Previous experience of a video game player and its effects on video game development

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This thesis presents what kind of effect the video game player's previous experience with video games has with their performance in new video games, as well as how does the current video game development industry take this into account in their game design. The insight from this research can be used to make video games more accessible, balanced, and enjoyable experience for players of all backgrounds.

To find out the effect of the video game player's previous experience, we conducted an experiment using a video game as a testing tool. This game benchmarked the performance of the participants in the session, and we then compared the results to the participants' previous gaming experience. The results of the test game showed that seasoned video game players performed better than inexperienced players when playing new video games.

This thesis also includes interviews with several video game development companies, where the game design dimension was viewed from the perspective of previous gaming experiences of the player. The companies reported to take the player's previous gaming experience into account in their game design and testing, and how one of the most difficult aspects in game design is balancing the difficulty to the player base possessing differing experience levels in video games.

Based on the findings of the thesis, video game design should be adjusted to accommodate players off all skill levels and types by having a varied tester base in the testing process of the game. Game developers should also take advantage of experienced players capability of performing well in video games they have not played before in their game design choices.

Keywords: game design, video game, flow, player type

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1. Introduction

Video games have grown into a vast hobby for a massive audience in recent decades. It was estimated by Jessica Clement from Statista [1] that the number of video game players around the world was over 2.4 billion at the end of 2023 and the number has been growing over the years. In 2024 the number of gamers increased by another 160 million, making the total amount of gamers 2.6 billion [1]. The age of video game players is also varied, and gaming is not solely a hobby for the children and teenagers, as the age of over 18-year-old video game players was 76% in United States in 2022 [2]. In Finland, 87% of people aged 18-70 reported to play video games weekly and in Denmark the number was 73% for same age group [3].

One of the core aspects of video game development is the game design, which defines the blueprint, from which the video game will be developed. Well-designed video games make the development phase easier and increase the chance of making the video game a fair and fun experience for the player. Designing the game to have the right amount of difficulty for the player is one of the core elements of game design and it is particularly important to make the game as accessible as possible for all types of players.

Video game players themselves vary in terms of their previous gaming experience, which can interfere with the game design. Games that are designed for experienced players might frustrate casual players that do not possess the skill to succeed in the game, while games that are designed for less experienced players can make the game boring for the skilled players. How the video game development companies and developers tackle the issue of accessibility and game difficulty has not been researched in a comprehensive way.

1.1. Goals and research questions

The main research questions this thesis answers are how experienced players compare against novice players in a video game neither party has played before and how big an impact the previous gaming experience has on the skill level of the players. Another research question for this thesis is to answer, how does the current video game development industry consider the previous video game experience of their player base in their game design.

The goal for the thesis is to give insight to potential video game designers and developers to find ways to incorporate methods to make their video game as accessible as possible for both experienced and inexperienced players when designing their game's difficulty. Another goal is to give the reader basic insight into game design and what type of video game players exist.

1.2. Research methods and source material

For studying game design, this thesis uses Ernest W. Adams' book, *Fundamentals of Game Design* [4], to get a general understanding of what game design is, how video games are structured, and what makes video games difficult for the player. Adams' book is also used to understand what different player types exist. For examining the different player types, this thesis also uses Jukka Vahlo's doctoral dissertation, *In Gameplay: the invariant structures and varieties of the video game gameplay experience* [5].

A third book used in the thesis is Michael Salmond's book, *Video Game Design: Principles and Practices from the Ground Up* [3], to examine video game categorizations. This thesis also utilizes multiple studies related to game design and different player types among video game players. The thesis also uses different statistics picked from Statista to explore data about video games. Along with the main sources this thesis incorporates other scientific literature related to game design and development.

To get better insight into how the current video game development industry utilizes the different game design methods regarding the previous gaming background of the players, this thesis uses interviews conducted with different video game development companies. The answers from these companies are then analysed to see broader trends in the industry.

To examine how the video game player's previous gaming experience affects their ability to play new video games, this thesis makes use of a test platform, where the testers' capabilities are assessed. The testers are picked with varying attributes to assess the differences between the players.

1.3. Structure

In Chapter 2, we will go through the core concepts of game design, how video games are structured and what are the elements in game design that cause the video game's difficulty. Chapter 2 also investigates how video games can be categorized into different genres. Chapter 3 examines what different player types exist, using Bartle's, Vahlo's and Salmond's models. These models are then compared to each other and further analysed.

Chapter 4 focuses on the current practices of video game development companies from the perspective of design in video game difficulty conducting interviews. The interview answers are then analysed. In Chapter 5, we will assess the various aspects researched in the thesis by conducting an experiment between experienced and novice players. The results are then gathered into tables and graphs and examined further. Finally in Chapter 6, the results of the thesis will be summarized together with concluding remarks.

2. Game design

Understanding how video games are designed is fundamental to understanding how the players perceive difficulty and how this is considered in game design. In this chapter, the basic structure of the game design is defined, looking first at how video games are structured, and after which what game design comprises of. This chapter also goes through how difficulty is implemented in video games and how video game genres are classified.

2.1. Fundamentals

The fundamentals of video game design consist of two key elements: the video game and its structure. Understanding what makes a video game work and how to best design it is essential to make an enjoyable experience for the player and to achieve the goals of the video game. To understand these elements, this chapter first examines what a video game is and how it is structured. Later this chapter focuses on game design and its principles.

2.1.1. The structure of a video game

The video game itself consists of few elements: The player, user interface and the core mechanics. The player creates input through the game's user interface, which creates actions for the core mechanics. In return, the core mechanics of the game create challenges through the user interface for the player as outputs from the user interface. The actions made by the player and the challenges fed to the user interface create the game's gameplay. [4, p. 51-52]

The user interface itself can be divided into two models: Camera model and interaction model. The camera model refers to how the game world is presented to the player. This involves, for example, the player's perspective, such as first or third person view for the game. The interaction model means the relationship between the player's inputs and the resulting outputs by the game. This creates a model of what the player can do at any given time when playing the video game. [4, p. 51-52]

The user interface and the available gameplay actions create a gameplay mode (see Figure 1). The video game can only have a single gameplay mode available to the player. The gameplay modes can be vastly different compared to each other when it comes to the user interface or gameplay controls. Some games only have a single gameplay mode, but games can also consist of many different gameplay modes. [4, p. 52-53]

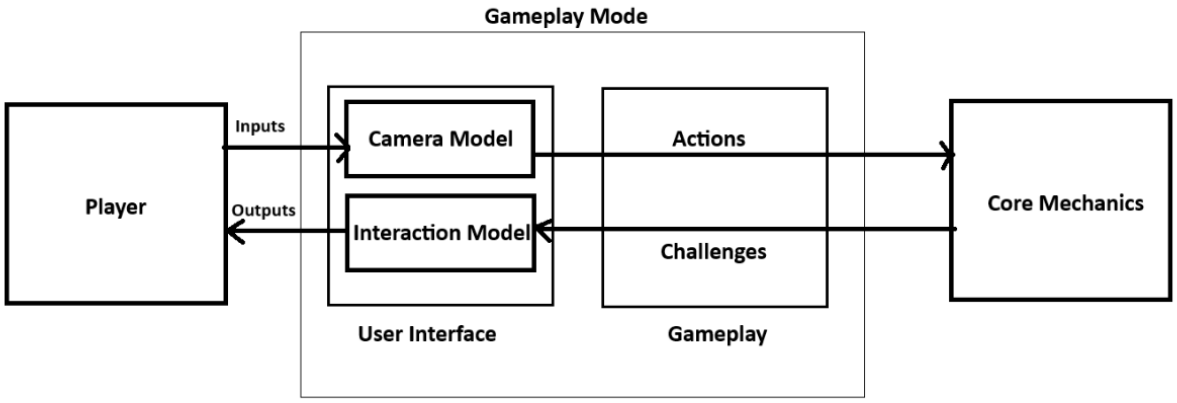

Figure 1: The structure of a video game.

For example, a game can have a map view, where the player is looking at the map. In this map view, the user interface shows locations of different game elements, while the gameplay can be limited to zooming or moving the map. Outside the map gameplay mode, the game can have a more interactive gameplay mode, such as moving the player character in the game world and interacting with different elements in the game. In the latter gameplay mode, the user interface and the gameplay are vastly different to the map gameplay mode. [4, p. 53-54]

The video game alongside the gameplay modes can also have shell menus. Shell menus are game menus, where the player cannot affect the game world, but instead control the game by other means. Some example shell menus are for example, main menu, pause menu and loading screens. Sometimes the player cannot interact at all with the shell menus, which is usually the case for the loading screens of video games, while in other shell menus the player can set different game parameters and options. [4, p. 53-54]

2.1.2. Game design

Game design can be described as a process of five tasks [4, p. 31]:

1. Imagining a game
2. Defining the way the game works.
3. Describing the elements that make up the game.
4. Transmitting information about the game to the team who will build it.
5. Refining and tuning the game during development and testing.

These tasks are performed by game designers in cooperation with the game developers. Game design combines two elements; creative thinking, where the game designer brings the game alive by imagining what the game is and what game design practices are used for the game [4, p.31]. For example, creating a survival game, where the player must survive the elements and build shelter can be an idea for a game that requires creative thinking. How the shelter is built and how does play the player plays the elements are the practical questions for the game design of the imagined game.

There can be many motivations that drive game design. These can be divided into a few categories [4, p. 34-36]:

- Market-driven games
- Designer-driven games
- Technology-driven games
- Art-driven games

Market-driven games try to maximize the sales and profit of the game. This can be seen in the game design by decisions on copying other successful games and choosing game elements to the game thar are currently trending. The downside is that market-driven games can lack harmony and originality, which can hamper the enjoyment of the game. [4, p. 34-36]

Designer-driven games take a different approach compared to market-driven games, where the focus is not on maximizing sales, but to fulfil the image that the game designer has for the game. Designer-driven games can thus be more creative and unique, but this can come at the cost of not

using the most common game design choices, which can make the designer-driven game less enjoyable gameplay experience for the players. [4, p. 34-36]

Technology-driven games are usually games that are designed to show a certain technology that can be related to the game engine's features or other technological achievements. For example, these types of games can be marketed to have the biggest playable area compared to other games. The downside can be that the technology-driven games focus too much on the featured technology and not as much on the enjoyability of the game. If a game features a large map without much content, the technological feat is not going to impress the player. Art-driven games usually display unique artwork or visuals for the game. Like technology-driven games, the downside can be in too much focus on the driving force, in this case art, and less focus on enjoyable gameplay for the player. [4, p. 34-36]

The game design process itself has three distinct stages [4, p. 58]:

- Concept stage
- Elaboration stage
- Tuning stage

In the concept stage of the game design, the fundamental blocks of the game are designed. Unlike the other stages, the concept stage consists of unchangeable implementations that cannot be changed during video game development. What is decided during this stage of the game design is the general idea of the game, and how it will be entertaining for the players. This includes defining the audience the game is designed for. For example, the audience of a game with an art-driven motivation in its design will aim towards an audience keen on its visual experience. A third decision made in the concept stage is the player's role in the game. The player can for example take the role of the main character of the game or control multiple game elements from a "overseer" type of role. [4, p. 59-60]

The elaboration stage takes the initial ideas from the concept stage and specifies the details of the game design. This can for example include building a prototype of the game and designing the specific elements of the game such as the main playable character, game world and core mechanics. This process is usually done through an iterative approach, where an initial version of the game element will be built, then the initial version will be tested, which will reveal what worked, what did

not work, and what more to add. The different video game development phases can require multiple iterations to get finalized. [4, p. 60-64]

In the final stage of the game design, the tuning stage, only fine-tuning is left in the game development. This means that the game will no longer have any more new features added to it, but instead the currently created features are debugged, polished, and adjusted for the final release of the game. This usually includes balancing the game to have the right amount of difficulty for the player. [4, p. 65]

2.2. Difficulty

The difficulty of video games is a complex subject. The difficulty factor for the player can be related to the player's own skill and limitations, the game's own difficulty or usually, the combination of both. A common method of adjusting the difficulty for the player is through a difficulty setting. This allows players to adjust the challenge of the game to their desired level.

Another difficulty modifier in video games is the information given to the player. A video game that guides the player to reach the game's goal will lower the video game's difficulty. Alternatively, a video game that omits a lot of information from the player will rely on the player's ability to understand both the goal of the video game and how to reach the goal. [6]

The complexity of a video game can also increase the difficulty for the player. The more there are game elements that the player must manage such as maintaining different meters at a desired level and keeping track of different numbers, the more challenging the video game is for the player. Different video game genres have some key elements that also vary in their difficulty level.

Players can have different preferences for the game's difficulty level, which can cause issues with the game design. If the game is too difficult, it can frustrate the player, while too easy difficulty level can make the game boring. Some players enjoy difficult games while others enjoy easier and more casual gameplay. Different player types are discussed further in Section 3.1.2.

One way to alleviate this problem is to add an adjustable difficulty level setting. Lower difficulty settings can give the player better positive modifiers such as more durability or power. A lower difficulty level can also lower the number of obstacles faced by the player, such as quantity or competency of enemy NPCs. In games requiring quick reaction time from the player, lower

difficulty can simply mean the player can take a longer time in their actions. Higher difficulty levels, on the other hand, bring different challenges for the player, such as negative modifiers for the player's character, more challenging enemy AI and added complexity to the gameplay.

The differing difficulty factors vary widely depending on the genre of the game. Some games do not possess any adjustable difficulty settings. In these situations, the game's difficulty is fixed, which can bring issues for players, who want to increase or decrease the difficulty. In some cases, the games are marketed to be difficult or easy to play. For example, Souls-like genre, a genre derived from the game *Dark Souls* and the following games mimicking it, is known for high difficulty gameplay with the entries in the genre, while casual games usually cater towards slower paced and easier gameplay for the player.

The difficulty aspect in video game design can also consist of many distinct types of challenges, such as:

- Speed, reaction time and time pressure challenges
- Logical challenges
- Memory and pattern challenges
- Game strategy and tactic challenges [4, p. 308]

Players perceive these challenges differently and can find some elements more difficult to deal with than others, depending on their different attributes and preferences. The player's previous gaming experience can also make some challenges less difficult. For example, a player possessing a good understanding of mathematics can use that knowledge to succeed better in the game such as a game of killer sudoku, that requires the player to make multiple calculations in their head to find the missing numbers.

2.2.1. Difficulty in level design

Berseth et al. [7] examined the optimization of difficulty level in video games. They prepared several testing scenarios for the players and found that making even minor adjustments to the game level caused changes in the game's difficulty level. As a result, they define a basic framework

whereupon game designers can create multiple versions of the same game level while maintaining the game's difficulty level at a desired rate. [7]

In Figure 2, the green box represents the area where the obstacles (brown squares) can be added, removed, resized, or moved. This creates a different path choice for the player that is highlighted with light blue lines. In Figure 3, the layout of the level differs from the first one, by having the obstacles moved in the play area, the possible player movement has changed. The level designer can assess whether the changed simulated paths are desirable for the level both from an aesthetic perspective as well as from a gameplay perspective. [7]

Using the framework, the level designer can edit the game difficulty and see the possible constraints for the player. A level that is deemed too easy by having too many options to complete the stage, the level designer can add an obstacle (an object or an enemy NPC) obstructing one or more of the calculated trajectories of the player character, thus making the level more difficult. Similarly in a level that is deemed too difficult by the level designer, one or more of the obstacles can be removed, opening more possibilities for the player to complete the level. [7]

Another way to increase or decrease the difficulty is to change different environmental parameters of the game. The game designer can modify the player's or the NPCs' stats, such as health, speed, or damage against the enemy NPCs. However, this requires close co-operation between the general game designer and level designers to ensure the game's difficulty does not change dramatically at some levels when the parameters for the base game are changed. [7]

Berseth et al. examine the possible player character trajectory by simulating the possible paths. One downside with this is that the players might not be able to recognize some of the computer simulated paths as easily and end up perceiving fewer options to complete the level. This can make some levels' difficulty from the computer simulation perspective look good for the level designers, but the level will be more difficult for the average player. [7]

Conversely, some players can find diverse ways to complete the level that the computer simulation is unable to consider, using unconventional ways to complete the level, such as using the game elements in an unexpected way or finding exploits. Rigorous game testing using both experienced and inexperienced game testers can alleviate some of the issues with difficulty balancing. [7]

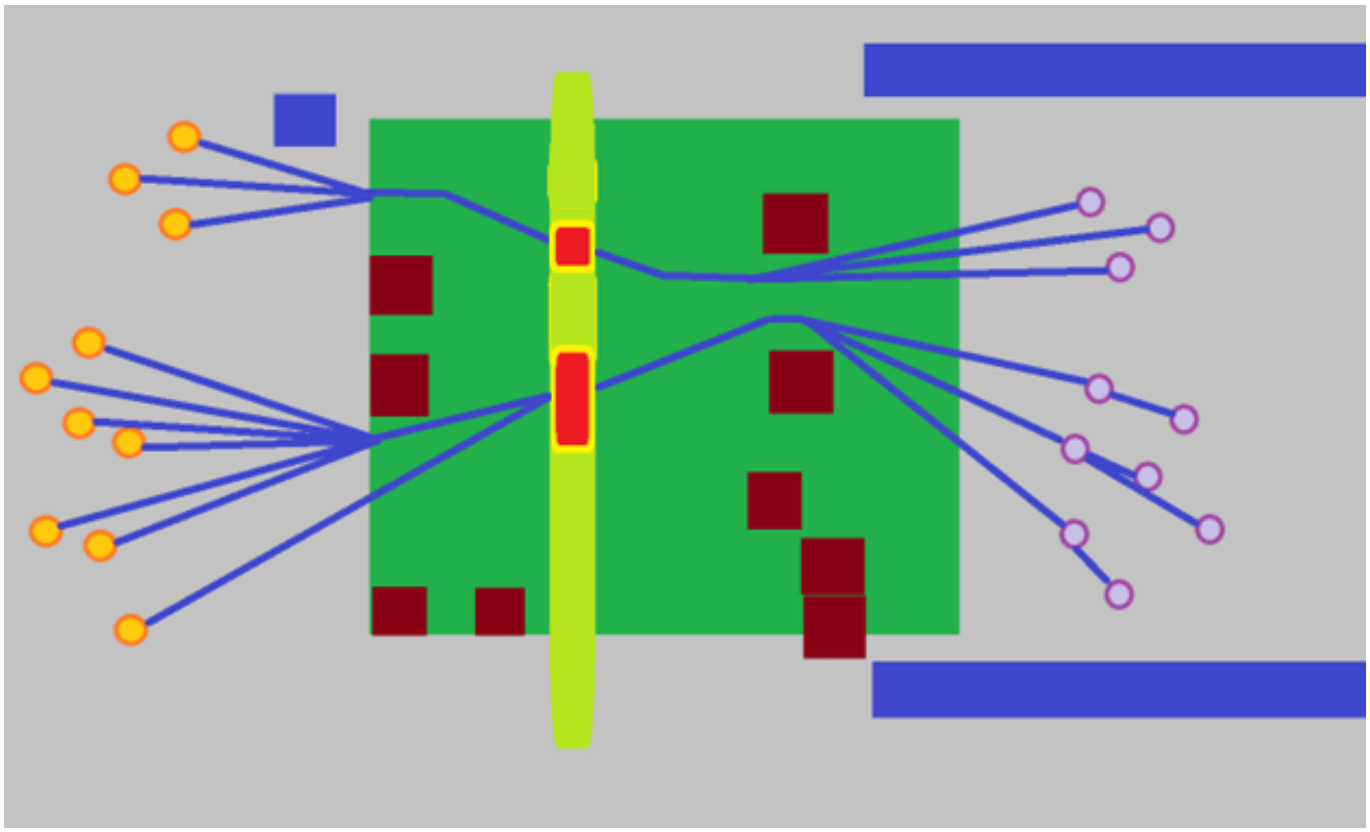

Figure 2: The highlighted rectangle shows how the bounds for obstacle location optimization can be defined. The location and scale of the rectangle can be easily changed.

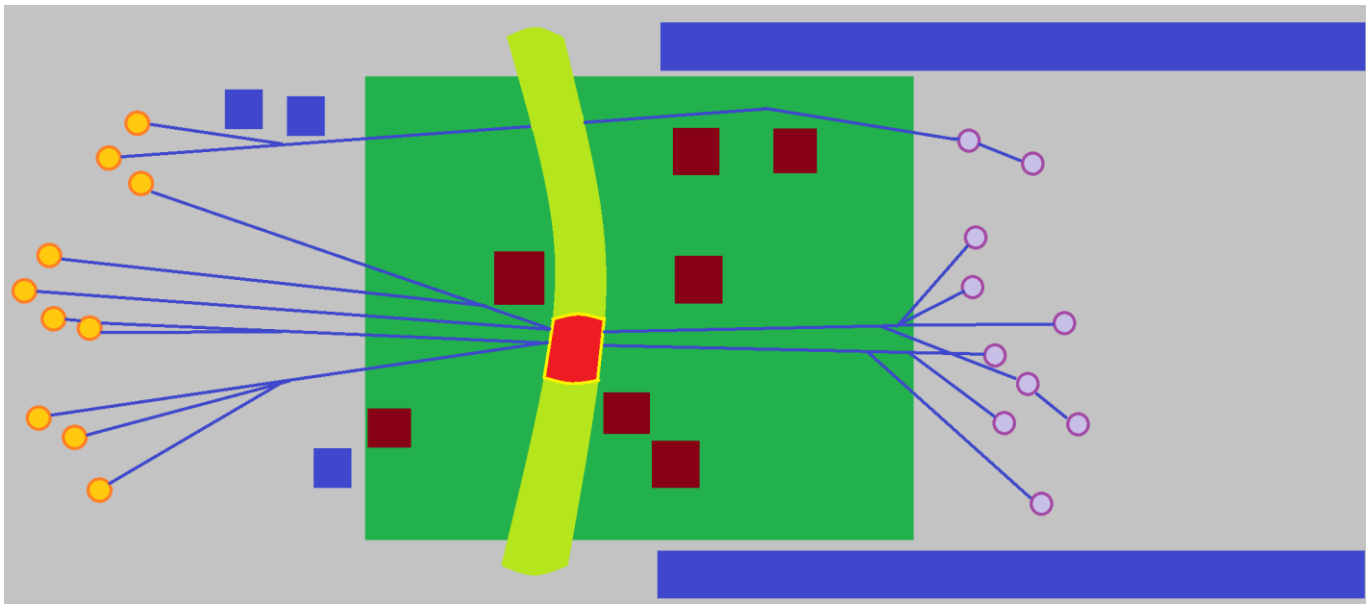

Figure 3: Changed level layup changes the possible paths for the player to take.

2.2.2. Player flow models

Larche and Dixon [8] study the relationship between mobile game's difficulty, flow, and expertise. They claim that previous research had mostly focused on adjusting the skill-challenge balance by modifying the speed of play. Larche and Dixon try to examine the difficulty balance by modifying the complexity of the puzzles.

Larche and Dixon describe the skill-challenge balance as one of the cornerstones of video game design, where the goal is to achieve a flow state for the player. Larche and Dixon mention three different flow models in their study:

- Classic Model of Flow
- Quadrant Model of Flow
- Skill-Challenge Balance Models "Inverted-U" Pattern of Flow [8]

In the Classic Model of Flow (see Figure 4), the flow state is achieved when the player's skill matches the challenge of the game. If the player's skill becomes higher in relation to the challenge, the player can perceive boredom, but if the game's challenge grows higher than the player's skill, the player will instead get anxiety. As the player's skill rises by playing the game, the game should aim to increase its challenge accordingly. [8]

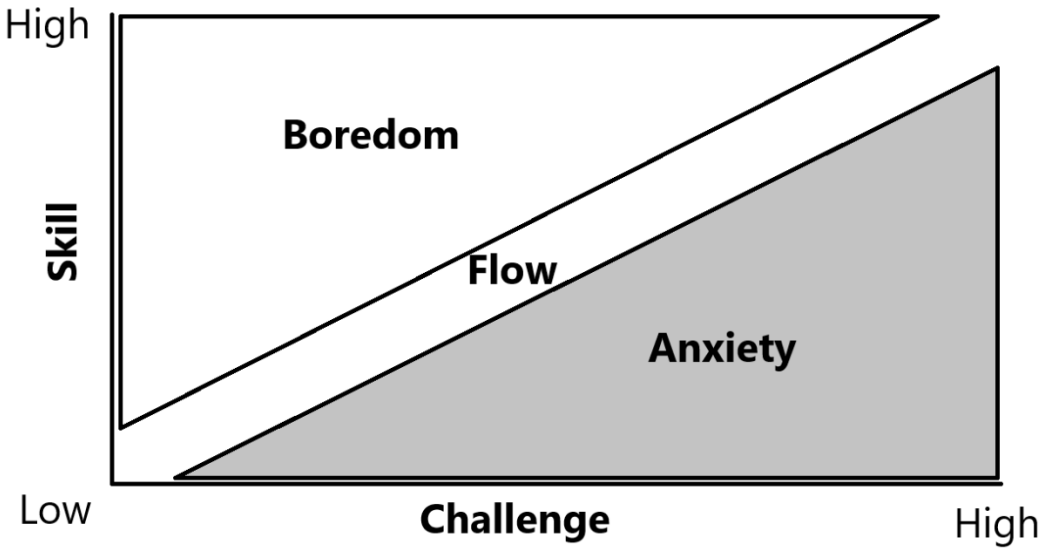

Figure 4: Visualization of the Classic Model of Flow

The Quadrant Model of Flow (see Figure 5) is like the Classic Model of Flow, but adds a fourth element alongside boredom, flow, and anxiety states: apathy. In the first flow model, the player is thought to achieve the flow state even with low level of skill and challenge if these elements are matched with each other. However, in the second flow model, low skill level and challenge in video games will result in apathy for the player. For example, when the player is starting to play a new game and has initially a low level of skill, they learn the game's mechanics. At the same time, most video games ease the player into the gameplay and mechanics by introducing the game's initial levels with low challenge. This can create a temporary state, where both the challenge of the game and player's skill are low and causes apathy in the player rather than the ideal flow state. [8]

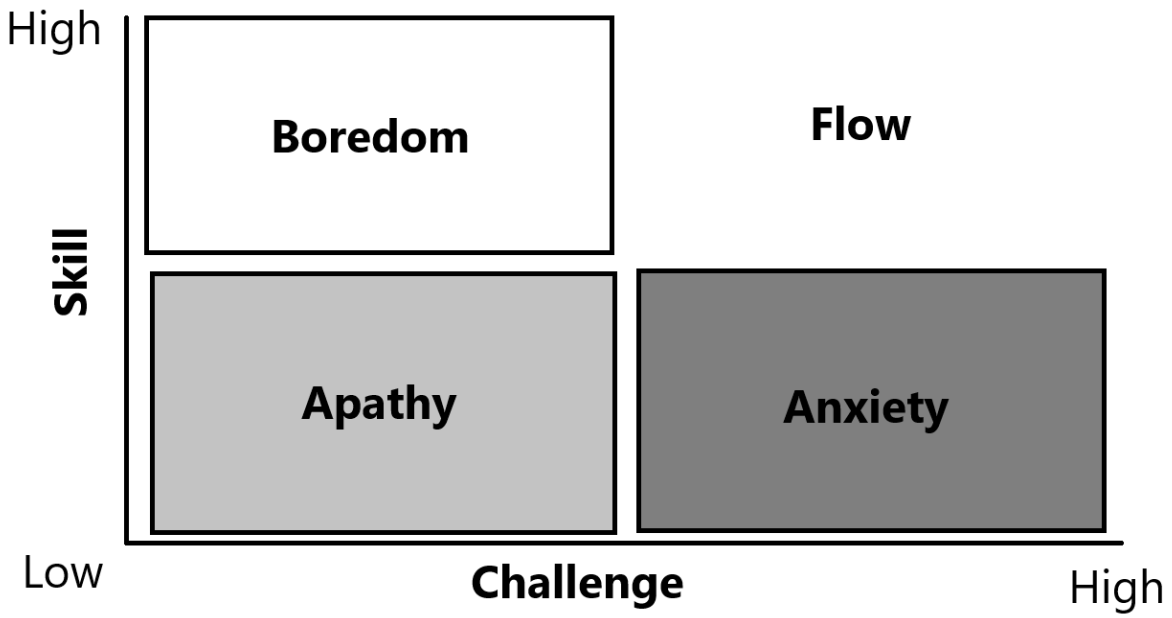

Figure 5: Visualization of the Quadrant Model of Flow

The "Inverted-U" Pattern model of flow (see Figure 6) has a different approach compared to the other two flow models. The third flow model measures the player's motivation to engage in the game activity based on the difficulty. If the player perceives the game too easy or hard, the player is at the lower levels of engagement with the game and within the inverted U-shape. As the game becomes more balanced between the east and hard difficulty, the player's engagement increases and reaches the apex of the inverted U-shape, when the player's perceived difficulty is optimally balanced. [8]

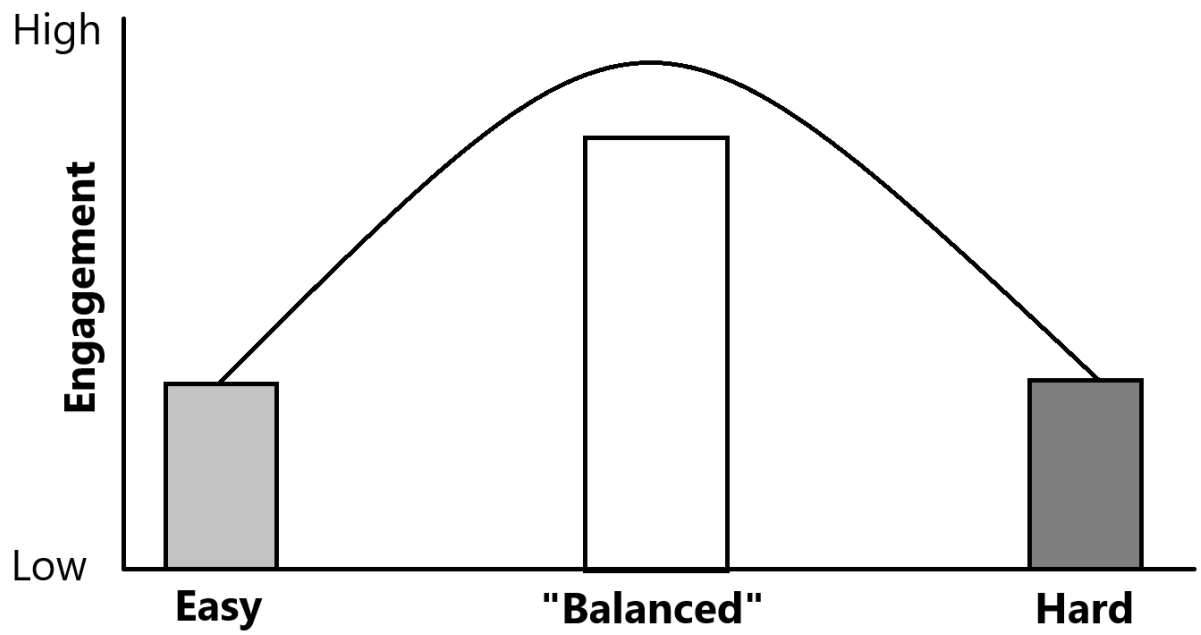

Figure 6: Visualization of the “Inverted-U” Pattern of Flow

Larche and Dixon find issues with the first two models’ element of anxiety, which was achieved when the player’s skill is too low compared to the challenge. They observe that feeling of anxiety can be connected to other elements of gameplay such as nearly missing a “level up” or missing an important game object. Larche and Dixon instead suggest the “anxiety” element of the flow models to be switched to “frustration” element, as frustration should be minimal for games that are perceived to be easy and frustrating when the game difficulty spikes above the player’s skill level. [8]

Larche and Dixon aim at observing the relationship between skill-challenge balance and flow by increasing the game complexity instead of the gameplay speed. They had seventy-two participants play a mobile game, *Candy-Crush Saga*, where the difficulty of the game increased, as the participants completed previous levels. The participants then filled in a game experience questionnaire, which is used to track the player’s flow state by asking for a scale rating with perceived difficulty, boredom, frustration, and excitement. [8]

Larche and Dixon found that the boredom of the players was highest when the players were playing at the easier levels and lowest during the harder difficulties. However, the players’ boredom was not much higher between regular and hard difficulties. The frustration was perceived to grow steadily as the game's difficulty grew higher. The players’ excitement also grew steadily from easy to hard difficulty levels, albeit at a much slower rate. [8]

The perceived skill of the participants dropped as the game difficulty spiked and conversely, the perceived challenge got higher when the game difficulty increased. Larche and Dixon studied the balance of the game difficulty by calculating the absolute difference between subjective skill and challenge score. They found that the game was the most balanced at the regular difficulty level, while the game showed signs of imbalances with easy and hard difficulties. [8]

Larche and Dixon noticed that while the players showed the highest level of flow state with regular difficulty, the flow state remained high on hard difficulty as well, while easy difficulty showed a much lower state of flow. This indicates that it is more important to not make the game too easy for the players rather than too difficult to achieve the highest flow state. They also noted the players' skill-challenge balance for the regular games followed similar patterns as the theoretical one to one skill-challenge balance (see Figure 7). [8]

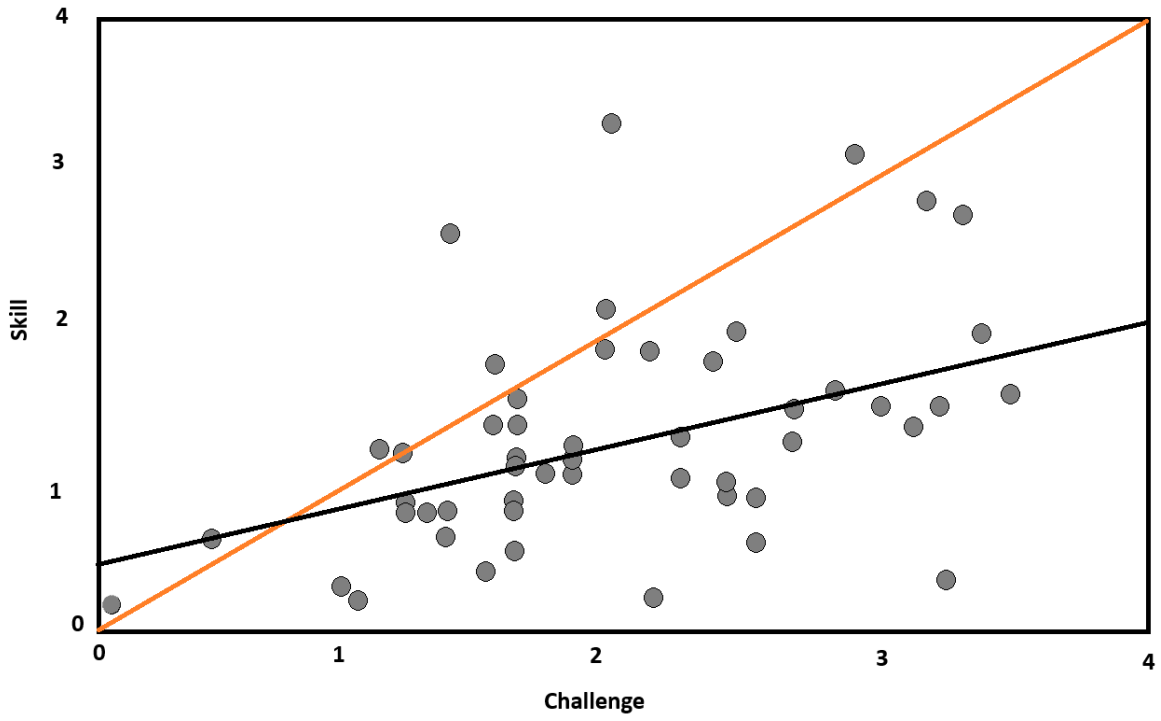

Figure 7: Scatterplot depicting the relation between skill and challenge for all participants for the regular games. The orange line indicates the theoretical balance between skill and challenge and the black line the studies average balance.

Larche and Dixon conclude that the classic skill-challenge balance model of flow might not catch some of the nuances of increased game complexity, as the flow state remained high both in regular

and hard difficulties. They also state that the competence of the player plays an immense value for reaching the flow state as being able to play difficult video games requires a prominent level of skill to not go toward the territory of frustration. [8]

Based on Larche's and Dixon's conclusions, to maximize the flow state of the player, game design should focus on increasing the player's skill level as much as possible. By increasing the player's skill level, the game can then offer more challenging levels to increase the chance of heightened flow state. If the player is not helped to reach a high enough skill level, the increased difficulty will lead to frustration. The other option is to lower the difficulty of accommodating the player's low skill level, but this results in apathy and lack of flow state for the player.

2.2.3. Absolute, perceived, and relative difficulty

Another way to view a player's difficulty is Adams' [4] concepts of absolute difficulty, perceived difficulty, and relative difficulty. Absolute difficulty is the relation between the required intrinsic skill to succeed in the game and the player's stress level. According to Adams, the stress level is connected to the video game's time pressure; how much time is given to the player to complete the task in the game, while the required skill of the task is independent of the time pressure.

Adams mentions that, for an enjoyable game experience for the player, the required skill should be adjusted with the stress by giving the player more time to complete a task, if the task is difficult and conversely, increase the stress by demanding the player to complete the task faster if the required skill is low. Perceived difficulty on the other hand means the player's own perception of the game's difficulty. Perceived difficulty consists of four factors:

- Intrinsic skill
- Stress
- Provided power
- In-game experience [4]

Intrinsic skill and stress are both elements that create the absolute difficulty of the game. The provided power in this context means improved abilities for the player character. These could

include, for example, new or better weapons, abilities, increased health, or some other game element that makes the game experience perceivably easier for the player.

The in-game experience means the player's improved skill at playing the game. This can manifest for example by having the player get accustomed to the game mechanics, finding exploits or secrets, and learning the optimal method to complete the game's objectives. This is not to be confused with the concept of previous experience, which is the player's skill in playing other similar video games. [4]

Relative difficulty is also related to absolute difficulty and is calculated by the relation of absolute difficulty and the power provided to the player. If the absolute difficulty of the game grows faster than the provided power to the player, the relative difficulty of the game grows and vice versa if the player is given power faster than the growing absolute difficulty, the game's relative difficulty becomes easier. [4]

To create smooth difficulty progression, the game's absolute difficulty must increase as the game progresses. As the absolute difficulty climbs up, the player should be given more power to be able to face the increasing challenge. This makes up for the relative difficulty of the game. Finally, with the gained in-game experience, the player becomes better at the game, further lowering the difficulty of the game for the player, and this makes up for the perceived difficulty (see Figure 8). [4]

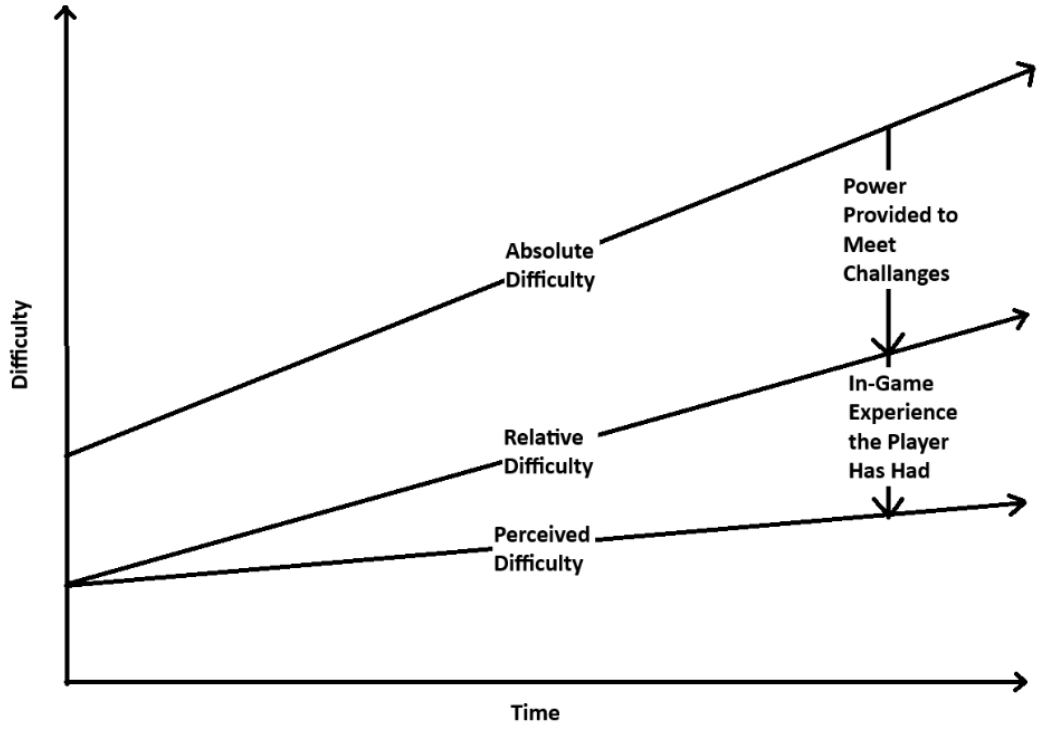

Figure 8: Adams' three levels of difficulty.

It is important to not raise the absolute difficulty at too fast of a rate. This can create too difficult game for the player, even with the given powers and in-game experience. Adjusting the given power to the player is also important, as too small amount will lead to the game being too difficult as the player character is not matched with the increased absolute difficulty, but also too much power will lead to too easy a game for the player.

The player's in-game experience should also be considered with difficulty adjusting, as too difficult game in the beginning can make the player frustrated and as a result give up playing the game before gaining the experience to make the game's difficulty easier. The difficulty in the beginning can be adjusted by tutorials and other information that eases the player into the game.

2.3. Video game genre classification

A common way to organize different media such as books, tv-shows and movies is splitting them into different genres. Video games are no exception to this, and they can be split using genre classifications. This chapter goes through the classic way of video game classification, what problems have risen from its use, and new improved ways of classifying video games.

2.3.1. Classic video game genres

Video games can be split into multiple different genres. The game genres bring massive differences into the gameplay and thus to the difficulty of the game. Some of the genres share some difficulty modifiers, while some have game design elements that are missing from other genres. For example, a first-person shooter game can adjust difficulty, by changing the configuration of the players and enemy NPCs weapons. There are also other adjustable elements such as the accuracy of the NPC and the health of the players.

Some of these elements such as players health bar and enemy quantity can be seen in other genres, where one of the goals or difficulty aspects can include an enemy NPC such as platformer games. Resource management games can on the other hand have difficulty elements that are missing from the shooter game genre, like balancing resource production.

A popular PC gaming platform Steam [9], developed by Valve Inc., has split game genres into six main categories:

- Action
- Role-Playing
- Strategy
- Adventure
- Simulation
- Sports & Racing

These main genre categories are then further split into six subcategories per main category. Taking one main genre as an example, the action genre is split into subcategories [9]:

- Arcade & Rhythm
- Fighting & Martial Arts
- First-Person Shooter
- Hack & Slash
- Platformer & Runner
- Third Person Shooter
- shmup (shortened from ‘Shoot them up’)

These categories and subcategories help the user to see video games with certain characteristics related to the genre. One issue one could find from the way Steam categorizes video games could be too close similarity between the subgenres. For example, Shoot them up, First-Person Shooter and Third-Person Shooter subgenres share a lot of the same games, as all these categories share the same basic principle of the player character shooting enemy characters in the game. However, this can still be useful for people looking for a specific characteristic from the game. Players looking for specifically shooter games, where the player is depicted from a third person view benefit from having the Third Person Shooter as a separate genre from just shooter games.

Another way Steam categorizes the games is splitting games based on the number of players the game supports or what type of online support the games have. Steam has seven Player Support categories [9]:

- Co-Operative
- LAN (shortened from ‘Local area network’)
- Local & Party
- MMO (shortened from ‘Massively multiplayer online’)
- Multiplayer
- Online Competitive
- Singleplayer

Some of these Player Support categories cascade with other categories. For example, Online Competitive and MMO player support are also within the Multiplayer Player Support genre, as both

categories are played with multiple people. Steam also has special sections, where the games are separated by platform, such as games supported by the Steam Deck, Controller-Friendly games and VR supported games. [9]

2.3.2. Issues with the classical game genres

The use of classical genres when categorizing video games has its own issues. Clarke et al. study [10], some of the limitations of the video game genres. In their analysis, they find video games challenge the old classification of genres, as compared to the traditional media, such as books, tv-shows and movies, video games are an interactive process. As the player interacts directly with the game, this makes the process of interaction more complex and thus more difficult to narrow down with the classical genres.

One issue brought up by Clarke et al. is how game genres do not involve bigger characteristic differences of games under the same game genre and can be too vague for the players. For example, the games *Grand Theft Auto* and *Super Mario Bros.* are both labelled as action games. While both games share some of the characteristics of the action genre, the gameplay differences are significant, as *Grand Theft Auto* is an open world shooter game with stronger emphasis on a narrative story, while *Super Mario Bros.* is a platformer game with emphasis to the gameplay. Players who enjoy one type of action game might dislike the other, limiting the benefit of the classification of the genre. [10]

Clarke et al. also bring up issues about the genre classification of complex video games. One example is the game *MineCraft* that has been labeled to be included in the following genres:

- Sandbox
- Survival
- Simulation
- Action
- Adventure
- Fantasy
- City Simulation
- Strategy

- 3D
- First-person [10]

The multitude of genres causes issues, as the player does not know how big the different genres are in the game. For example, the amount of action in the game *MineCraft* can depend on the player's choices, and the game also offers a game mode that removes enemy NPCs from the game, which can reduce the action element completely from the game. Thus, a player who enjoys peaceful games might overlook the game, as they are unaware of how action genre plays in the game, if the player is instead interested in Adventure genre elements. On the other hand, some action games like *Grand Theft Auto* cannot be played extensively without playing into the elements of the action genre, making it unsuitable for players uninterested in action genre motifs. [10]

Clarke et al. mentions what is the best practice for classification of video games. This involves two types of exclusiveness: mutual exclusivity and joint exclusivity. Mutual exclusivity in classification means that two elements do not overlap with each other. For example, Action and Shooter genres can both have the element of destroying enemy NPCs as a game element and thus are not exclusive. Joint exclusivity instead means every item can be placed in some genre. With video game genres, this means every game can be placed under some game genre classification. However, Clarke et al. do not see this type of ideal classification as possible, as video games are too complex to be labelled with such a pinpointed classification system. [10]

Another problem examined by Clarke et al. comes from the subjectivity and fluidity of the genres themselves. People from diverse backgrounds and cultures can see game genres differently making it difficult to find a mutually agreed and understood genre classification. There is also the issue of constantly evolving understanding of game genres, where new genres are born based on newly created game mechanics and elements. This creates difficulty for the users to understand the different classifications. Clarke et al. conclude that a new way to classify games could create better insight for the players to understand the different game categories. [10]

2.3.3. New approach to classify game genres

With recent development of video games utilizing new and wider range of game mechanics, discussion about recategorization of game genres has been brought forward. A study conducted by Doherty et al. [11] examines the need for recategorization of older genres. The study underlines that

by recategorizing older video game genres, further studies comparing the player skills to each other will become easier. The researchers suggest five ways to assort the video game genres:

- Aesthetics
- Control Action
- Psychological Effects of Game Attributes
- Perceptual, Attentional, and Cognitive Benefits
- Game User Reactions

Examining the categorization of aesthetics, Doherty et al. examine that the player can be motivated to play video games by different aesthetics of the game, such as sensation, fantasy, narrative, challenge, fellowship, discovery, expression, or submission. They find that aesthetics categorization attempts to define games more from the player's purpose of playing the game rather than from the attributes and mechanics of the game itself. One of the advantages of using aesthetics as a category compared to more traditional game genres according to Doherty et al. is the ability to compare games based on the games' goals rather than mechanics. By doing this, even games with differing mechanics can be compared with each other. [11]

Control Action on the other hand is a categorization described by Doherty et al. as the limitation of controls of the player. It includes the possible movement inputs that the player is capable of as well as the limit where the game punishes the player for failing to follow the correct control actions in the game. This categorization allows games to be compared based on their movement type regardless of other differing aspects like visuals and story. Doherty et al. divide control actions into four aspects:

- Frequency of interaction, how frequently the player must interact with the game to avoid failure.
- Degree of error tolerance, how many errors can the player make with controls of the game without losing the game.
- Consistency of movement, the consistency of the controls of the game.
- Control movement type, what controls are available for the player, such as keyboard buttons, touchscreens, handheld controller buttons and switches etc. [11]

One way to categorize games according to Doherty et al. is through the psychological effects of game attributes. This category examines what player abilities and skills are needed to succeed in the game. For example, some games require the player to memorize different patterns to complete the stage while other games require motor skills and reaction time to succeed. Doherty et al. divide these into three psychological constructions:

- Motivation
- Skill-based Learning
- Cognitive Processes and Knowledge [11]

These psychological constructs have related game attributes. For example, the players' motivation can be linked to game attributes of representation, feedback, and rules/goals. These attributes in the game can be the source of the player's motivation for playing the game. For skill-based learning, Doherty et al. identify game attributes that relate to the player's control over both the game and the process of learning its mechanics. These skills can be honed by the player to become better at the game. The final psychological construct, cognitive processes and knowledge examines the game's attributes of challenge, adaptation features and conflict. Previous experience in video games can for example make it easier to play new games that have similar mechanics and challenges. [11]

Looking at the Categorization by Perceptual, Attentional and Cognitive Benefits category, Doherty et al. conclude that beyond improving hand/eye coordination, video games can provide the player with many benefits depending on the type of game. According to Doherty et al., one way to categorize video games could be through identifying what specific benefits the game provides for the player, for example improving the player's visual acuity, contrast sensitivity, useful field of view and mental rotation. However, these improvements have not been evaluated using a placebo-controlled, double-blind method, and thus cannot yet be claimed with accuracy to bring the benefits to the player. [11]

The final categorization suggested by Doherty et al. is by the player's reaction to the video game. Doherty et al. mentions the Game User Experience Satisfaction Scale (GUESS), which is a scaling system that utilizes nine distinct aspects of video games that the players enjoy the most. GUESS's dimensions are the following:

- Usability
- Enjoyment
- Play engrossment

- Narrative
- Audio
- Aesthetics
- Visual aesthetics
- Creative freedom
- Personal gratification
- Social connectivity [11]

Doherty et al. assesses that scoring the GUESS's dimensions could divide games by their aspects and by the player's reactions. Games within the same dimension category have a great likelihood of being enjoyable for players that value highly the same dimension category. One issue mentioned by Doherty et al. is the lack of an objective way to measure these dimensions. To gain accurate data using GUESS's dimensions, the games need to have a separate benchmarking system, so that they can be properly compared to each other without bias. [11]

3. Player types

Video game players can be split into diverse groups, which can help us understand their motivations. In this chapter, the thesis goes through three player type definitions made by three different researchers. These three different approaches for categorizing player types are then compared to each other.

3.1 Bartle

There are multiple types of video game players, ranging from different attributes like age, gender, and previous gaming experience, to preferences and personality types. Richard Bartle in 1997 split player types into two axes [4, p.490]; the player-oriented – world-oriented axis and the enjoy acting – enjoy interacting axis (see Figure 9). This axis generates four types of players:

- Killers
- Achievers
- Socializers
- Explorers

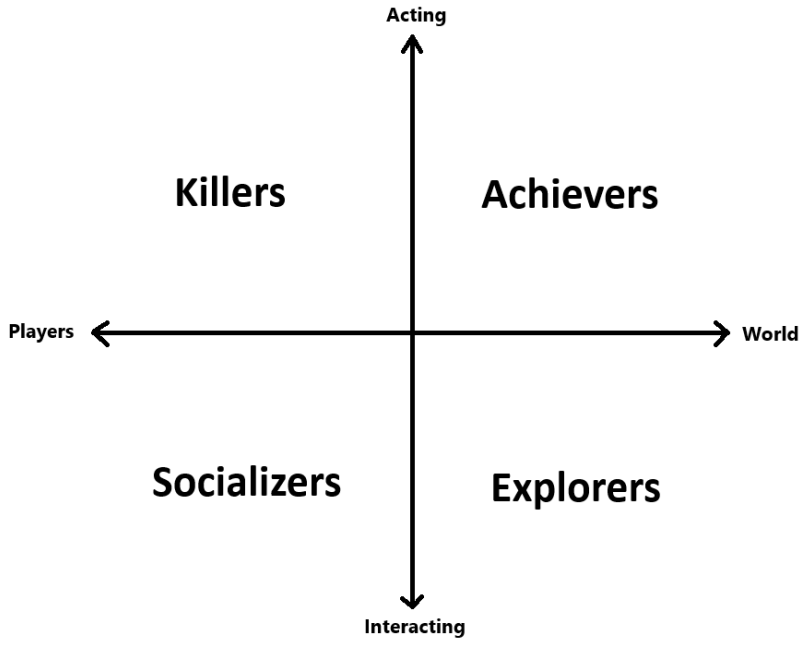

Figure 9: Richard Bartle's player type axis

The killers, who consist of under one percent of gamers, are competitive gamers, who are motivated to win against other players. They feel rewarded for gaining points and getting winning statuses in games. Achievers, who consist of around ten percent of gamers, are similarly to killers motivated to gain points and winning statuses. They get enjoyment from gathering different achievements but are less competitive compared to killers. [12]

Socializers are by far the biggest group of gamers, around 80 percent. They enjoy collaboration with other players and other social aspects of video games. The final group of gamers, explorers, who consist of around ten percent of gamers, get their motivation through discovering added content in video games and exploring the game world. [12]

Bartle bases his studies on behavioural segmentation, where he tries to find common patterns in video game players' behaviour towards the game. Some of the variables of this type of segmentation include benefits sought in a game, user status and usage rate. The gamer tries to get a benefit from the game, such as relaxation and entertainment. [12]

3.2 Vahlo

Other models of player types have also been made after Bartle's model. Vahlo studies in his doctoral thesis the player types from another perspective from Bartle [12 p. 60]. According to Vahlo, Bartle studies why people play video games, while he wants to focus more on what kinds of video games people prefer.

Vahlo examines what are the motives of the players' gameplay and based on that, can one identify or form specific categories. In his study, 1,718 respondents' motivations as players were categorized into five main categories, based on a 33-question questionnaire conducted for the participants [5]:

- Assault
- Manage
- Journey
- Care
- Coordinate

In assault motivation category the player receives gratification when performing aggressive behaviour in video games, such as destroying game objects, killing enemy characters, and conquering territory. The management category appeals to players who enjoy city building, management, crafting, and material gathering. [5]

For the Journey motivation category, players had interests related to collecting collectables, exploring the game world, and making meaningful decisions as the player character. The Care category instead motivates players to affectionate actions, for example caring for pets or managing relationships. The final motivation category, Coordinate, focuses on games such as rhythm and platformer related games, where the player uses reaction time to succeed in the game. [5]

Using standardization techniques, Vahlo found seven clusters from the testing group gravitating to the various categories (see Figure 10). In the first cluster, the participants showed greater preference towards Assault category while showing disinterest towards Care category compared to the other clusters. The clusters participants consisted 76% of men, had an average age of 31.6 years and were 19.5% of the total respondents. The gameplay time was also large in the first cluster, as the participants had the highest average gameplay time in a week, amounting to 17 hours and 10 minutes. As the participants in this cluster enjoyed the assault categories actions, this player cluster was named The Mercenary. Players in this cluster favoured sneaking, shooting enemies, killing, and executing battle tactics. [5]

For the second cluster of participants, Vahlo deliberated that the players disliked the Assault category and showed great interest instead in the Care and slight preference in Manage and Journey categories. Of this cluster, 72% were women and the average participant age was 40.8 years. The average gameplay time per week was also smaller compared to the first cluster, amounting to 10 hours and 40 minutes. The participants in this cluster were named The Companion. Participants in The Companion cluster consisted of 8% of the total participant list, making it the smallest player cluster. The Companion cluster's players preferred mostly befriending in-game characters, character creation and city/village development. [5]

Vahlo found that the third cluster showed great interest in Manage while showing less interest in the other categories. Most participants in this cluster were men, amounting to 73% and having the average age of 37.8 years. Players in this cluster played a total of 13.6 hours in a week and amounted to 18.8% of the total participants. Vahlo called the players in this cluster The

Commander. The Commander type players had preference towards city development and management. [5]

The fourth cluster consisted of players preferring mostly the Journey and to lesser degree Assault categories. Participants in this category were 55% men with an average age of 31.5 years and average playtime of 15.1 hours per week. The fourth cluster's players enjoyed character creation and exploring the game world. Vahlo named the players in the fourth cluster The Adventurer and they consisted of 15.8% of the total participants. [5]

The fifth cluster was like the Adventurer cluster, as the players in this cluster also preferred the Journey category. However, Vahlo examined that the fifth cluster disliked the Assault categories gameplay motifemes and instead enjoyed Coordinate category. Players in this cluster were mostly women, consisting of 78% of the total players and had an average age of 42.3 years alongside average gameplay time of 10.5 hours in a week. The players in this cluster, like the Adventurer cluster, enjoyed traversing the game world, but they showed special interest in collecting rare items and materials. Vahlo dubbed the fifth cluster participants as The Explorer. [5]

For the second last cluster, Vahlo examined the participants preferring mostly the combination of Assault and Coordinate categories while disliking Journey and Care categories. This cluster mostly comprised of men at 69% having average age of 39.6 years and the participants in this cluster played average of 10.8 hours per week. Different gameplay activities enjoyed by the players of this cluster were racing as well as sneaking and shooting. Vahlo named these clusters players as Daredevil. [5]

The last cluster of players unique to other clusters enjoyed only the Coordinate category while disliking other gameplay activities. The participants in this cluster were mostly women at 71% with an average age of 45.3 years and average playtime of 10 hours per week. Vahlo found the players in this cluster prefer gameplay activities such as matching different gameplay elements together and platform elements and item collecting. The players in this cluster disliked many of the Assault categories activities such as killing and destroying. Vahlo named the final clusters players as The Patterner. [5]

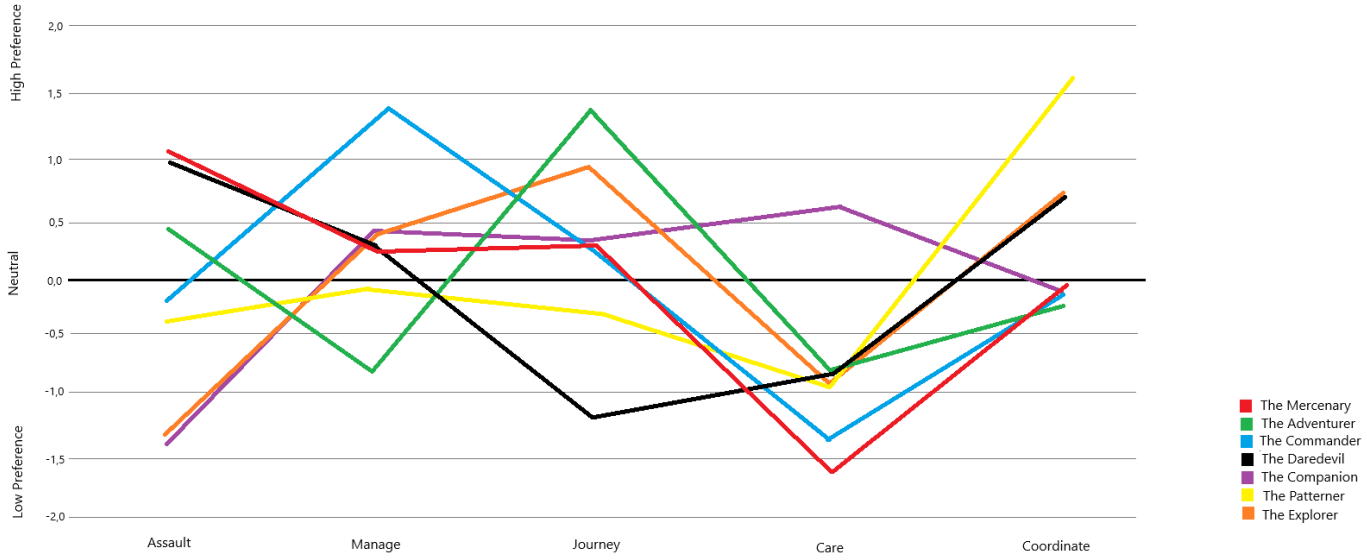

Figure 10: Vahlo's Gameplay Motifeme categories with the seven player clusters preferences.

3.3 Salmond

Another way to differentiate player types is by using already existing psychological categorization models and then implementing them in game design. Michael Salmond studies a method to implement the Big Five (also known as OCEAN) model in game design. Project Horseshoe was an annual conference, that provided a think-tank-like environment for game designers to tackle problems and find unique ways to better game design [13]. Salmond found that Project Horseshoe had created a game design model using the Big Five personality model as its base. These categories form the five domains, which are the following [3, p. 70-71]:

- Novelty, openness to experiences
- Challenge, conscientiousness, self-control
- Stimulation, extraversion, social/active
- Harmony, agreeableness, community
- Threat, neuroticism, negative emotions

Salmond observes that novelty in game design context means game repeatability. For example, games that always have the same ruleset and mechanics would be considered low in novelty, while games that have altering gameplay depending on varied factors would be considered high in

novelty. Challenge in game design is the game's difficulty and the player's ability to hone their skills to be better at it. Salmond mentions how highly challenging games require methodological approach while less challenging games have low or no mastery element in them. [3, p. 70-72]

Looking at the Stimulation category, Salmond translates the category to mean the intensity level at which the game experience is levelled at the player. High Stimulation games would be games that are high in intensity and socialization while games with low Stimulation are more relaxed with pacing and gameplay. Low Stimulation games also tend to lean more towards solo experiences in gameplay. Harmony in game design means shared experiences with other players. A game with high Harmony focuses on cooperative gameplay with other players while a low Harmony game focuses on the individuals' accomplishments and capability. [3, p. 70-72]

The final domain category Salmond examines is the Threat category, which evaluates the negative emotions triggered in the player. Games with high Threat will have more violent gameplay, with objectives of destroying and killing enemies, while low Threat games are more serene and slow-paced, which focus on more positive feedback in game design. [3, p. 70-72]

3.4 Comparison

Looking at Bartle's, Vahlo's and Salmond's models, one can find many similarities with the categorization of different player types. Bartle's Killers category players share many of the same interests with Vahlo's Mercenary type players. These types of players reflected to Salmond's model would find interest in games with high Threat category.

Bartle's Achiever type of players could instead be coupled with Vahlo's Explorer and especially Patterner type of players as they both share an interest in collecting rare items and getting medals and achievements. Salmond's models do not necessarily correspond to this type of player directly. A collection of rare items in games could be connected to the Challenge category, but in rare cases the collection of items in a video game could be made easy for the player, which would vary the Challenge level of the game.

Socializer type of players in Bartle's model could be compared to Vahlo's player types of Companion and to lesser degree Commander, as both player types find enjoyment in relationship building with the NPCs as well as other players in the game as well as management and organizing

of communities. These types of players enjoy the most games with elevated levels of Harmony as well as Stimulation of the Salmond's categories, as the high Harmony games focus on the community and Stimulation type focuses on social activities.

Finally, the Explorer type of players of Bartle's model can be linked to Vahlo's Explorer type, as both types of the same name also share the enjoyment of same activities by exploring the game world. Vahlo's Adventurer type of players could also be linked close to the Explorer type. Players in these categories correspond the most to the Novelty category of Salmond's model.

Comparing these models, Vahlo's model seems to be a more refined and modernized version of the Bartle's model that could be seen, if not outdated, less refined. Salmond's model on the other hand is modelled differently, focusing more on the game type categories, like Vahlo's five main categories, from which Vahlo examined his player types.

4. Current practices in video game development

In 2021, there were approximately 18,500 video game development companies consisting of single-person indie development companies to bigger multinational companies in the United States alone [14]. To understand how video game players' gaming experience is considered, it is important to look at the current practices in the industry. In this chapter, four different video game companies are interviewed on their game design practices. Afterwards, the interview answers are analysed.

4.1. Interviews

To assess how video game development companies use video game design to make games more accessible to casual gamers and challenging for experienced players, I asked a few key questions from four different video game development companies. The questions presented to the companies consisted of the following four questions:

1. How do you take into account the previous gaming experience of the player in the game development?
2. Do you have different approaches with different genres and platforms?
3. Do you test your games with both experienced and less experienced game testers?
4. Can you see any issues with making the game too easy for experienced players or vice versa, too difficult for casual gamers?

The video game development companies were asked in an email to either attend an interview about the topic or to answer the four questions.

4.1.1. Frozenbyte

Frozenbyte is a Finnish game development company that was founded in 2001 and now consists of 80 employees. They are most recognized for their popular game series *Trine*, which is a 2D/3D platformer game. Frozenbyte answered the questions presented in an email.

In the first question of how the company considers the players' previous game experience, Frozenbyte mentioned how they try to create tutorials that teach the players about the different gameplay mechanics as they are introduced to the player for example by using hint messages. The usage of hint messages in their experience works well as it provides enough information to inexperienced players to understand the new mechanic while not hindering more experienced players that want to progress the game quickly without restrictions.

The second question asked whether the differing game genre or/and platform bring any difference to the game designs approach. Frozenbyte answered that the genre differences can bring increased difficulty to the tutorialization of the game. They mentioned that some genres, such as FPS games, can rely more on the player's previous gaming experience in the game design while other genres require a more thorough explanation of all the mechanics.

When asked about whether Frozenbyte uses both inexperienced and experienced gamers in their game testing, Frozenbyte replied how they use friends and partners of the employees that do not possess great amount of video game experience to assess their games difficulty for inexperienced players. On the other hand, they recruit more seasoned testers through forums and other methods to get the experienced players perspective to their games.

Frozenbyte gave one direct example of the importance of testing with their game *Trine* (2009). As the developers made the final level, they radically changed the gameplay compared to the rest of the game. As the developers tested the level, they did not notice the difficulty spiking, as they already had several hours of gameplay. When the game got released, many players gave feedback about the difficulty of the last level. Frozenbyte mentioned that if they had more outside testers, they could have noticed the last levels difficulty for inexperienced players.

The final question asked about the difficulty in game design when trying to make games easy enough for casual players and difficult enough for experienced players. Frozenbyte said that adjusting the game difficulty for casual gamers was an especially challenging task, as the vastly different skillsets and background of casual gamers provides a challenge. With their new game *Has-Been Heroes*, the difficulty has been retaining the inexperienced players' interest long enough for them to understand the mechanics of the game. Frozenbyte estimated that around the 10 hour mark the game's mechanics become familiar, but it can be difficult for casual players to continue playing until that point.

Frozenbyte also mentioned how too easy games can become frustrating for experienced players if their advancement in the game is slowed by too comprehensive guide to the game's mechanics.

4.1.2. Colossal Order

Colossal Order is a Finnish video game development company. Today it has around 30 employees and was founded in 2009. Colossal Order is most famous for its city simulation games *Cities in Motion* and more recently *Cities Skylines* that were published under the publisher company Paradox Interactive. It released its most recent game, *Cities Skylines 2* on October 24, 2023. Colossal Order also answered the presented answers in an email.

The first question again asked about how the company considers previous gaming experience of the player in their development work. Colossal Orders answered to follow the conventions of the game's genre, which in their case is simulation games.

When asked about what different approaches the company takes with different genres and platforms, the company claimed to only work with one genre (simulation games) and could not comment further on that aspect. When it comes to differing platforms, Colossal Order mentioned that they treat PC and consoles in their game design the same way. One major difference is the controller support, which must be considered with UI/UX design.

Colossal Order said to test their games with both experienced and less experienced game testers. When asked about any issues they face with making games too easy for experienced players or too difficult ones for casual gamers, they answered that it is the core challenge of balancing the game. How to make it easy to access but difficult to master.

4.1.3. Potion 8

Potion 8 is a Finnish PC gaming company, which is currently working on its first video game, *Goblin's Die*. The company currently has 5 employees and was founded in 2023. Potion 8's Creative Director Janne Kodisoja answered the presented questions with an email. To give as

concrete answers as possible, Kodisoja referred to the presented questions with the methods of their current game development process.

For the first question, Kodisoja answered that they utilize the customers' previous experiences from other games as well as literature, cinema, and other media. He mentioned in their game *Goblin's Die;* the main theme is goblins. According to Kodisoja, as media pictures goblins as small, weak, and mischievous creatures, Potion 8's team can use the player's already established knowledge about goblins to minimize broader lore creation, while still giving their own unique take on goblins. Kodisoja mentioned how they can use the player's previous assumptions to trick the player into humorous and surprising gameplay situations. He also brought up the player's previous understanding of similar gameplay mechanics from other games such as combat, crafting and movement can be utilized when creating the game's tutorial flow.

For the second question, with the different approaches between different genres and platforms in game design, Kodisoja mentioned, as their game takes elements from older RTS/isometric style of games, which were played on PC, their focus for their game's platform was around mouse and keyboard. However, after the game's test sessions, they noticed how some people preferred to play the game with a controller. Because of that, they decided to add controller support for their game, so that everyone can play in their preferred way.

Potion 8 confirmed to use both experienced and less experienced game testers in their game development. Kodisoja said that their team believes that experienced gamers that have played similar games as *Goblin's Die* will quickly learn the basic mechanics of the game and thus do not want to be stuck reading and going through tutorials. As a result, they have to offer them a way to jump into the story of the game quickly. Kodisoja mentioned that they will test the game also with less experienced players to see how instructive their tutorials are for inexperienced players. He underlines that the responsibility of customer service falls in the hands of the game designers and developers and thus the players' needs should be met regardless of their experience level. Kodisoja gave an example from their current game, where they have developed a combat training area, where the player can train the game's combat system, but can at any time skip the section and move on in the game.

For the final question, Potion 8's team was asked about their view on any issues with developing too difficult game for less experienced gamers and too easy for experienced ones. Kodisoja found that this is one of the biggest challenges to get right in game development. He said that the balance

of difficulty in game development weighs between intuition, data, and user feedback. In Kodisoja's view, when a player finds themself in a difficult stage of the game, they can see the difficulty as a sign that they are not yet ready for the area and come back later. Other players can instead see it as a challenge and try to get through the stage anyway. Because of this, Kodisoja finds the best solution from game design perspective, is to give the choice for players to either go through the game more slowly and make their player character stronger, thus making the game less challenging or go through the game stages faster, thus increasing the difficulty, depending on the player's motivation.

4.1.3. Bugbyte

Bugbyte is a Finnish videogame company having a small three-man indie team. The team consists of the team lead and marketing, lead engineer and art director. Bugbyte is famous for developing multiple mobile games such as *Daredogs*, *Ace Tales* and the *Battlevoid* series. Their most recent game, *Space Haven*, is a PC game, they released in 2020. Bugbyte also answered the presented questions in an email.

Bugbyte answered the first question about the player's previous gaming experiences effects on game development, by mentioning their aim in their game development is to use tried and tested mechanisms to create an intuitive user interface and gameplay mechanics for the user. According to Bugbyte, what is intuitive depends on the game's genre to an extent and as such, they can utilize the player's knowledge of the same game genre's common gameplay mechanics. However, they also underlined that they try to avoid implementing some of the poorer interface and mechanical choices that the game genre can have.

With the second question about approaching different game design choices depending on the genre and platform, Bugbyte specified that every genre requires their own way of approaching the design. Bugbyte mentions that the key is to study other games in the same genre that is being developed and the userbase of the games. From that, one can assess what type of gameplay factors the players will enjoy in the game.

Asking about Bugbyte's game testing method regarding the tester's experience, they mentioned their approach is to use a parallel method of doing their own testing alongside having the players themselves test the game and give feedback to the development team. They do this by giving the

players an early version of their game, and through the player feedback, they can develop their game in a way to make the players happy. For example, their latest game *Space Haven* has been in development for 9 years and the game became available to other players already after the third year.

Bugbyte answered the final question, about game difficulty adjustment for experienced and inexperienced players, that game difficulty balancing is an exceedingly challenging task, because players have a unique way of experiencing difficulty in video games. Their approach is to create a very customizable game, with many knobs and levers to customize the gaming experience and the difficulty level. This way the player can tweak as needed if they feel the game is too easy or too difficult.

4.2. Analysis of the interviews

Looking at the first question presented at the companies, all of them mentioned using the player's previous experience of other video games when developing them. Frozenbyte specified using hint messages in their game, which is a common informational mechanic in other games as well.

Bugbyte takes a similar approach to Frozenbyte, by using mechanics that are commonly seen and used in the same game genre, while avoiding bad examples used in other games. Potion 8 also mentioned how they rely on the player's previous experiences with other media as well, which is used in their game design. Thus, it can be concluded in general that video game companies rely on players' previous gaming experiences and knowledge in their game design.

For the second question, Frozenbyte and Bugbyte mentioned that different game genres bring different game design choices and challenges. Colossal Order and Potion 8 focused more on the platform aspect bringing in challenges for game design. Both companies talked about how controller support must be included in their games.

Colossal Order saw this as a challenge from UI design perspective, while Potion 8 saw the inclusion of controller support as a way for the player to play the game in the way they enjoy the best. From these answers one can assess that different genres and video game platforms change the game design aspect, when developing a video game.

The third question was about the use of players with differing gaming experience in game testing. All companies claimed to use both skilled and casual players in their game testing. Potion 8 highlighted the importance of using players that had differing experiences to evaluate the effectiveness of tutorials. Frozenbyte also came to the same conclusion, where they noticed that lacking inexperienced players can make the game too difficult for casual players.

Bugbyte brought forward their own way of testing with a larger player base during the development of the game, which covers a wide range of skills. Based on the response, the usage of both inexperienced players and experienced players is used commonly in the game testing of video games.

For the fourth question, the companies were asked about issues making games too difficult or easy for the varied player base. All the companies found this to be one of the biggest challenges when developing a video game. Frozenbyte has found it more difficult to retain casual players interest in learning the mechanics of their game and the key thing to focus on is to get their players to reach a pivotal point, where they have mastered the core concepts of the game.

Potion 8 relies on creating a game environment, where the player is able to choose between staying in the tutorial area and continuing towards other challenges. Bugbyte instead prioritizes the customizability of the game, so that the players can balance the difficulty by themselves.

Frozenbyte mentioned their issue of retaining the player's interest to learn the core concepts of their game. If the game introduces too much of a challenge to the players, the players can fall to the "anxiety" bracket of the flow model [8]. This indicates that Frozenbyte along other video game companies find it challenging to balance the amount of difficulty for the player.

A way to alleviate this is to slow down the introduction of new concepts for the player. This will give the player time to get comfortable with the initial mechanics of the game, before jumping to more complexity. However, it is also important to give the player possibility to increase the complexity and difficulty of the game, if they are already familiar with the game's mechanics, as too slow progression will lead to apathy [8]. This type of customization of the game's difficulty had been taken into account with Potion 8 and Bugbyte's approach.

One dimension to analyse is how the video game genres, examined in chapter 2.3, ties into the game design decisions related to the player's experience. For example, Frozenbyte's game *Trine* is a platformer game, thus the initial complexity is simple for new players. This allows even people that

are new to video games to get used to the basic mechanics, before having the game introduce new elements that bring new challenges to the player.

On the other hand, Colossal Order's game *Cities Skylines*, is a city builder/simulation game, that tends to be a genre with more complexity from the beginning. This can create a challenge for the game designers to not overwhelm the new player's by having hundreds of buildings and building types available without first explaining the basic mechanics of the game.

5. Testing the effects of players skill level

To test how the player's previous gaming experience affects their performance in playing video games, this thesis utilizes an experiment using a test game on participants. In this chapter, the testing tool is introduced, the participant selection criteria are explained and afterwards the test results will be shown and analysed.

5.1. Testing tool

To test the difference between experienced and inexperienced players, I created a test game for the thesis. The game is a 2D-platformer with a few elements:

- Player character
- Enemy character
- Key
- Door
- Jumping obstacles

The game acts as a testing tool, where the players are assessed on their performance. Main observations on the tester's abilities will be the overall time that the tester takes to finish the game as well as their abilities to pass the differing challenges of the game. The game was made using Unity, a game development platform.

Before starting the game, the testers are given basic instructions on the controls of the game. These include movement back and forward as well as jumping. All other information is omitted from the testers to simulate a sparsely designed video game, where the game designers assumed the player has a base level of understanding, how 2D platformer games work. In case the tester got stuck, I aided them by giving advice on how to pass the current stage of the game.

The game itself is divided into four stages. The first stage only has the player character in the middle of the stage (see Figure 12). For experienced players, often the logical step is to move to the right of the screen to advance to the next stage, but this can be challenging for testers new to video games.

In the second stage the player is presented with simple obstacles (walls) that the player must jump over (see Figure 13). The first obstacle is made short enough for the player to jump over with a single jump, but the second obstacle requires double jumping (using jump button twice in a row). Double jumping is common in platformer games, but this can again be challenging for inexperienced players to notice.

In the third stage, the player faces an enemy character that moves between two jumping obstacles (see Figure 14). The player must jump over the enemy character to advance. If the player collides with the enemy character, the stage resets and the player is teleported to the beginning of the third stage. Recognizing the cube as a foe can be recognized by its red colour, often used as an identifier for enemy characters in video games. For inexperienced players, recognizing the other object as an enemy character and knowing how to get past the enemy can be challenging.

In the final stage, the player is presented with a locked door that acts as the game's end (see Figure 15). The stage also has a key the player must get, before being able to interact with the door. The key is obtained by climbing a few platforms. As the player obtains the key, the door’s lock graphic disappears, indicating that the door can now be accessed.

The testers are given a short interview before and after playing the test platform. The interview before playing the game assesses the tester’s former experience of video games, while the post-test interview explores how the player felt playing the game and how difficult they personally felt the game was.

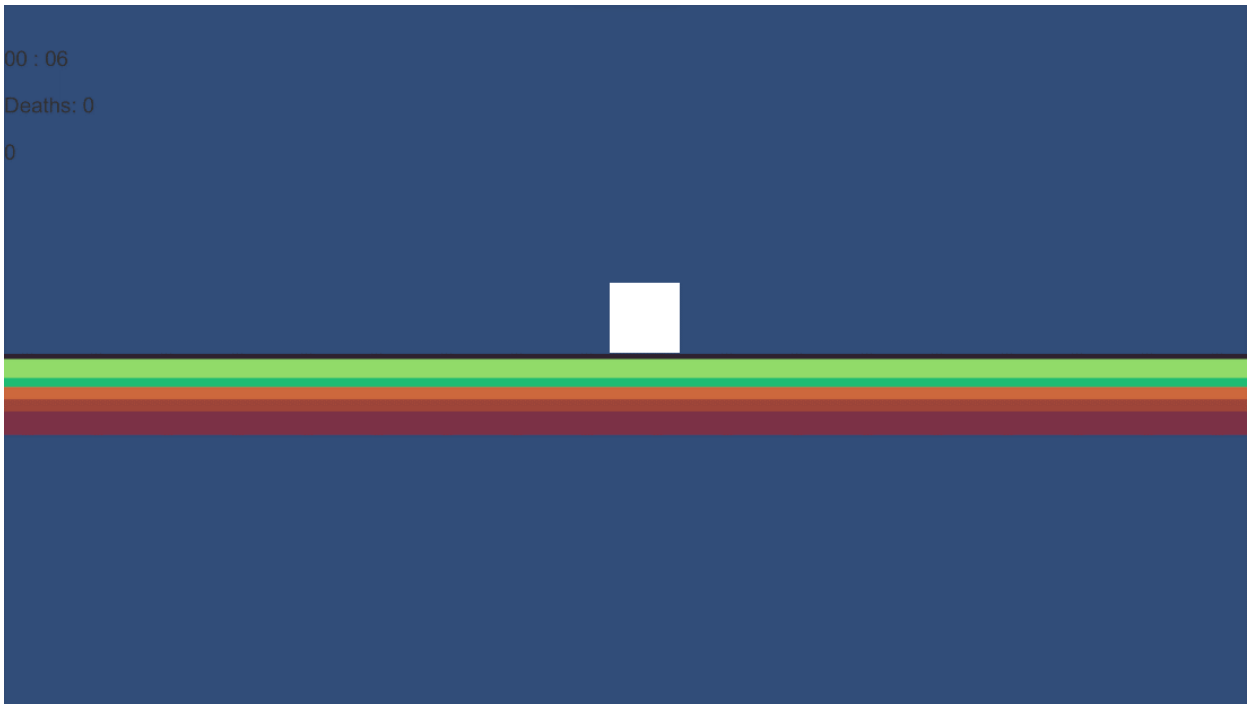

Figure 12: Starting position for the test game.

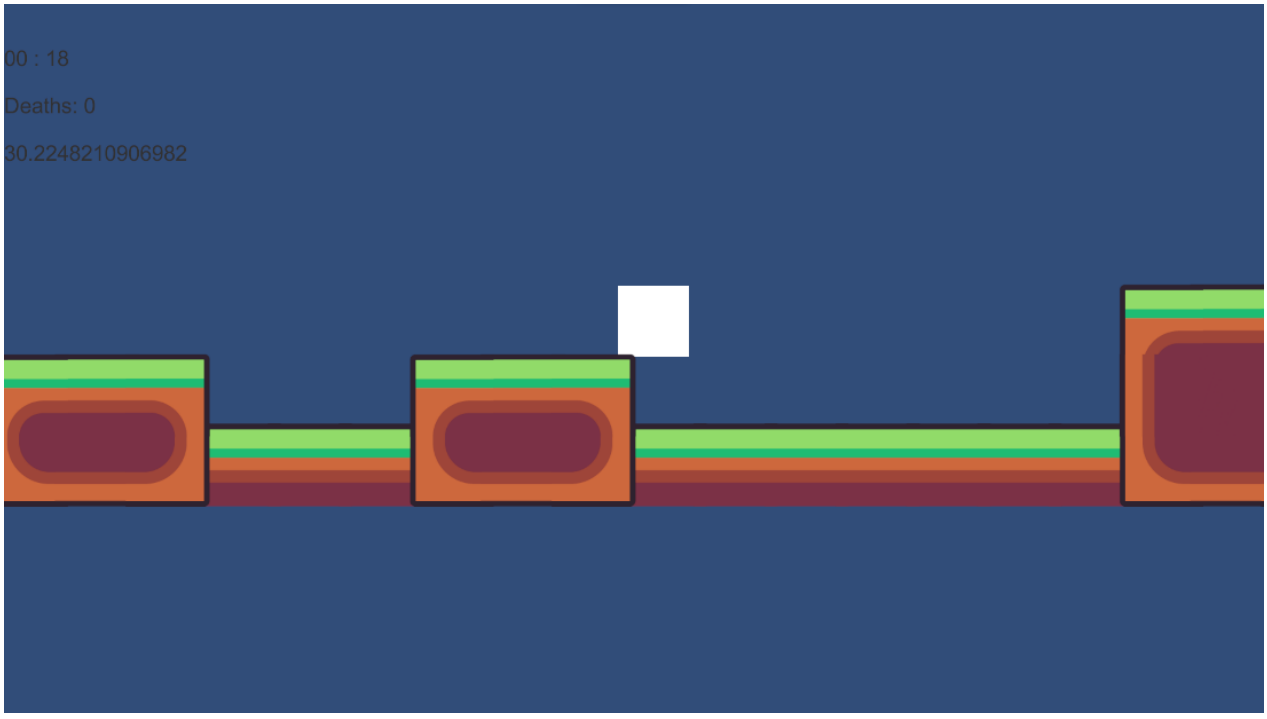

Figure 13: Second stage of the game. The first obstacles can be jumped over normally, but the taller obstacle requires player to use double jump.

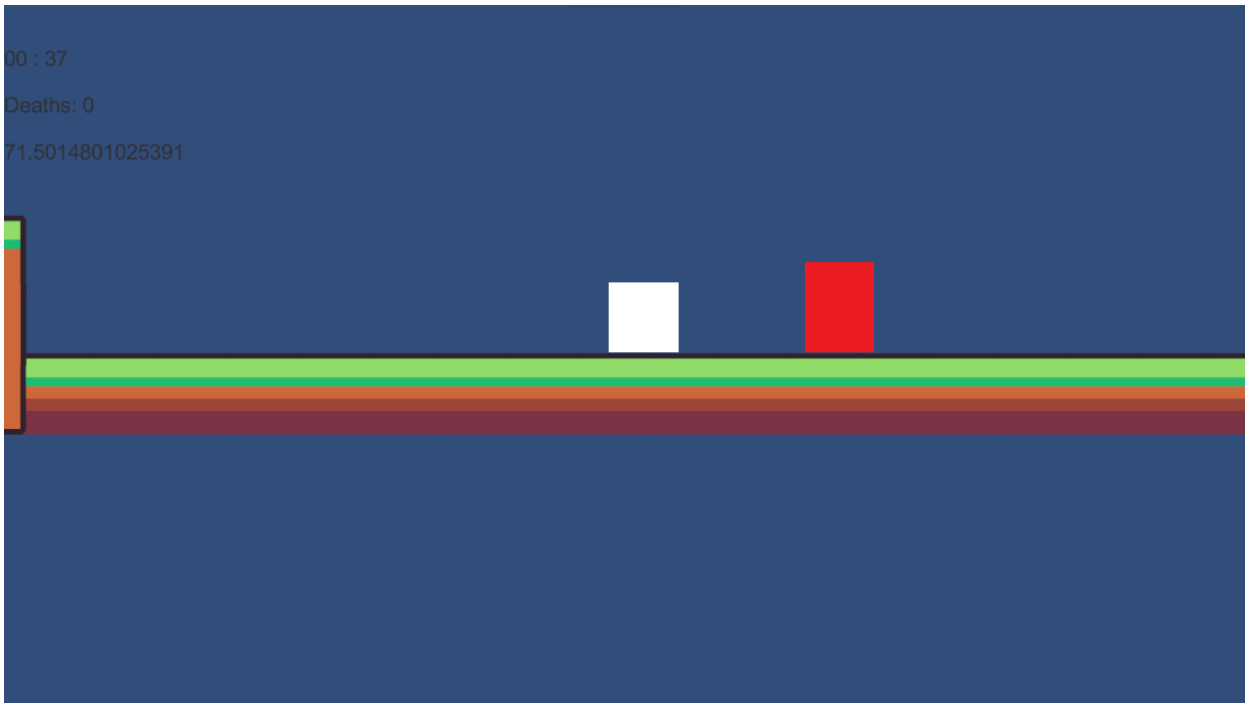

Figure 14: Third stage of the game. The enemy character moves back and forth, and the player must jump over it to continue.

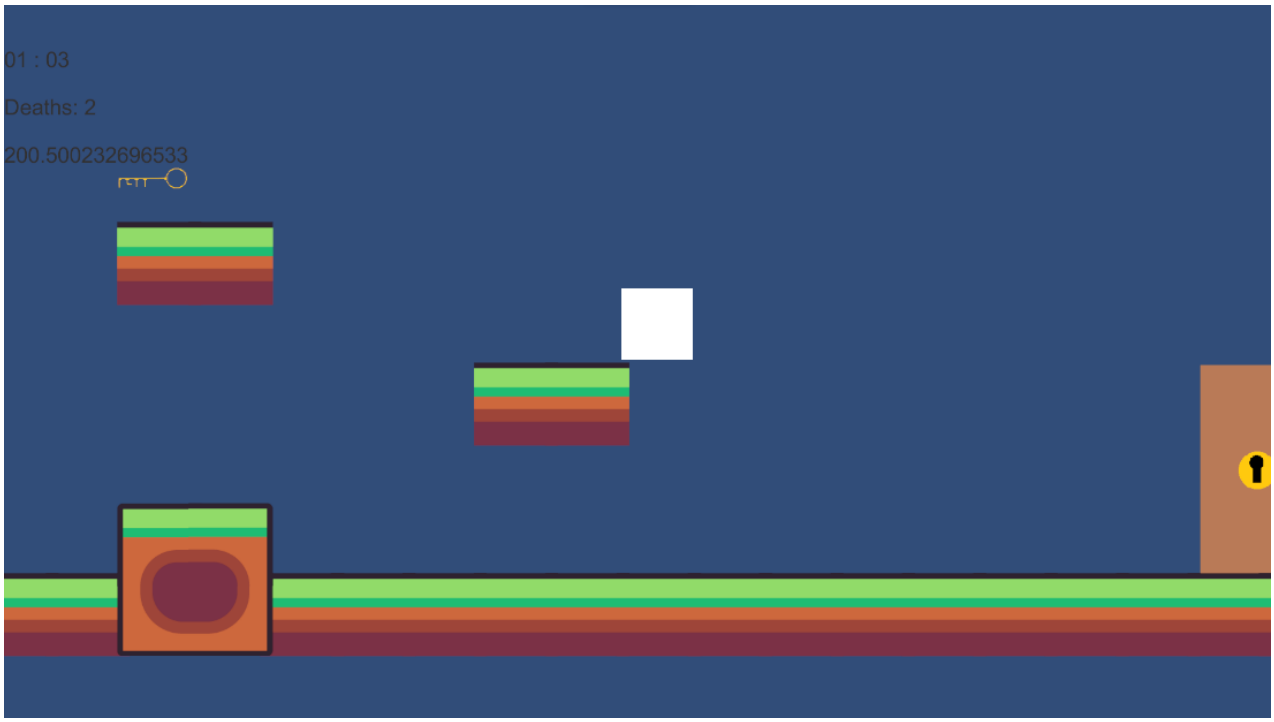

Figure 15: Fourth and final stage of the game. The player must fetch the key first to unlock the door and finish the game.

5.2. Testers

Six testers with differing ages and gaming experience were chosen for the testing platform. The criteria for the testers were to get players that were very experienced with video games and platformers as well as players with little to no experience with video games. By selecting this criterion, if the previous gaming experience had a significant impact, it would reflect in the results. The secondary criterion was selecting people with variance with age in case the testers' age impacted the results. For example, reduction of reaction time related to age could increase the time it takes to finish the game and pass some of the challenges.

The testers were from Finland and Mexico. They were asked to evaluate their previous gaming experience in video games and solely from the perspective of playing 2D-platformer video games. For privacy, the only other data point that was collected was the age and sex of the tester. The previous gaming experience has been modelled to be between numbers 0-5 as follows:

- 0 meaning no previous gaming experience whatsoever or less than 1 hour in their life
- 1 meaning exceedingly small amount, equivalent of 1-12 hours
- 2 meaning small amount, equivalent of 12-25 hours
- 3 meaning moderate amount, equivalent of 25-50 hours (about 4 days)
- 4 meaning large amount, equivalent of 50-100 hours (about 8 days)
- 5 meaning extensive amount, equivalent of 100+ hours

The testers attributes are summarised on Table 1.

Table 1. Tester's attributes

	Age	Sex	Previous experience in video games	Previous experience in 2D platformer games
Tester 1	55	Female	0	0
Tester 2	55	Male	1	1
Tester 3	29	Male	3	1
Tester 4	27	Male	5	5
Tester 5	27	Male	5	5
Tester 6	30	Female	5	5
Average attributes:	37.2	-	3.2	2.8

5.3. Results and analysis

For the results, three metrics were used:

- The number of player deaths
- The total movement of the player character in the game
- The time it took to finish the test game

For the player deaths. The reasoning to choose this as one of the datapoints was to map out the player's ability to know where to go in the beginning of the game. As most of the popular 2D platformer games have the goal of the stage on the right side, the player moving to the left in the beginning of the game would indicate that they are not familiar with the common game design practice for 2D platformer games. It could also indicate the test player to be curious about whether the game had anything hidden on parts of the game, which would not be the "main" path of the game.

The total movement of the player in pixels can be used to see how optimally the player moves through the game. For example, failing to jump over obstacles will increase the total movement, which can then be used in the assessment. The time can be similarly used to evaluate the player's performance. In cases where the player stops to think how to get past any challenges in the game,

total movement measurement might not record the player's capability as accurately. The testers' results are presented in Table 2.

Table 2. Test results

	Player deaths	Total movement (pixels)	Total time
Tester 1	9	428	2:20
Tester 2	11	854	4:05
Tester 3	10	642	2:43
Tester 4	2	338	1:16
Tester 5	2	282	0:56
Tester 6	0	177	0:50
Average results:	5.7	454	2:02

For reference values, I tested the game multiple times to get optimal results and had total movement of 100 pixels and total time of 0:16. The average number of player deaths was 5.7, the average total movement was 454 pixels and the average time for the testers was 2 minutes and 2 seconds.

All the testers player deaths occurred due to hitting the enemy character and not from falling from the game stage in the beginning of the game. The enemy object caused mostly issues for the first 3 participants. These participants also had the least amount of previous gaming experience. This could indicate that recognizing obstacles in video games, such as enemy characters and finding a way to avoid them can be more difficult to players, that have low video game experience.

None of the players moved to the left in the beginning of the game, despite some of the testers' lack of experience in 2D platformer games. As all the testers were Finnish or Mexican, one hypothesis could be that it comes naturally to move from left to right same as the reading direction in the western world. There might have been differing results for people that are more familiar with reading right to left.

Some of the tester's scores were not linked to their previous gaming experience. For example, tester 1 had the least amount of gaming experience in general as well as in 2D platformer games, yet they performed better than testers 2 and 3, both of which had more experience in gaming and 2D

platformer games. Tester 1 had fewer player deaths, total movement and finished the test platform faster than testers 2 and 3. However, testers 4, 5, and 6 that had the most amount of gaming experience, had the best scores of the entire testing team. From this data, one conclusion could be that a small amount of gaming experience is not necessarily going to give an edge with a new game, but a significant amount of gaming experience can make the player better at playing new games.

Comparing the ages of the testers, no clear indications can be made. While the best testers were also the youngest of the testing team, tester 3, who is much younger compared to tester 1, had worse testing results. This indicates that age is unlikely to be a factor in the ability to play different games, at the very least within the age range of 27-55. This conclusion is, however, not clear-cut, as the lack of testers in general as well as lacking younger and older testers can limit the visibility of the player's age's impact.

The elapsed time for the participants in the test game varies around 1 to 4 minutes. One aspect that could affect the time could be that the participants were not told to finish the game as fast as possible. Some of the participants could have been faster, had this instruction been given for the participants. Another data point that could have been conducted related to the total movement of the player could have been the number of jumps, double jumps and potentially attempted triple jumps. This datapoint could have given indication on the preference of movement through jumping or vertical movement related to the participants and their previous gaming experience.

6. Conclusions

This thesis has tried to answer the question, how the video game player's previous gaming experience impacts the performance of the player. From the results of the testing tool in Chapter 5, we can conclude that the player's previous gaming experience does have a positive impact for the player's gaming performance, when playing new games. We can also see that the difference between experienced and inexperienced video game players creates a challenge within the game design choices, which need to be accounted for to make a video game accessible and enjoyable experience for the player.

One aspect for an enjoyable game experience is the player's flow, that was studied in Section 2.2.2. The goal for the video game difficulty is to have the player become experienced in the video game and have the difficulty increase alongside the player's capabilities. This will make the player stay within the flow state, thus being an enjoyable experience. Another perspective found in this thesis in Section 2.2.3 is how the difficulty of the video game is comprised of absolute, perceived, and relative difficulty dimensions. These should be understood when developing the game to have the game's difficulty balanced through the whole game.

We have also learned how the video game industry sees the challenges of the variance of experience with their player base and how the industry tries to tackle the issues using different methods in Chapter 4. One important way to avoid issues with the players having different experience levels is to test the game early in the development process with experienced and inexperienced game testers. Doing this will allow the level designers in the development team to adjust the difficulty level based on the feedback from the testing.

The gaming industry also must consider the significant differences between the playing styles of different video game players. As was examined in Chapter 3, the players have many differing motivations when playing video games. These differing motivations can make some players like or dislike their experience more, based on the available gameplay offered in the game.

Another challenge for the video game industry is categorizing their games accurately, so that the players have easier time finding the games they enjoy. One of the issues discussed in Chapter 2 was the current labelling of game genres. A better classification system for game genres, such as the suggested method by Doherty et al., could solve this problem. Technological changes in video game

platforms will further drive the need for reclassification, as older genres can become limited in their application.

Further work on the topic should focus on expanding the experiment conducted in Chapter 5 with a larger tester quantity. This would increase the validity of the results and potentially show in greater detail the differences between the testers. Another examination point that could not be considered in the test game presented in this thesis is the potential impact with the age of the participants on their gaming performance.

The results of this thesis open some new research questions. For example, can the testing environment of the experiment in Chapter 5 have an impact on the results of the testers and if so, what specific factors of the testing environment affect the results. Another research question could be pointed towards the video game industry gone through in Chapter 4, examining how different properties of the video game companies such as their size, the amount of games they have produced before and what genre of games are they designing impact on their focus on their game design decisions regarding how they deal with their player's previous gaming experience.

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