondents confirmed our results from the quantitative study: every game has its players. Yet, to make sure they create a game that would meet their target expectations, five of our respondents (J.DF, A.J, E.C, T.S and A.A) mentioned using personas in their professional life. Creating personas is a well-known tool of the UX Design processes, it helps personalise the end user and reminds everyone involved in the process of the stakes and opportunities of creating value for the target. As T.S stated “And the reality is that you can’t target everyone”, so the game designers and creators have to go through some choices to create value for the selected target.

Knowing the players and having pictured them with personas, we dug deeper into their motivations. Our quantitative study revealed that different types of players will have radically different motivations to play a game, how does the industry deal with these different

motivations? Overall, our respondents confirmed that the main motivation depends on the type of player, the website Quantic Foundry was quoted as a reference by different respondents (T.S and E.C) for its work on gamers motivation. Motivation depends also on the type of games you are working on; A.J mentioned the existence of "a kind of a video games grammar", they explained that every type of games have requirements to fulfil to meet players' expectations providing examples "In FPS in general there will be a notion of precision and […] constant movement. If you got into a strategy game, you're going to have more of a notion of what I'm doing, intelligent choices". In an opposite point of view, R.D stated that the main motivation for a gamer to play is to fight boredom, regardless of the player's type, they also added that the needs for reward and satisfaction could be seen as secondary motivations.

As mentioned by R.D and expressed by our players pool, rewards play a crucial role as a secondary motivation. In our quantitative study, we asked the players which type of reward motivates them the most. We adapted this question by asking our professional respondents which type of reward is the most efficient. We asked this question to A.J, T.S and R.D, consequently having the perspective of professionals from big and small studios, as well as from French and overseas studios. Interestingly, R.D was the only one to spontaneously mention the four existing categories of rewards: narrative, social, progression and tangible. T.S (from a big french studio) mentioned three of them, not talking about the social reward, probably because their project is not concerned. Finally A.J mentioned only progression and tangible rewards, which is understandable considering they are working on a mobile game, where social and narrative rewards are more rarely encountered. Our pool of players ranked the importance of rewards as follows: progression, narrative, social, tangible (N.B: when segmenting to casual gamers, the ranking remains the same, whereas hardcore gamers ranked as follows: progression, social, tangible, narrative). Analysing the SEQ related to this section, our professionals ranked the rewards as follows: social, progression, tangible and narrative. Interestingly, our three professionals provided us a ranking very close to the one of hardcore gamers, but all of them stated their target as casual/hyper casual gamers. Two explanations can come to mind: the first one being on the professional side. Maybe the efforts are unconsciously driven by hardcore gamers' feelings. It proves the existence of some personal biases that can interfere with the designer role. To reduce these biases, spending more time on creating accurate personas to better understand the target's needs could be explored. The second explanation is on the players side, casual gamers are not the most familiar with video

games, maybe they think something is motivating them, whereas something else is actually their main trigger.

Now focusing on A.J's answer, they are the only one with professional experience in creating mobile games. When they worked on 94% (a famous mobile game where players had to guess the most popular answers to a variety of questions and scenarios), they had to manage monetization at the same time as rewards. They explained that the balance is difficult to find in F2P (free to play) games. They leveraged different mechanics: premium version, advertisements and surveys. The first one belongs to direct monetization processes: the player pays and unlock some content (in 94%, A.J noted "The people who had the premium were playing another game"). The other ones belong to indirect monetization, because the rewards were in-game currency. In 94%, this currency could be used to have some clues to prevent the player from getting stuck too long on the same level. The objective is to leverage different monetization techniques to generate a controlled level of frustration.

b. Players engagement, experience and satisfaction

i. General presentation of the theme

Our research question specifically focuses on reaching optimal engagement for the players. In our quantitative study, we aimed at uncovering what keeps players motivated into playing. Gathering those insights, we decided to address this topic with professionals along with derived themes like players' experience and their satisfaction.

ii. Respondents' opinion: convergence and divergence

To measure players' engagement, all of our six professionals highlighted the importance of retention, this is the KPI they analyse the most. However, all of our professionals stated that they are not analysing data, this is done by another team. This process seems to be the same in every studio, regardless of the size and scale. But "retention alone is not enough" has told us A.J, our six professionals agreed on the crucial importance of conducting tests, especially in the early stages of development, before the game is released. The three respondents that were the most vocal about the importance of testing were our three UX designers (E.C, T.S and A.A). As they come from big and small studios, this statement can be generalised: video games studios should conduct tests more frequently to learn from the players. [N.B: other designers also mentioned testing, without stressing it as much as UX

designers did.] We learnt that conducting tests in this industry can be extremely time- and energy-consuming, especially in big studios. Designers are more inclined to turn to internal tests (asking other teams to test their game) because external testing requires Non-Disclosure Agreements and additional efforts from the dedicated teams. Internal testing does reduce the efforts that should be put in preparing the test, indeed, A.A stated “you have to prepare the test. If you don’t even ask the right questions at the beginning, we won’t have the right answers”; by “right answers” they didn’t mean the ones they want to hear, but insightful ones, to elevate the designs and meet players’ expectations. These internal testing sessions can significantly change a game. J.DF illustrated this statement with the example of the zombie mode in Call of Duty. This mode came from the imagination of a developer that wanted to add a survival mode with zombies to the game. He decided to try this out by playing with a colleague from the studio, it turns out they really enjoyed this improvement and spent hours playing on it. Eventually, they got some budget to pursue this idea and now, some people know Call of Duty only for its zombie mode. Out of curiosity, we asked what they would focus on during the analysis of these tests, T.S enlightened us “for example, we can see that there’s a big drop from the players. So there’s probably a problem here that has made the players no longer feel committed”. Consequently, an accurate analysis of the tests’ outcomes can provide new directions on where to work for designers, but A.A rightly warned us “you have to listen to the player, but don’t take everything at face value”, and A.J to complete [because] “players aren’t aware of what they want”.

Along with insights about design issues, testing can provide valuable insights about what keeps players engaged. After asking players what would make them continue playing, we asked the professionals about the efficiency of existing strategies to keep players engaged. R.D, working on virtual reality games stated that it is not something he is working on, we will analyse why later in the paragraph. According to the average SEQ, the five other professionals mentioned the implementation of a social dimension (chat, multi-gaming, make players talk about the game …) as the most efficient strategy, but harder to reach. Then, releasing new gameplay mechanics (DLCs, new content, progression system, …) was declared the second most efficient strategy to maintain the players interest in the game, but there is a risk of being too repetitive. Finally, releasing new cosmetics (skins) is considered less efficient, it is more about creating an illusion of progress. When asked on the same topic, players ranked exploring, design and narrative in the first three spots, followed by challenges, mechanics and customization. The only common denominator between players and

professionals are gameplay mechanics, yet with a significant difference in ratings (professionals ranked it second and players second to last). Our hypotheses are:

- a lack of existing user research on this topic
- players are not aware of the importance of having good and efficient mechanics.

Unfortunately, we are limited in our analysis by the chosen methodologies and we will not go more in-depth as it would rely on hypotheses and not on existing data.

As mentioned before, R.D is the only one that did not feel concerned by this question. As they are working on virtual reality games, the sessions are shorter and there is actually no room for a player to disengage. This could also be something to explore to enhance players' engagement: shorten the gaming sessions for the player to be optimally engaged along the session. Additionally, this statement is supported by data from our quantitative study (78% of our respondents have gaming sessions lasting less than 4 hours).

c. Immersion, design and emotions

i. General presentation of the theme

The main focus of our research is to provide guidelines on how to improve UX design in video games, it is then crucial to address the theme of design with our respondents to gather their valuable insights of this topic. Additionally, literature stated that great design can lead to immersion (state of flow) and fun, as well as a very large palette of emotions, proving the need to address the three of them together.

ii. Respondents' opinion: convergence and divergence

To address this theme, we asked our respondents (except A.J) to rank design, sound and narration in terms of importance to create immersion. These three game's characteristics were not chosen out of the blue, they were the most replied by our players with very close percentages (22% for sound, 21% for design, 16% for storyline [N.B: we evacuated emotions as it is not something designers can actually work on, we see that as a consequence of their work]). Every one of them started by explaining that these three characteristics are working together to create immersion, making them very difficult to rank. Also the term 'beautiful design' has been strongly challenged, J.DF explained "it's not necessarily aesthetically beautiful, but rather aesthetically interesting, let's say". Indeed, all of them explained with

passion that immersion results from consistency and coherence between the three elements (design, sound and narration), if one is off, then the immersion will not be there. E.C and T.S even mentioned how difficult it is to reach a state of flow, and how everything matters in reaching it, echoing parts I.3 and II.2 of our Literature Review; reaching that state of flow could mean reaching optimal engagement. The SEQs on that question definitely mirrored their sayings, we calculated an average of 5.25 for the design, 4.75 for the narration and 4.25 for the sound, with very few deviation among the ratings.

We decided to let our respondents speak their minds longer than usual on that question, and funnily enough, we noticed some changes in their wordings after a few sentences. For instance, E.C "a good game is one that is playable without sound. But now we know that sound, as in all media, is half the job of immersion", A.A "an immersive experience for me, above all, it's the gameplay" or R.D "Master of Light [the game they created], for example, has a very good soundtrack that was designed for the game and is interactive with it, adding a real plus.". When speaking about their personal opinions, most of them would acknowledge the importance of the soundtrack, joining the players' opinion, yet they ranked it last in importance. We hypothesise that the ranking made by designers is due to professional constraints like budget and time, forcing them to choose where to put the efforts, sometimes in contradiction with their personal beliefs.

On a different note, R.D (who is designing Virtual Reality games) has shared with us his professional belief: "The immersion, it's your body moving, your body playing." For him, the future of video games is virtual reality (VR), as the player would be fully immersed in the game. He explained that the democratisation of VR is only a matter of time. Currently the gear needed to play in full immersion (headset, sensory jackets, cameras, …) is far too expensive. However, research in VR is progressing step by step, paving a promising way for the future.

It appears logical that when the immersion is broken, it can trigger negative emotions for the players. We saw in our quantitative study that some players could feel frustrated, angry or tired after playing [N.B: this is a very small proportion of our pool of players, most of them reported positive feelings]. We asked four of our professional respondents (J.DF, E.C, T.S and A.A) if they implemented some strategies to manage and reduce these negative feelings, they all answered yes, proving that this issue is known and worked on in the industry. J.DF, as a level designer, explained the importance of leveraging difficulty and finding a balance to

adapt the game to the feelings of the players, addressing the same topic tackled by the part II.2 of our literature review. They explained that always requiring cognitive effort and focus from players is not efficient “there are times when, in fact, we let the players rest, because being overloaded [is counterproductive]”. E.C addresses this question by differentiating the identification of the negative emotions and their moment of appearance, through testing, and the management of the negative emotions, through level design. They added on J.DF’s statement that the balance is between stimulating the player without creating anxiety and stress (also stated by R.D). T.S adopted a scientific approach by addressing each negative feeling separately, according to them, the strategies that should be adopted should prevent repetition, manage the timing of teaching new mechanics and prevent errors; summing that up: applying basic UX principles. A.A joined T.S in their answer, they highlighted the same strategies and added up on the importance of UX writing to reduce stress. They also raised some concerns about over-designing the interface in the name of anticipation and managing errors. They stated something very interesting in terms of UX design; when applied to video games, frustration can be positive, indeed, it can be a source of motivation to keep the players engaged, they said “Frustration can also be a good thing to have. It’s a driving force that makes you want to move forward”, again it is a matter of balance. The rest of the respondents agreed on this statement, for instance R.D (speaking for the players) “I like being stuck in levels. I like to be given a challenge and to respond to it, it’s satisfying.”. Rather than deleting all the pain points, designers should focus their efforts on determining which ones are motivating the gamers to keep playing and those that are frustrating them.

d. Improvement and community

i. General presentation of the theme

Conclusively, the third chapter of our literature review addressed the need for representation and inclusivity in video games designs (III.1), proving the need to talk to the community of gamers to tackle this topic properly. Which is why we decided to open the discussion with people from the industry as well to understand their opportunities and challenges.

ii. Respondents’ opinion: convergence and divergence

Our quantitative study aimed at providing some insights on the psychology of the gamers. We found out that some gamers would appreciate playing a character with similar psychological traits as them, with the highest SEQ average for RPG players (4.59). J.DF gave an insight very close to the one provided by players by talking about RPG in the first place. They added some nuance by explaining that the identification process will be harder if the character is facing choices with different values than the one defended by the player, but we will analyse this later in this paragraph. Elaborating on the identification topic, T.S, A.A and A.J differentiate the identification by similarity from the one by adoration. When creating or selecting a character to play with, players usually have two ways of doing: the first one is a character that looks like them with similar personality traits, the other one is a character that embodies everything they wish to be. Consequently, reducing the choices to characters that are similar to the players would deny 50% of the players' choice, which would be detrimental to the players experience.

On the same question, A.J and A.A highlighted the need for representation and inclusivity, stressing that women started to play video games when the studios decided to create female characters, A.A concluded "if the game allows you to be yourself, that means you've got your place". A.J provided a very telling example: "the creators of Baldur's Gate implemented the average character created by players, and it's really just any white human, when in the end, you could have done a lot more fun things than that". Elaborating on this approach, T.S mentioned that Just Dance (a game he worked on) used to create characters based on the personas, explaining why you can have a sporty character as well as a classy one. The three of them proved the need to carry on developing characters that look like the players, because players actually want this.

Defending the opposite vision, J.DF and A.A explained that the character is built to support the narration (A.A provided the example of Lara Croft, J.DF used Mario). Consequently, the narration leads the gameplay, leaving few possibilities and opportunities for the implementation of psychology principles into the character's design. Acknowledging the limitation of this position, J.DF stated "for main characters, you have to keep control, because you have to succeed from A to Z in delivering the narrative intent you want for the players", but the door is left open for innovation in secondary characters. In this point of view, no psychology analysis or principles is needed to build a main character.

Going more in-depth on that question, five out of six respondents spontaneously mentioned the in-game choices, they all agreed that when it comes to making choices, playing a character that has a similar moral compass to yours is much easier and comfortable for the player. Interestingly, R.D and E.C defended that being forced to play a character that is the complete opposite of you (mentally but also appearance-wise) can be very exciting and interesting (both of them mentioned Disco Elysium as an example) when A.A was more inclined to think that doing so can damage and ruin the immersion if poorly managed.

As proven by this long paragraph, the question of implementing psychology in video games, and more especially in the characters' design, is raising debates in the video games industry. This is a field some studios are starting to explore, yet still very niche, proving that there are opportunities in the industry, as long as other choices are not denied to the user. Despite the players' opinion, the answer to this question seems to be related to a commitment made by the studios in the very early stages of development.

Consequently, we decided to open the question to a broader perspective by asking the professionals if the implementation of psychology could be the innovation gamers are looking for. This trend was supported by our gamers' pool rating an average SEQ of 5.73 when asked about their satisfaction level on the game they are currently playing.

What surprised us was the open-mindedness of our respondents, all of them answered with a potential yes, yet raising some concerns. A.A and A.J explained that while players often have the most unconventional ideas when ideating an innovative game, their actual preferences align with what they are already familiar with. In A.A's opinion, "sometimes simpler is better, because players are going to look for something complicated anyway". They strengthen their saying by using the example of The Stanley Parable (a time loop based game with situations appearing in a random order): players were convinced that the game was adaptive to their gameplay, but developers clarified that it did not, players were seeking a level of difficulty that was not present. For them, small pieces of innovation in gameplay is better than a radical innovation, R.D joins them on that statement, but they have chosen a more negative approach "I say this hoping I'm wrong, but I don't think we'll be discovering any new mechanics. The aim, in fact, is to reinterpret and reimagine what we know how to do today, to break the codes a little". E.C nuances this point of view by warning about dark patterns, developers and designers should always be aware of the consequences (potentially psychological ones) of their actions. Applying that to the implementation of psychology, it would mean going slow,

step by step, and take as much time as needed to evaluate the consequences to avoid the player feeling manipulated.

T.S is convinced that understanding the players' psychological needs could enhance their experience, but they expressed their strong belief in adaptive games, independently from the implementation of psychology. Adaptive games already exist thanks to level design, but there are opportunities to go further and to adapt games to the players expectations, however the opportunities are limited now due to budget constraints (also evoked by J.DF, as well as the time constraint). Some improvements were made in Just Dance to go in that direction, to allow players to tailor the game to their needs. Indeed, the game offered the players the possibility to choose the duration and intensity of the gaming session, adapting it to their present needs and desires. In a similar mindset, J.DF explains that some psychological principles and biases are already implemented in video games. For instance, they explain that if a player must choose between a dark path and a lightened one, they would choose the lightened path (with a 90% confidence rate), because light means security and being able to anticipate.

To conclude on a positive note, A.J stated "Is it possible to have one experience by player? Yes, that's the dream of people working on generative AI. Actually, yes, we could potentially give you the game of your dreams". But using the example of AI-made playlists on Spotify, they nuance their saying by explaining that it would create a bubble for the players and would prevent them from discovering new types of games, having this element of surprise that makes you like and play the game. Again, even when opening up the question, we faced very different opinions, proving the existence of opportunities, but also the existence of challenges.

Part 3: Cross-sectional analysis

A. Additional findings

In our quantitative study, when we asked the players how they would improve their favourite game, they obviously mentioned reducing the prices, but they also mentioned very often that they would like developers and designers to listen to the community. After discussing with six professionals from the industry, and having heard all of them mention the need to conduct more research to know and learn from the players, we can say that there is a huge opportunity for studios to enhance players' experience.

Four of our respondents mentioned the importance of giving the player the impression of progressing in the game, most of the time through unlocking little rewards. The goal here is to keep the players engaged through little actions and little progress. Even if they do not bring a lot of value to the gameplay of the players, they will keep being engaged. The fifth respondent mentioned the illusion of choice (echoing part III.1 of our Literature Review), the players should feel like they are in control, when actually the designer is the one controlling their choice thanks to design. They stress the importance of a well-executed UX design. It should be invisible to the eyes of the user.

Despite being off-topic, the implementation of AI in video games was discussed with two respondents that had similar opinions. They don't see the implementation of AI as a no-go, but they raised some concerns. The first one explained that level design exists to leverage the difficulty of the game, so the AI is not needed. But both of them acknowledged the opportunities offered by generative AI. One of the respondents explained that generative AI can help designers generate the dialogs of NPCs (Non Playable Characters) and therefore ease the work of designers. The challenge in implementing AI resides in the balance of its use to not damage nor reduce the quality of the designers' work.

Across different questions, three of our respondents mentioned the importance of onboarding; after further investigations, they were identified as our three UX designers. According to their expertise, onboarding is crucial to make the game adaptive to different types of players. The challenge for onboarding in a video game is to take the time to explain the mechanics to a casual gamer without making the hardcore gamer feel bored. An onboarding well executed can help reduce the stress as the player will know how to react and how to play in given situations. Conclusively, even if the onboarding can be perceived as harming the immersion, it is necessary to be well executed to ensure long-term engagement from the players.

B. Influencing factors

While conducting the analysis of our qualitative data, we noticed differences of opinions across roles. Indeed, the UX designers tended to have slightly divergent opinions from our other respondents. However, our sample was too small to generalise this statement.

Surprisingly, we did not notice significant divergences between professionals from a big studio or from smaller ones. This shows a standardisation of the processes across the industry, which can help create frameworks to improve efficiency but it can also reduce the place

accorded to innovation. We also did not notice significant differences among designers for various platforms, some specificities were evoked, especially for designing mobile games. But overall, the processes, concerns, opportunities, challenges and opinions remained independent from the gaming devices that would support the design. We believe this proves the opportunity for the industry to reach cross - platform gaming.

The Dark Souls games were mentioned by five of our respondents, every time for different reasons. The game in particular that was the most mentioned was Elden Ring. According to our respondents, these games are unique in terms of UX design and psychology implementation. Consequently, we recommend to everyone interested in video games design and psychology to have a closer look at these games.

VI. Discussion

Part 1: Implications of the results

As a reminder, we gathered 119 players' responses in our quantitative study and we conducted qualitative interviews with six professionals from the video games industry. The findings from these studies, both quantitative and qualitative, uncovered meaningful insights that, we believe, have significant implications for both academic theory and industry processes.

Our research contributes to the extension of theoretical knowledge by extending the frameworks of

- Bartle's typology, mentioned in part II.1 of our literature review. The quantitative study we conducted revealed that gamers have different motivations, depending on their gaming habits and their favourite game genre. Our qualitative study confirmed the importance of acknowledging the existence of different types of players, and to develop gamer personas to better design games for every one of them. Therefore, the use of personas can prevent from personal biases interfering with the designs and enables game developers to create experiences that resonate with a wider audience.
- Game Flow, coined by Célia Hodent in 2018 (cf part II.2 and I.3 on the state of flow of our literature review). This framework defined Game Flow as the act of leveraging difficulty and tension precisely. Our interviews with industry professionals revealed

> that this balance is very important to achieve when designing a game. Indeed, game designers explained that maintaining player engagement requires a careful mix of challenge and relaxation, which is why dedicated teams of level designers have become increasingly vital in game studios. They noted that always requiring cognitive effort from players can lead to overload, so including moments where players can rest is essential. This careful balance is not just about maintaining flow but it also plays a significant role in enhancing immersion.

On this matter, our research has proven that immersion (when the state of flow is reached) is the result of a perfect balance between design, sound and narrative. Sensory and aesthetic aspects, such as music and visual design, are universally valued by players for immersion, regardless of their player type in Bartle's typology. Professionals nuanced this statement by highlighting the importance of the narration.We also learnt that frustration is not disrupting the immersion, it can be a trigger to keep the players engaged. This finding highlights the effectiveness of enhancing these elements to immerse a wide range of gamers.

With this study, we were able to have a better understanding on how the experience should be tailored to players (mentioned in the part II.3 of our literature review). Players must be able to choose between characters that are similar to them or completely different. We strengthened our knowledge about the role that could be played by AI and VR into shaping the future of video games (evoked in part III.3 of the literature review).

Our findings confirmed some of our concerns and impressions: our professionals confirmed part III.2 of our literature review, stating that when a game is displaying choices, the players' moral values should be considered. Finally confirming the findings of Zapata et al. in 2017 (cf part II.1 of our literature review), we underscore the importance of testing in the video games industry. Indeed, small ideas can lead to blockbuster improvements.

The practical implications of our findings are particularly relevant to professionals from this industry. When questioning players, we learnt that rewards are very important and motivating for them. Indeed, various types of rewards are crucial for maintaining player motivation. Progression rewards proved to be particularly important and relevant in the motivation process. Social and narrative rewards also play a significant role, indicating that a multi-faceted approach to rewards is necessary to sustain long-term player interest.

In our quantitative study, we also learnt that players attach great importance to innovation and game mechanics, highlighting a growing need among gamers for renewed experiences. This is linked to a trend observed in the video game industry, where innovation is increasingly valued as a key success factor. However, our qualitative findings suggest that a small innovation can be more impactful and more accepted than a big one. Players need familiarity and simplicity to understand the game completely. Even with the simplest game, they will try to find an inexistent complexity, so there is no need for game designers to over-design video games. Our findings (quantitative and qualitative) also suggest a need to strengthen the connection between professionals from the industry and players. The objective is for players to feel like their voice is heard and for professionals to have a more complete understanding of the players' needs and psychology. Implementing this insight will probably lead to more reliable personas and user research.

We would like to conclude on the urgent need for the industry to acknowledge the importance of UX design. Knowing who your players are and analysing their psychology will lead to the creation of video games that are more likely to please the players, and therefore to an increase of sales.

Part 2: Limitations

Even though both our quantitative and qualitative studies provided valuable insights and key understandings on how to answer our research questions, it is crucial to acknowledge some limitations and potential biases inherent in these studies.

In our quantitative study, we used a straightforward questionnaire, which constrained the ability of the gamers to freely express their thoughts and opinions on topics that matter to them. We chose to limit responses to predefined options or short answers, by doing so we might have missed secondary themes and perspectives that a qualitative approach would have uncovered. Indeed, the questionnaire we used to collect the data does not capture the full complexity of gamers' motivations and emotions. Various factors that could influence engagement with video games, such as the influence of peers, cultural preferences, or the impact of game updates and events, need to be taken into account. That's why it's important to supplement these results with other types of research, particularly qualitative, to get a more complete picture of the video game industry.

Another important limitation of our quantitative study resides in the sample. Although 119 people took part, the sample was largely made up of young male adults (75% male) aged between 18 and 24 (81%), mostly students (62%) and French (87%). This sample limits the possibility to extend the results to other age groups, genders or nationalities. Moreover, the participants in the study were recruited from our social networks, which may introduce a participation bias. Participants may tend to respond positively if some of them knew us.

Now exploring the limitations of our qualitative study; our sample was composed exclusively of French professionals (even if one was working overseas), which may limit the global understanding of our findings. On the other hand, our quantitative sample was more diverse in terms of nationality; however, with over 87% of our respondents being French, we can state that our results predominantly reflect the French perspective on our research questions. Consequently, the application of our findings mostly apply to the French video games industry and may be restricted when considering the global context of the video games market.

Continuing on the qualitative research, the cultural and professional uniqueness of the French market might have influenced the behaviours and wordings observed in our study. As a consequence, it seems difficult to apply these findings to any other national markets without further research to validate and extend these insights to a broader context.

Finally, despite our efforts to reduce them as much as possible by collaborating at every stage of the analysis, it is crucial to acknowledge that some personal biases might have interfered with the objectivity of our findings. We ensured a rigorous approach, yet it is also important to highlight that participants, in both the quantitative and qualitative studies, might have been influenced by the phrasing of the questions. This could have led them to provide answers perceived as expected instead of their personal opinion.

Part 3: Recommendations for future research

To provide a more comprehensive approach on that topic, we recommend conducting future research with international respondents. This would enable the collection of data from various cultural perspectives and professional approaches and practices, enriching our findings from French respondents. Comparing these two cohorts would help find convergence

and divergence amongst different cultures and highlight global key understandings applicable to the overall video games industry.

Our quantitative study reached mainly hardcore and casual gamers, helping us to gather useful data on how to attract and retain these gamers. For future research, we would recommend to focus on rookie gamers (by rookie gamers, we cover all the people that consider themselves as new to video games). These newbies are a completely different target with other habits than traditional gamers, and we believe that UX Design should try to meet their expectations to extend the players' base for video games studios. To do so, we need first to understand their expectations and motivations, to make sure we capture them properly and completely, a qualitative approach could be appropriate.

We conducted our qualitative study with six respondents, and we acknowledge that including a larger number of respondents would enhance the objectivity and accuracy of the findings. A broader sample would also lead to a better inclusivity by integrating a wider range of gender, age, background, culture, ... Future studies should ensure a balanced representation in demographics so that the findings would reflect a wider community.

We strongly believe that a study focusing on the role of emerging and promising technologies, such as virtual reality (VR) and artificial intelligence (AI), in the UX Design of video games could provide valuable insights for the future of the industry. As we are only at the early deployment stages of these technologies in video games, their impact on players' psychology must be studied to generate best practices in UX Design. Both of these technologies might be revolutionary in creating immersive experiences and adaptive game universes. Understanding the potential, the challenges and the limitations of such technologies can lead to increased engagement and satisfaction from the players. The objective is to ensure that when these technologies become mainstream, the industry can deliver user-centred experiences based on the players' psychology to exceed their expectations.

VI. Conclusion

Part 1: Main results

This thesis aimed at answering the following research question: How can the video games industry use the principles of psychology to improve the UX of its products to reach

optimal engagement? The goal of our research was to investigate the role of cognitive, emotional and behavioural psychology principles into the UX Design of video games to offer actionable insights to optimise player engagement.

Our research revealed key insights from both gamers and industry professionals. Based on their psychology, gamers can be clustered in groups, allowing the industry to create personas to better address their needs. Gamers also expressed a need to be heard by the industry, a need that the industry should fulfil by an integration of User Research in their game development process. By listening to the gamers' feedback, professionals could create a game that fit perfectly their users' expectations, especially in terms of monetization and moral values.

We found out that gamers experience common feelings after a gaming session (happiness, satisfaction, …), and our qualitative study reveals that some of them may be induced by designers to keep the players engaged. Indeed, one specificity of game design is to generate frustration through the designs to maintain the player's motivation, when a traditional UX designer would try to remove any source of frustration from their designs.

However, even when designing to create frustration and bad feelings, the moral values of the players are always considered, especially when designing in-game choices. Finally, gamers and professionals taught us that innovation does not reside in the customization of the game, but it lies in small improvements of the gameplay.

Part 2: Contribution

These key findings revealed actionable insights to optimise players engagement. We recommend designers and game developers a frequent use of User Research and personas in their daily work. This would help them make sure they are working towards the players' needs. Based on that insight, we recommend involving a broader range of stakeholders (level designers, UX researchers, ….) in the development process. Every job can provide valuable insights concerning the development of the game. Finally, we recommend small and impactful innovation supported by familiarity and simplicity.

We acknowledge the limitations and potential biases of our study and we provide some guidance for future research. The audience should be enlarged from national to international, and should also include rookie gamers. These two improvements can help our findings reach a global understanding and veracity, or they may be proved to be specific to the French market.

Our study can also be improved on some other key points: size of the qualitative sample and personal biases interference.

Literature has also shown that VR and AI could play a decisive role in shaping the future of psychology and video games. We therefore recommend exploring these topics as well as the organic and reciprocate relationship between video games and psychology. Indeed, even if we have proven that the gaming experience can be enhanced by psychology, we strongly believe that the opposite could also be true, and that psychology could learn from the video games industry.

Part 3: Conclusion

By bridging the gap between psychology and UX design, this thesis highlights the need for the video game industry to prioritise long-term player satisfaction over short-term engagement metrics. Despite being conscious of the continuous growth of the industry, we advocate for a more informed approach to UX design to create inclusive, immersive and engaging experiences for all player types.

This research serves a call to action for game developers to rethink their approach to UX design, with the goal of creating a new paradigm in game design, where understanding the diverse psychological needs of players becomes as essential as the technical and creative aspect of development.

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VIII. Appendices list

Appendix 1: Quantitative interview guide: Exploring players' motivations and behaviours

Exploring players motivations and behaviours

Thank you for participating in this survey, which lasts approximately 5 minutes. We aim to understand how different elements of game design influence player engagement, motivation, and overall experience. Your responses will provide valuable insights that will contribute to our research. Please answer the following questions based on your current or most recent gaming experience. **Your input is important to us and will remain confidential.**

Q1 How do you identify?

- ○ Male (1)
- ○ Female (2)
- ○ Non-binary (3)
- ○ I don't want to answer (4)

Q2 How old are you ?

- ○ Under 18 years old (1)
- ○ 18 - 24 years old (2)
- ○ 25 - 35 years old (3)
- ○ 36 - 60 years old (4)
- ○ 60+ years old (5)

Q3 What is your working occupation ?

_____

Q4 *Which country are you from ?

_____

Q5 *How often do you play video games?

- ○ Less than once a week (1)
- ○ Once a week (2)
- ○ Twice a week (3)
- ○ Three times a week (4)
- ○ More than 3 times a week (5)

Q6 *In average, how long is one of your gaming sessions?

- ○ Less than one hour (1)
- ○ 1 - 2 hours (2)
- ○ 2 - 4 hours (3)
- ○ More than 4 hours (4)

Q7 *Which device do you play games with ?

- ☐ Computer (1)
- ☐ Consoles (2)
- ☐ Mobile (3)

Q8 *Which configuration do you prefer?

- ○ Solo player (1)

○ Multi-player (2)

○ Both (3)

Q9 *What are your 3 favorite video games ?

_____

Q10 *What do you like in your favorite games ? (choose 2)

☐ Innovative gameplay mechanics (1)

☐ Design of the game (2)

☐ Storyline and narrative (3)

☐ Customization options (4)

☐ Challenges, quests and rewards (5)

☐ Immersive world and environments (6)

☐ Social interaction with other players & NPC (Non Playable Characters) (7)

☐ Competitive aspects (e.g., rankings, leaderboards) (8)

☐ Progressing in the game (9)

☐ Relaxation (10)

☐ Other (please specify): (11)

_____

Q11 *Please rank what makes you want to keep playing to a video game. (1=strong influence on your decision, 7=low influence on your decision)

_____ Game design (1)

_____ Exploring & discovering the game's world (2)

_____ New gameplay mechanics (3)

_____ Narrative & storyline (4)

_____ Challenges & rewards (5)

_____ Customization of the interface (6)

Q12 *What type of in-game rewards do you find most motivating?

- ○ Tangible rewards (e.g., in-game currency, items) (1)
- ○ Progression rewards (e.g., leveling up, unlocking new abilities) (2)
- ○ Social rewards (e.g., recognition from peers, leaderboard ranking) (3)
- ○ Narrative rewards (e.g., story advancement, lore discovery) (4)
- ○ Other (please specify): (5)

_____

Q13 *What makes you feel most immersed in a video game (select 2):

- ☐ Sound & music (1)
- ☐ Beautiful design (2)
- ☐ Emotions triggered (3)
- ☐ Storyline (4)

- [ ] Technical innovation (new dynamics, mechanisms, …) (5)
- [ ] Mastering a game (6)
- [ ] Other (please specify): (7) _____

Q14 *What makes you quit a game? (select 2):

- [ ] Repetitive gameplay (1)
- [ ] Lack of progression (2)
- [ ] Poor game mechanics (3)
- [ ] Uninteresting storyline or narrative (4)
- [ ] Difficulty level too high (5)
- [ ] Lack of social interaction (6)
- [ ] Being on a loose streak (7)
- [ ] Other (please specify): (8) _____

Q15 *After a gaming session, how do you generally feel?

- [ ] Happy (1)
- [ ] Excited (2)
- [ ] Frustrated (3)

- [ ] Angry (4)
- [ ] Satisfied (5)
- [ ] Anxious (6)
- [ ] Sad (7)
- [ ] Tired (8)
- [ ] Other (please specify): (9)

_____

Q16 *On a scale of 1 to 7, how would you like your character in-game to have the same personality traits as you? (1=don't like, 7=like)

1 2 3 4 5 6 7

Q17 *On a scale of 1 to 7, how satisfied are you with the games you are currently playing ? (1=not satisfied, 7=satisfied) (Move the cursor)

1 2 3 4 5 6 7

Q18 If you could improve your favorite game, what changes would you bring?

_____

Q19 Describe the game of your dreams.

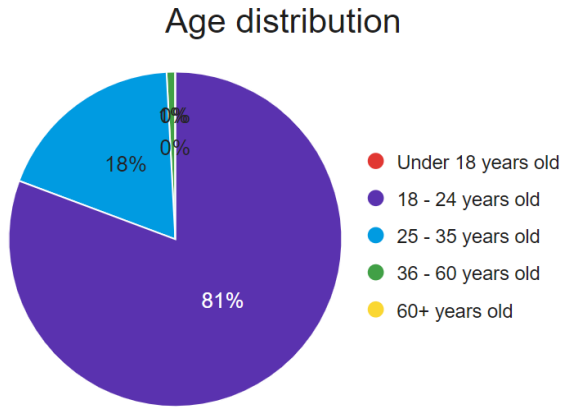
_____

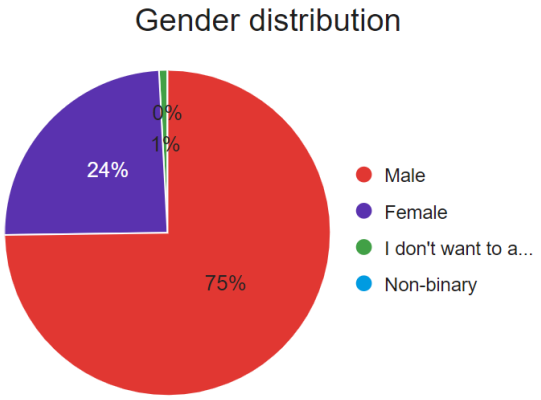
Q20 Would you like to add anything else?

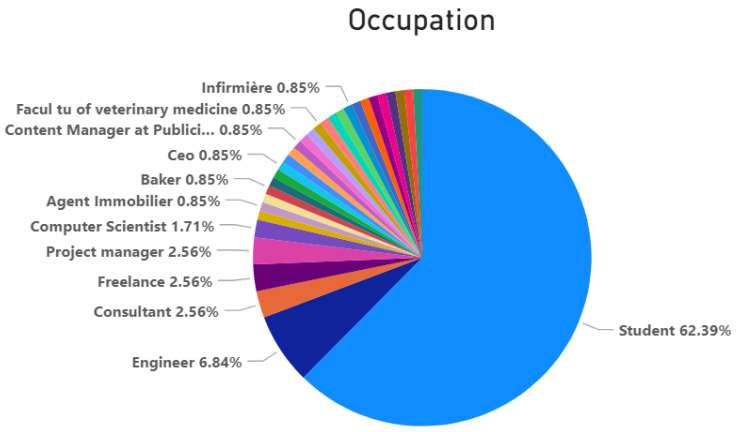
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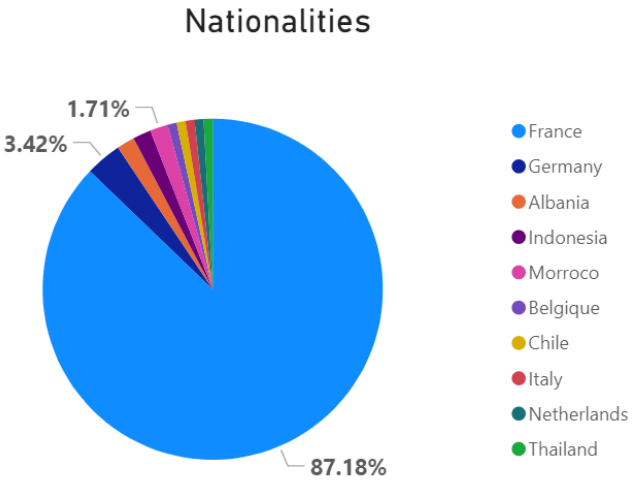
Thank you for your time and for your valuable input! We highly appreciate your participation, as it will help us in our understanding of the intricacies between the principles of psychology and UX in video games.

Appendix 2 : Sample Characteristics: demographics and player profiles (Age distribution, Gender distribution, Occupation, Nationalities)









Appendix 3: Elements that motivate gamers to keep playing a video game (1=strong influence on your decision, 7=low influence on your decision)

Table 1: Elements that motivate casual gamers to keep playing a video game

Rank	Element	Average score
1	Exploring & discovering the game's world	2.47
2	Game design	2.8
3	Challenges & rewards	3.16
4	Narrative & storyline	3.27
5	New gameplay mechanics	3.97
6	Customization of the interface	5.35

Table 2: Elements that motivate hardcore gamers to keep playing a video game

Rank	Element	Average score
1	Game design	2.64
2	Exploring & discovering the game's world	2.68
3	New gameplay mechanics	3.39
4	Narrative & storyline	3.41
5	Challenges & rewards	3.48

6	Customization of the interface	5.41

Appendix 4: After a gaming session, how do you generally feel?

Type of games	Satisfied	Happy	Tired	Excited	Angry	Frustrated	Anxious	Sad
FPS/TPS	43%	25%	14%	7%	4%	4%	0%	0%
RPG	41%	18%	24%	12%	0%	3%	0%	0%
MOBA	43%	10%	14%	19%	0%	5%	0%	0%
Competitive	42%	23%	4%	19%	0%	4%	0%	0%
Survival	48%	24%	7%	7%	0%	0%	3%	0%
Narrative	39%	35%	10%	3%	0%	3%	0%	0%

Appendix 5: If you would improve your favorite game, what changes would you bring?



Appendix 6: Describe the game of your dreams



Appendix 7: Qualitative interview protocol (in French)

Questionnaire interview

Nous vous remercions d'avoir accepté de participer à notre enquête. Nous sommes Lou et Emeline, étudiantes en Msc Product Management and UX Design, dans le cadre d'un double diplôme entre les écoles SKEMA Business School et Politecnico di Milano. Nous sommes actuellement en train de travailler sur notre mémoire intitulé [traduit en français] **"Améliorer l'expérience de l'utilisateur dans les jeux vidéo : Intégration des principes psychologiques pour un engagement optimal",** qui explore comment l'industrie des jeux vidéo peut utiliser la psychologie pour enrichir l'UX de ses produits et favoriser un niveau d'engagement optimal. Nous vous invitons à partager librement vos réflexions et expériences professionnelles sur ce sujet. N'ayez pas peur de dire tout ce qui vous passe par la tête, il n'y a pas de réponses bêtes, tout avis provenant de votre expérience professionnelle nous est précieux. Vos réponses resteront confidentielles, seront anonymisées et utilisées uniquement à des fins académiques.

Pour votre information, avant cette étude qualitative, nous avons mené une étude quantitative auprès des joueurs pour en apprendre plus sur leurs habitudes, leurs motivations et leur psychologie lorsqu'ils jouent. Nous partagerons avec vous au cours de l'entretien les informations que nous avons pu recueillir.

Démographie

- Pouvez-vous décrire brièvement votre métier ainsi que votre expérience en tant que concepteur de jeux vidéo ? Pouvez-vous également nous décrire votre cœur de cible, quel est votre joueur type?

- Notre étude quantitative a démontré que les femmes préfèrent jouer sur console, pouvez-vous nous parler d'éléments de conception que vous avez mis en œuvre pour également attirer et fidéliser les joueuses ?

Motivations et préférences

- Quelles sont, selon vous, les principales motivations qui poussent un joueur à lancer un jeu et à continuer à y jouer ?

- Dans notre étude quantitative, nous avons interrogé les joueurs sur ce qu'ils préfèrent dans leur jeu favori. Les casual gamers (jouant 1 à 2 fois par semaine) ont répondu apprécier "l'aspect immersif du jeu", tandis que les hardcore gamers (jouant plus de 3 fois par semaine) ont mis en avant "les mécaniques de gameplay innovantes". Comment prenez-vous en compte ces différents types de motivations dans le design de votre jeu ?

- Comment répartissez-vous différents types de récompenses dans votre jeu pour répondre aux différentes motivations de vos joueurs ? Décrivez s'il vous plaît les types de récompenses (évaluez ensuite l'efficacité de chacune de 1 à 7 (1 pas efficace, 7 très efficace))

Engagement des joueurs, expérience et satisfaction

- Comment mesurez-vous l'engagement et la satisfaction des joueurs dans votre jeu ?

- Quels éléments de design de votre jeu permettent de maintenir l'intérêt des joueurs ? Pouvez-vous donner des exemples concrets ?

- Nous avons remarqué grâce à notre recherche que les joueurs arrêtent de jouer à cause d'un gameplay trop répétitif ou d'un manque de progression. Quelles stratégies utilisez-vous pour empêcher les joueurs de quitter un jeu et pourquoi les avoir choisies ? (évaluez ensuite l'efficacité de chaque stratégie de 1 à 7 (1 pas efficace, 7 très efficace))
    - *Optionnel: comment arrivez-vous à maintenir engagés des joueurs ayant différents niveaux de jeu?*

- Notre recherche précédente a démontré que les joueurs s'inquiètent du coût élevé des achats dans le jeu et estiment qu'une monétisation excessive peut nuire à leur expérience de jeu. Pouvez-vous nous donner des exemples de stratégies de monétisation réussies qui renforcent l'engagement des joueurs tout en respectant les objectifs de l'entreprise ?

Immersion, design et émotions

- Qu'est ce qui est le plus important selon vous pour offrir une expérience immersive aux joueurs entre: un beau design, une bande sonore efficace ou une narration innovante? Pouvez-vous les classer de 1 à 7 (1 étant peu important, 7 très important) en termes d'importance ? Pouvez-vous fournir des exemples d'utilisation concrets pour chacun ?

- Quelles mécaniques ou stratégies utilisez-vous pour gérer les émotions négatives chez le joueur (stress, frustration, ennui, colère, …)?

- Il est ressorti de notre étude quantitative que les joueurs n'étaient pas réticents (ils sont même plutôt enclins) à jouer un personnage qui a les mêmes traits de personnalité qu'eux, que pensez-vous de cela?

Amélioration et communauté

- Dans notre étude quantitative, les joueurs ont décrit le jeu de leurs rêves comme un jeu innovant en termes de mécaniques et de design du gameplay. Est ce que vous pensez que l'utilisation de certains principes psychologies pourrait être l'innovation qu'ils recherchent?

Conclusion

- Pouvez-vous nous partager certaines informations ou petits tips tirés de votre expérience professionnelle qui pourraient être utiles à d'autres concepteurs de jeux, en particulier pour créer des jeux émotionnellement et cognitivement attrayants ?

- Est-ce que vous avez d'autres éléments à apporter à la discussion ?

Appendix 8 : full transcripts of the interviews

The transcripts are available here (French version, the English version is not available) : https://docs.google.com/document/d/1bTHFHeLM1-kqoPn0sY3rJTUZIMZCje_44wqHAgiGTvg/edit?usp=sharing

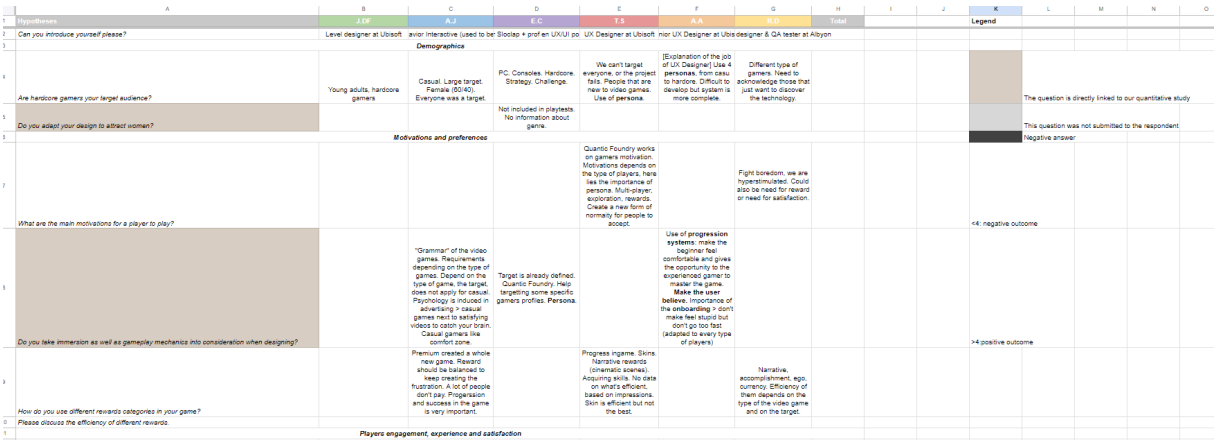
Appendix 9: Rainbow spreadsheet

	B	C	D	E	F	G	H	I	J	K	L	M
Hypotheses	J.DF	A.J	E.C	T.B	A.A	R.D	Total		Legend			
Can you introduce yourself please?	Level designer at Ubisoft	or interactive (used to	Sioclap + prof en UX/UI pc	UX Designer at Ubisoft	nior UX Designer at Ubis	designer & QA tester at Abyon						
Demographics												
Are hardcore gamers your target audience?	YES	NO	YES	NO	YES/NO	NO				The question is directly linked to our quantitative study		
Do you adapt your design to attract women?			NO							This question was not submitted to the respondent		
Motivations and preferences										Negative answe		
What are the main motivations for a player to play?				Social, rewards, updates		Avoid being bored			<4: negative outcome			
Do you take immersion as well as gameplay mechanics into consideration when designing?		YES/NO	NO (target is defined)		YES (but difficult)				>4:positive outcome			
How do you use different rewards categories in your game?		Different players		Different touchpoints		Depends on the game						
On a scale of 1 to 7, how would you rate the efficiency of narrative rewards? (1=not efficient, 7=very efficient)				1		4.5	2.75					
On a scale of 1 to 7, how would you rate the efficiency of social rewards? (1=not efficient, 7=very efficient)						7	7					
On a scale of 1 to 7, how would you rate the efficiency of progression rewards? (1=not efficient, 7=very efficient)		6		6.5		6	6.17					
On a scale of 1 to 7, how would you rate the efficiency of tangible rewards? (1=not efficient, 7=very efficient)		4		4		3	3.67					
Players engagement, experience and satisfaction												
How do you measure players engagement and satisfaction?	KPI analysis, not his job	Retention KPIs + users feedbacks	Playtests	Retention KPIs + User research	Tracking system + metrics + tests	Social media + reviews + tests						
What design elements are you using to keep players interested in your game?	Renewing the gameplay					Reward + no device needed to play (innovation)						
On a scale of 1 to 7, how would you rate the efficiency of issuing DLC / acquiring new skills ingame? (1=not efficient, 7=very efficient)	6	5	5	5	1st in importance	Not concerned because working on VR and experience is shorter (around 40 minutes)	5.25					
On a scale of 1 to 7, how would you rate the efficiency of new cosmetics? (1=not efficient, 7=very efficient)	1	1	//	//	//		1					
On a scale of 1 to 7, how would you rate the efficiency of social aspect? (1=not efficient, 7=very efficient)		7	n, casino techniques, mat	4	2nd in importance		5.5					
Is it possible to use monetization strategies while reinforcing players engagement and reaching business goals?		NO										
Immersion, design and emotions												
On a scale of 1 to 7, how would you rate the importance of a beautiful design to create immersion? (1=not important, 7=very important)	5.5		5	5	1st	5.5	5.25					
On a scale of 1 to 7, how would you rate the importance of a powerful soundtrack to create immersion? (1=not important, 7=very important)	3		5	5	1st	4	4.25					
On a scale of 1 to 7, how would you rate the importance of an innovative narration to create immersion? (1=not important, 7=very important)	7		4	5	3rd	3	4.75					
Do you use strategies to deal with players' negative emotions?	YES, leverage difficulty		YES, playtests, UI, level design	YES onboarding, good UX, user tests	YES, good UX Design & vetting							
Do you think ingame characters should have the same personality traits as the player?	YES in RPG games	YES for inclusivity	YES, for identification purposes (idealisation vs real life)	YES but admiration vs familiarity	YES, familiarity, identification & inclusivity	YES/NO both options are interesting to explore						
Improvement and community												
Do you think the implementation of psychology could be the innovation players are looking for?	YES	YES but difficult	YES because not done	YES to enhance the experience	YES but players need familiarity and innovation can be very small	YES/NO, innovation is in new way of gaming, better immersion						

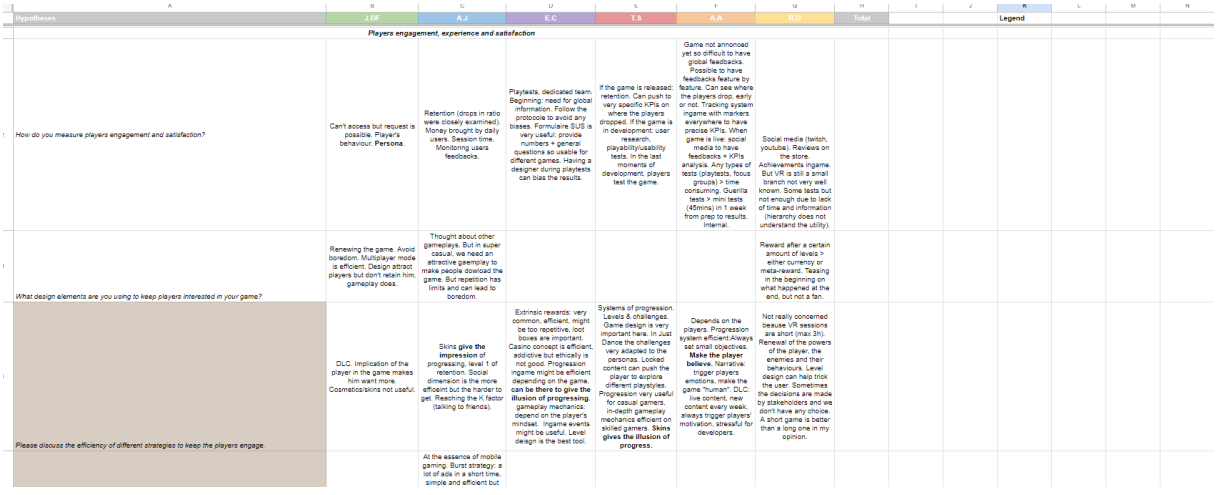
You can see the Rainbow spreadsheet more in details here:

https://docs.google.com/spreadsheets/d/1IBeUkKhSAQhlQ73hm0zNolmGYJH7mDBBQXOQb6tF6Rk/edit?usp=sharing

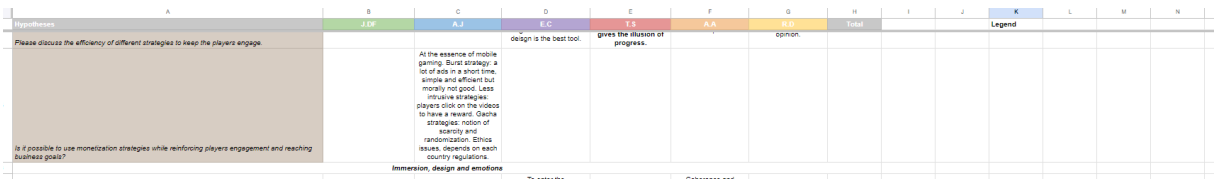
Appendix 10: Thematic coding



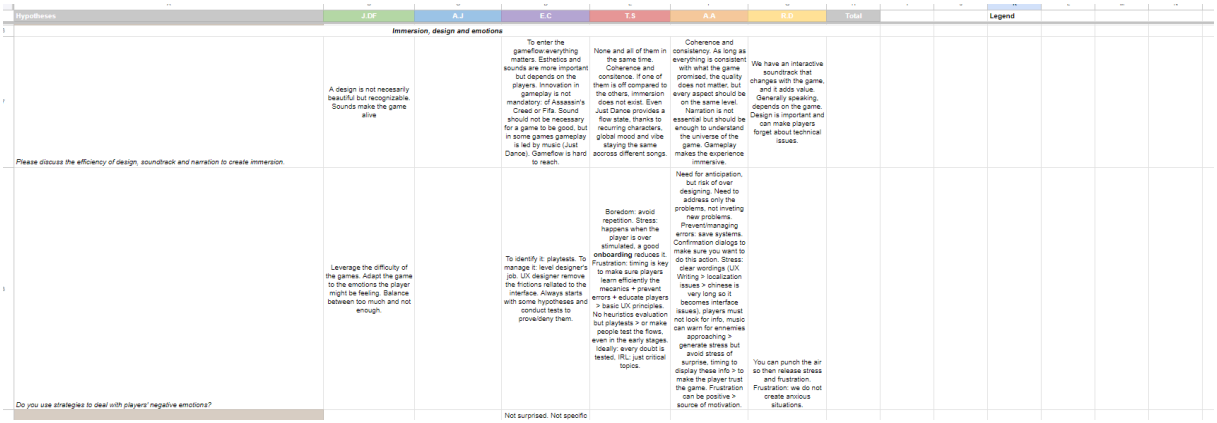
Hypotheses	J.DF	A.J	E.C	T.S	A.A	R.D	Total	Legend
Can you introduce yourself please?	Level designer at Ubisoft.	avior Interactive (used to be	Stociap + prof en UX/UI po	UX Designer at Ubisoft	nior UX Designer at Ubis	designer & QA tester at Albyon		
Demographics								
Are hardcore gamers your target audience?	Young adults, hardcore gamers	Casual. Large target. Female (60/40). Everyone was a target.	PC. Consoles. Hardcore. Strategy. Challenge.	We can't target everyone, or the project fails. People that are new to video games. Use of **persona**.	[Explanation of the job of UX Designer] Use 4 **personas**, from casu to hardore. Difficult to develop but system is more complete.	Different type of gamers. Need to acknowledge those that just want to discover the technology.		The question is directly linked to our quantitative study
Do you adapt your design to attract women?			Not included in playtests. No information about genre.					This question was not submitted to the respondent
Motivations and preferences								Negative answer
What are the main motivations for a player to play?				Quantic Foundry works on gamers motivation. Motivations depends on the type of players, here lies the importance of persona. Multi-player, exploration, rewards. Create a new form of normalcy for people to accept.		Fight boredom, we are hyperstimulated. Could also be need for reward or need for satisfaction.		<4: negative outcome
Do you take immersion as well as gameplay mechanics into consideration when designing?		"Grammar" of the video games. Requirements depending on the type of games. Depend on the type of game, the target does not apply for casual. Psychology is induced in advertising > casual games next to satisfying videos to catch your brain. Casual gamers like comfort zone.	Target is already defined. Quantic Foundry. Help targetting some specific gamers profiles. **Persona**.		Use of **progression systems**: make the beginner feel comfortable and gives the opportunity to the experienced gamer to master the game. **Make the user believe.** Importance of the **onboarding** > don't make feel stupid but don't go too fast (adapted to every type of players)			>4:positive outcome
How do you use different rewards categories in your game?		Premium created a whole new game. Reward should be balanced to keep creating the frustration. A lot of people don't pay. Progression and success in the game is very important.		Progress ingame. Skins. Narrative rewards (cinematic scenes). Acquiring skills. No data on what's efficient, based on impressions. Skin is efficient but not the best.		Narrative, accomplishment, ego, currency. Efficiency of them depends on the type of the video game and on the target.		
Please discuss the efficiency of different rewards.								
Players engagement, experience and satisfaction								



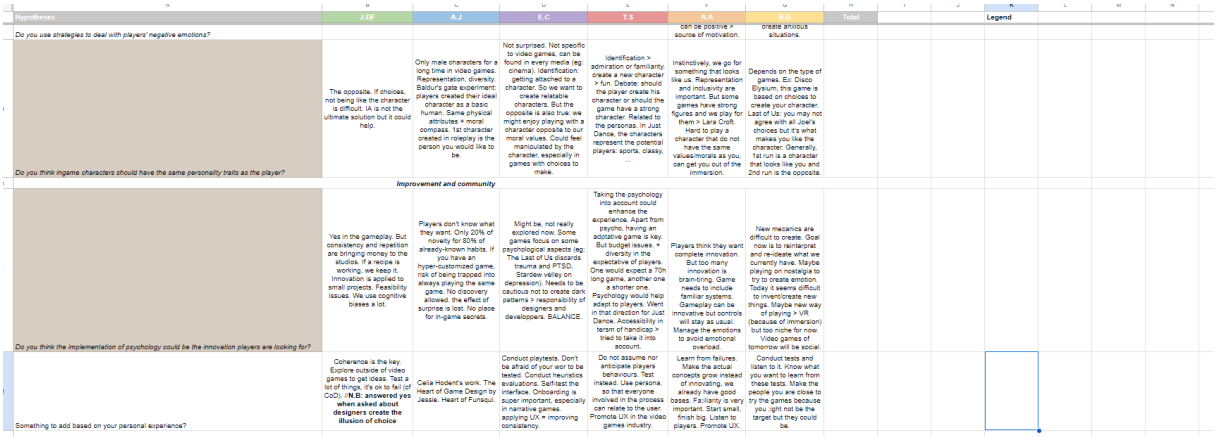
Hypotheses	J.DF	A.J	E.C	T.S	A.A	R.D	Total	Legend
Players engagement, experience and satisfaction								
How do you measure players engagement and satisfaction?	Can't access but request is possible. Player's behaviour. **Persona**.	Retention (drops in ratio were closely examined). Money brought by daily users. Session time. Monitoring users feedbacks.	Playtests, dedicated team. Beginning: need for global information. Follow the protocole to avoid any biases. Formulaire SUS is very useful: provide numbers + general questions so usable for different games. Having a designer during playtests can bias the results.	If the game is released: retention. Can push to very specific KPIs on where the players dropped. If the game is in development: user research, playability/usability tests. In the last moments of development, players test the game.	Game not announced yet so difficult to have global feedbacks. Possible to have feedbacks feature by feature. Can see where the players drop, early or not. Tracking system ingame with markers everywhere to have precise KPIs. When game is live: social media to have feedbacks + KPIs analysis. Any types of tests (playtests, focus groups) > time consuming. Guerilla tests > mini tests (45mins) in 1 week from prep to results. Internal.	Social media (twitch, youtube). Reviews on the store. Achievements ingame. But VR is still a small branch not very well known. Some tests but not enough due to lack of time and information (hierarchy does not understand the utility).		
What design elements are you using to keep players interested in your game?	Renewing the game. Avoid boredom. Multiplayer mode is efficient. Design attract players but don't retain him, gameplay does.	Thought about other gameplays. But in super casual, we need an attractive gameplay to make people dowload the game. But repetition has limits and can lead to boredom.				Reward after a certain amount of levels > either currency or meta-reward. Teasing in the beginning on what happened at the end, but not a fan.		
Please discuss the efficiency of different strategies to keep the players engage.	DLC. Implication of the player in the game makes him want more. Cosmetics/skins not useful.	Skins **give the impression** of progressing, level 1 of retention. Social dimension is the more efficient but the harder to get. Reaching the K factor (talking to friends).	Extrinsic rewards: very common, efficient, might be too repetitive, loot boxes are important. Casino concept is efficient, addictive but ethically is not good. Progression ingame might be efficient depending on the game, **can be there to give the illusion of progressing**, gameplay mechanics depend on the player's mindset. Ingame events might be useful. Level design is the best tool.	Systems of progression. Levels & challenges. Game design is very important here. In Just Dance the challenges very adapted to the personas. Looked content can push the player to explore different playstyles. Progression very useful for casual gamers, in-depth gameplay mechanics efficient on skilled gamers. **Skins gives the illusion of progress.**	Depends on the players. Progression system efficient:Always set small objectives. **Make the player believe.** Narrative: trigger players emotions, make the game "human". DLC: live content, new content every week, always trigger players' motivation, stressful for developers.	Not really concerned beause VR sessions are short (max 3h). Renewal of the powers of the player, the enemies and their behaviours. Level design can help trick the user. Sometimes the decisions are made by stakeholders and we don't have any choice. A short game is better than a long one in my opinion.		
		At the essence of mobile gaming. Burst strategy: a lot of ads in a short time, simple and efficient but						



Hypotheses	J.DF	A.J	E.C	T.S	A.A	R.D	Total	Legend
Please discuss the efficiency of different strategies to keep the players engage.			design is the best tool.	gives the illusion of progress.		opinion.		
Is it possible to use monetization strategies while reinforcing players engagement and reaching business goals?		At the essence of mobile gaming. Burst strategy: a lot of ads in a short time, simple and efficient but morally not good. Less intrusive strategies: players click on the videos to have a reward. Gacha strategies: notion of scarcity and randomization. Ethics issues, depends on each country regulations.						
Immersion, design and emotions								



Hypotheses	J.DF	A.J	E.C	T.S	A.A	R.D	Total	Legend
			Immersion, design and emotions					
Please discuss the efficiency of design, soundtrack and narration to create immersion.	A design is not necessarily beautiful but recognizable. Sounds make the game alive		To enter the gameflow everything matters. Esthetics and sounds are more important but depends on the players. Innovation in gameplay is not mandatory: cf Assassin's Creed or Fifa. Sound should not be necessary for a game to be good, but in some games gameplay is led by music (Just Dance). Gameflow is hard to reach.	None and all of them in the same time. Coherence and consitence. If one of them is off compared to the others, immersion does not exist. Even Just Dance provides a flow state, thanks to recurring characters, global mood and vibe slaying the same aocross different songs.	Coherence and consistency. As long as everything is consistent with what the game promised, the quality does not matter, but every aspect should be on the same level. Narration is not essential but should be enough to understand the universe of the game. Gameplay makes the experience immersive.	We have an interactive soundtrack that changes with the game, and it adds value. Generally speaking, depends on the game. Design is important and can make players forget about technical issues.		
Do you use strategies to deal with players' negative emotions?	Leverage the difficulty of the games. Adapt the game to the emotions the player might be feeling. Balance between too much and not enough.		To identify it: playtests. To manage it: level designer's job. UX designer remove the frictions related to the interface. Always starts with some hypotheses and conduct tests to prove/deny them.	Boredom: avoid repetition. Stress: happens when the player is over stimulated, a good onboarding reduces it. Frustration: timing is key to make sure players learn efficiently the mecanics + prevent errors + educate players > basic UX principles. No heuristics evaluation but playtests > or make people test the flows, even in the early stages. Ideally: every doubt is tested. IRL: just critical topics.	Need for anticipation, but risk of over designing. Need to address only the problems, not inveting new problems. Prevent/managing errors: save systems. Confirmation dialogs to make sure you want to do this action. Stress: clear wordings (UX Writing > localization issues > chinese is very long so it becomes interface issues), players must not look for info, music can warn for ennemies approaching > generate stress but avoid stress of surprise, timing to display these info > to make the player trust the game. Frustration can be positive > source of motivation.	You can punch the air so then release stress and frustration. Frustration: we do not create anxious situations.		
			Not surprised. Not specific					



Hypotheses	J.DF	A.J	E.C	T.S	A.A	R.D	Total	Legend
Do you use strategies to deal with players' negative emotions?					can be positive > source of motivation.	create anxious situations.		
Do you think ingame characters should have the same personality traits as the player?	The opposite. If choices, not being like the character is difficult. IA is not the ultimate solution but it could help.	Only male characters for a long time in video games. Representation, diversity. Baldur's gate experiment: players created their ideal character as a basic human. Same physical attributes + moral compass. 1st character created in roleplay is the person you would like to be.	Not surprised. Not specific to video games, can be found in every media (eg: cinema). Identification: getting attached to a character. So we want to create relatable characters. But the opposite is also true: we might enjoy playing with a character opposite to our moral values. Could feel manipulated by the character, especially in games with choices to make.	Identification > admiration or familiarity, create a new character > fun. Debate: should the player create his character or should the game have a strong character. Related to the personas. In Just Dance, the characters represent the potential players: sports, classy, ...	Instinctively, we go for something that looks like us. Representation and inclusivity are important. But some games have strong figures and we play for them > Lara Croft. Hard to play a character that do not have the same values/morals as you, can get you out of the immersion.	Depends on the type of games. Ex: Disco Elysium, this game is based on choices to create your character. Last of Us: you may not agree with all Joel's choices but it's what makes you like the character. Generally, 1st run is a character that looks like you and 2nd run is the opposite.		
			Improvement and community					
Do you think the implementation of psychology could be the innovation players are looking for?	Yes in the gameplay. But consistency and repetition are bringing money to the studios. If a recipe is working, we keep it. Innovation is applied to small projects. Feasibility issues. We use cognitive biases a lot.	Players don't know what they want. Only 20% of novelty for 80% of already-known habits. If you have an hyper-customized game, risk of being trapped into always playing the same game. No discovery allowed, the effect of surprise is lost. No place for in-game secrets.	Might be, not really explored now. Some games focus on some psychological aspects (eg: The Last of Us discards trauma and PTSD, Stardew valley on depression). Needs to be cautious not to create dark patterns > responsibility of designers and developpers. BALANCE.	Taking the psychology into account could enhance the experience. Apart from psycho, having an adotative game is key. But budget issues. + diversity in the expectative of players. One would expect a 70h long game, another one a shorter one. Psychology would help adapt to players. Went in that direction for Just Dance. Accessibility in terms of handicap > tried to take it into account.	Players think they want complete innovation. But too many innovation is brain-tiring. Game needs to include familiar systems. Gameplay can be innovative but controls will stay as usual. Manage the emotions to avoid emotional overload.	New mecanics are difficult to create. Goal now is to reinterpret and re-create what we currently have. Maybe playing on nostalgia to try to create emotion. Today it seems difficult to invent/create new things. Maybe new way of playing > VR (because of immersion) but too niche for now. Video games of tomorrow will be social.		
Something to add based on your personal experience?	Coherence is the key. Explore outside of video games to get ideas. Test a lot of things, it's ok to fail (cf CoD). **/N.B: answered yes when asked about designers create the illusion of choice**	Celia Hodent's work: The Heart of Game Design by Jessie. Heart of Funquoi.	Conduct playtests. Don't be afraid of your wor to be tested. Conduct heuristics evaluations. Self-test the interface. Onboarding is super important, especially in narrative games, applying UX = improving consistency.	Do not assume nor anticipate players behaviours. Test instead. Use persona, so that everyone involved in the process can relate to the user. Promote UX in the video games industry.	Learn from failures. Make the actual concepts grow instead of innovating, we already have good bases. Faillarity is very important. Start small, finish big. Listen to players. Promote UX.	Conduct tests and listen to it. Know what you want to learn from these tests. Make the people you are close to try the games because you right not be the target but they could be.		

You can see the thematic coding more in details here:

https://docs.google.com/spreadsheets/d/1IBeUkKhSAQhlQ73hm0zNolmGYJH7mDBBQXOQb6tF6Rk/edit?usp=sharing