

Challenge Design and Categorization in Video Game Design

Michael Brandse¹ and Kiyoshi Tomimatsu²

¹ Graduate School of Design, Kyushu University

² Faculty of Design, Kyushu University

4-9-1 Shiobaru Minami-ku Fukuoka 815-0032, Japan

michaelbrandse@kyudai.jp, tomimatu@design.kyushu-u.ac.jp

Abstract. In this paper, we examine how challenge is designed in games. Building on the paratelic system proposed by Stenros, we approach challenge design in two ways; first we look at how challenge is designed by the game creators, and then we look at how players approach games with challenges of their own as well as how often they participate in this kind of behavior. Since challenge is an important component to the majority of games, we argue that understanding how challenge is designed is important for further research into challenge in games.

Keywords: Design Patterns and DUXU, Motivation in DUXU, Challenge design, Video game design.

1 Introduction

Challenge in video games is still somewhat of an alien concept. However, challenge is something that is largely integrated into the gameplay of a game and often provides the core motivation to the player to continue playing the game. According to Malone, the theory of intrinsically motivating instruction is organized in three categories, namely challenge, fantasy and curiosity [1]. Furthermore, Cox argues that the theory of Flow is important to the immersion of gamers, which includes challenge as one of its components [2]. It follows from this that challenge is of major importance to games and is therefore something that needs further research.

Earlier, we examined the concept of challenge in video games and argued that the current way of defining challenge is faulty in nature [3]. We found that the current definition, which is largely based around the difficulty of the challenge, was not sufficient and instead developed a set of challenge design heuristics by which a well-designed challenge should abide. Building upon the philosophy behind our new way of defining challenge in video games, we have subsequently categorized various forms of challenge. We decided to build upon the paratelic system proposed by Stenros[4], who used frame analysis to analyse the playing habits. However, instead of looking at the user, we used the definitions to look at how challenge was designed.

2 Method

2.1 Primary Research

Equipment. For most games that were surveyed, we used their respective consoles to analyze them. The consoles used were Nintendo, Super Nintendo, Nintendo 64, Gamecube, Wii, Gameboy, Gameboy Advance, Nintendo DS, Playstation, Playstation 2, Playstation 3, Xbox 360 and PC. For other games for which we either lacked the hardware or the ability to play, we used internet resources in the form of Let's Play's, which are video walkthroughs of games.

Protocol Design. For the software survey, we have attempted to test a wide variety of games across a wide variety of platforms, in order to ensure we would get the most complete picture of design trends within games when it comes to challenge.

Table 1. A selection of the games used for the software survey

Atari	Frogger, Pong, Pacman, Pitfall, Indiana Jones.
Nintendo	Crono Trigger, Super Mario World, Tetris, The Legend of Zelda, Terranigma, Puyopop Fever, Elite Beat Agents, Magnet Loop, Super Monkey Ball, Lost Vikings, Duckhunt, Little King's Story, Zack & Wiki Quest for Barbaros Treasure.
Playstation	Wild Arms, God of War, Jak & Daxter, Super Stardust HD, Prince of Persia, Katamari Damacy, Uncharted, Folklore, Okami, Shin Megami Tensei Digital Devil Saga, Viewtiful Joe.
Personal Computer	Lemmings, Dishonored, Super Meat Boy, Mark of the Ninja, Super Monkey Island, Day of the Tentacle, Psychonauts, The Incredible Machine, Commander Keen, Doom, Bioshock, Overlord.
Xbox	Geometry Wars, Kameo Elements of Power, Final Fantasy XIII, Blue Dragon.
Mobile	Temple Run, Pokopang, Plants versus Zombies 2, Angry Birds, Fieldrunners.
Sega	Sonic The Hedgehog, Skies of Arcadia, Alex the Kid.

Data Analysis. Games were analyzed based on the core gameplay¹ of the game as well as the obstacles within the game that were meant to challenge the player. Gameplay present within the game that was not part of the core gameplay was ignored. Stenros also looked at "griefing"[5] as a major component to player habits. However by design griefing is often discouraged and even fought by game developers [6,7,8], so we will not include this into our analysis.

¹ The core gameplay is the main means of interaction the player has with the game environment.

2.2 Secondary Research

Participants. There were a total of 34 participants ranging from students to professionals, of which 70.6% was male and 29.4% was female. The average age was 24.5 years old, with a standard deviation of 4.7. Participants were from varying nationalities.

Preparation. A questionnaire was prepared to question participants on their player behavior in the game, with focus on non-designed challenges.

Protocol Design. Observations were conducted into online communities of players to find whether players would engage in activities that were generally not required to complete a game. Among the observed communities were communities that specialized in walkthroughs², wikis that concentrated on particular games and communities that concentrated on specialized pastimes such as speedrunning, a particular kind of meta challenge that shall be explained later. Communities that were observed were;

- www.gamefaqs.com
- demonsouls.wikidot.com
- www.zeldaspeedruns.com
- www.lparchice.com
- www.youtube.com
- www.nuzlocke.com/challenge.php
- www.tasvideos.org
- www.speedrunslive.com

Furthermore, a questionnaire was developed based on the most common forms of behavior that we observed, to analyze to which extent players would engage in these non-obligatory activities. The questionnaire consisted out of five parts. The first part requested basic information from the participant, namely age and sex. The other four parts concentrated on each of the four types of meta-challenge we observed and the player habits in regards to those types.

Data Analysis. In observing communities, special attention was given to behavior that was not necessary to completing a game. For this, we examined guides on how to perform this behavior, recordings of this behavior in the form of video or online discussions between players to ask, promote or inform about particular forms of behavior.

3 Results

3.1 Base Challenge

In categorizing challenge types, we have identified the basic classifications base-challenge and meta-challenge. Base-challenge's defining feature is that it is designed.

² Walkthroughs are extensive documents that provide information on games, from elements like collectables to how to complete the game step by step, often written by amateurs.

If the player plays the game like it is intended, the player will generally encounter and need to overcome a number of Base challenges that are necessary to complete the game. Stenros referred to this as “playing the game.” Within base challenge, we defined five subcategories, which are numerical challenge, luck challenge, skill challenge, time challenge and pattern challenge.

Numerical Challenge. The challenge of numbers relies on numerical values in order to challenge the player. The numerical challenges can be considered one of the oldest forms of challenges in digital video game design, e.g. in the early days players were often motivated to gain a so called score, an indicator of how well the player played the game.

There are two ways in which a numerical challenge can manifest itself; either through attrition or through strengthening. When a numerical challenge relies on attrition, it means that players of games need to be careful to not run out of a particular resource, whose amount is generally visualized through a number. Often these lead to abstract concepts, such as the concept of “lives” where if the player runs out of lives the player needs to start over again. Numerical attrition also works as a goal for the player; when the player has to reduce certain resources from opponents to zero in order to win the game.

Numerical strengthening on the other hand relies on getting as much of a certain resource as possible. The resource can generally not hit zero (and if it can, it does not result in the player having to start over again) and can bestow certain advantages on the player if the resource hits a certain value. A common example is experience. The player will gain experience through performing certain actions and if the experience value reaches a predetermined value, the player’s avatar will gain advantages such as growing stronger or getting access to better equipment. Another form of numerical strengthening is through gaining points for a final score. In this case, the score does not bestow additional advantages when it reaches a certain value, but instead serves as the motivation to the player to perform better next time and improve on the score (a concept better known as high-scores, where players attempt to beat the previously set record). The concept of score was especially prevalent in early games, when games were generally limited to simple gameplay and had to rely on high-scores in order to increase the longevity of games. Score is often combined with time challenge.

Luck Challenge. The challenge of luck is one where the computer decides randomly on certain events, such as chance. It is generally determined by a random number generator that has been built into the game.

An example of a luck challenge occurs in games where players can get items from defeated enemies through chance. The computer randomly decides whether the player will get an item and what item the player will get.

Skill Challenge. A challenge of skill is when players are required to master certain moves that are required to overcome obstacles in the game. These can come in the form of the control scheme, where the player is constantly subjected to challenges growing more and more difficult using the same control scheme over the game.

This form of challenge is common to platforming³ games. Another form of this challenge is the one where players gain various items with different uses that the player needs to master. This particular form of challenge is especially prevalent in action adventure games, where the player gains different tools that are needed to solve different puzzles.

Time Challenge. During a challenge of time, the player is forced to complete a certain task within a set amount of time. Failure to do so will either result in the player having to do the game over or the player having to redo the task once more.

In earlier games, it was common for the game to largely be about doing certain tasks within a time limit. For instance, in platforming games the player would have to get to the goal of the level before the time was depleted or else the player would have to start over again. Another early application was in score based games, where players had to get an as high as possible score in a set amount of time.

Modern applications generally limit the time limits to singular tasks, with only very few elements within the game relying on a time limit.

Pattern Challenge. Pattern based challenges rely on the memory of the player. The player needs to memorize patterns within the game world, its enemies and all the other involved objects in order to overcome the challenges laid down by the game. Especially encounters with hostile entities are often designed to exhibit specific behavior patterns depending on how they are approached by the player. The player will then need to learn those patterns and use them to his advantage. Another use of pattern based challenge, which was often used in older games, is where the world itself becomes part of the pattern based challenge.

Challenges of this kind often required the player to memorize the placement of enemies and hazards within the world, because if the player was unable to, the repercussions would generally be harsh (ie. the player would often have to retry the stage being played from the start or even start over the entire game). This is also known as “trial and error” game-play, as players often needed to keep trying until they remembered every obstacle to a tee.

3.2 Meta Challenge

When we observed player behavior however and did user surveys, we found that the participants did not limit themselves to base-challenges alone, and instead would create their own challenges as well. We called this phenomenon meta-challenge, which is challenge that is designed by the player. Meta-challenge can have a wide variety of goals; from making the game more difficult to even making a completely different game within the game itself. Meta-challenge is not obligatory in nature; the player does not need to overcome meta-challenges in order to finish the game. Stenros referred to this as “playing the system.” We identified four subcategories of meta

³ A platforming game is a game where the player needs to run and jump through an obstacle course.

challenge, namely lusory challenge, peripheral challenge, hoarding challenge and alacritous challenge.

Lusory Challenge. In *Rules of Play* [9], Salen and Zimmerman outlined the lusory attitude, as defined by Suits, B. as “in anything but a game the gratuitous introduction of unnecessary obstacles to the achievement of an end is regarded as a decidedly irrational thing to do, whereas in games it appears to be an absolutely essential thing to do.” This refers to the way players perceive game rules and how they often forgive rules that makes a game more challenging, but whose effectiveness in the real world would be debatable.

However, the lusory attitude can not only be applied to the reason why people don’t mind game rules, but also to how certain players approach challenges already set by the game. The latter is what we refer to as lusory challenge. It is the act of the player creating optional challenges for himself that are far more difficult to overcome than the initial challenges set by the designers, while still completing the final game goal that the designers had set.

We found that 82.4% of the participants participated in lusory challenges.

Peripheral Challenge. In *Peripheral Play* [10], Geurts, S. investigated the phenomenon of free play within a game and named the phenomenon peripheral play, as the peripheral play exists within the game world, but (mostly) outside of the rules of the game. She defined it as free play within the boundaries of the game world.

We define peripheral challenge as challenges that are born from peripheral play. Due to the free nature of peripheral play, peripheral challenge can take, but is not limited to, the form of base challenges. We should note that while all set challenges born from peripheral play are considered to be peripheral challenges, it is not necessarily the case that all forms of peripheral play result in the birth of peripheral challenges.

We found that 70.6% of the participants participated in peripheral challenges.

Hoarding Challenge. Hoarding challenge is the player’s need to get every item that is possible to get in a game. Often these days, games contain a lot of challenges to cater to that need, often nicknamed “collect-a-tons”⁴. These are most often kept optional. Hoarding challenge refers to any behavior where a player needs to get his hand on something that is not required for the completion of the game.

While it could be argued that a hoarding challenge should be considered a base challenge, we should consider that even if no “collect-a-tons” are present within the game, players will still attempt to collect elements that were not meant to be acquired in full. An example of this would be *Final Fantasy Four Heroes of Light*. While the game does not require the player to collect every item, and actually discourages it by limiting the amount of items a player can hold at any given time, players have still

⁴ Games often contain elements where the player is motivated to collect certain kinds of items of which there is a select amount hidden within the game world. These items will often yield extra rewards for the player once a number has been collected and are voluntary in nature. These are often known as “collect-a-tons.”

created methods of getting all the items in the game, complete with information on where to get the item, when to get the item, how to get the item and how big the chance is of the player getting the item. [11]

We found that 88.2% of the participants participated in hoarding challenges, making this the most common meta-challenge for players to participate in. Furthermore, we found that 58.8% of the participants also expressed a desire to get all collectibles available in a game.

Alacritous Challenge. Alacritous challenge has certain parallels with lusory challenge in that it is about the player setting himself a goal to beat the game in a different way. However, as opposed to lusory challenge, where the primary goal is to make challenges more difficult to overcome, with alacritous challenge a player competes to complete the game in the fastest time. Among gamers, this particular feat is also known as speed-runs.

While taking on an alacritous challenge, players often share their findings online, creating a competitive environment where players compete for the fastest possible time. There are two forms of alacritous challenge, or speed-runs, namely tool-assisted and regular.

Tool assisted means that the user made use of a video game console emulator⁵ that can slow down the frame-rate of a game for higher precision (and thus a better time when played back on normal speeds). Players will often abuse glitches and hacks within games in order to get to the end as fast as possible. Players will use any means necessary to get the fastest time.

A regular speed-run is the opposite of that, where players compete for the fastest time playing the game like they normally would, using only whatever features are available on the original hardware. Video game console emulators are sometimes used, but only for the purpose of playing the game rather than using the functionality available within the emulator software. Sometimes, players do a regular speed-run in segments, where they replay (groups of) video game levels where they can retry as much as they want and only the fastest time counts. This is also known as a segmented speed-run.

With the advent of the internet, doing speed-runs has become easier with the existence of websites such as Youtube where players can upload their speed-run results in order to compete with other players of games. Furthermore, there exist a slew of communities whose primary goal is to educate players on speed-run strategies or what kind of speed-runs can be done on any particular game, as well as to record the fastest speed-runs on the games that they give information about.

We found that 50% of the participants participated in alacritous challenge, making this meta-challenge the least popular meta-challenge.

⁵ Video game console emulators are software that aims to emulate a console, so that the games for said console can be played on hardware other than the original video game console.

4 Limitations

A limitation of this study is that it has focused on games that already have been created; it doesn't take into mind new kinds of challenges that may be created in the future. Therefore, the categorization and sub-categorizations are not exhaustive. Another limitation is that this study does not take into account female playing behavior. It can be argued that the majority of video games have been created with a male audience in mind, with males being the dominant workforce in game development even to this day [11]. When we surveyed player habits in relation to meta-challenge, 71% of the participants were male. Therefore, the forms of challenge and playing habits observed in this paper do not necessarily reflect how a female target audience would approach challenge in games. However, even with those limitations, we feel that this study is necessary to understand games and challenge in games.

5 Conclusion

In looking at how challenge is designed in games, we defined two particular forms of challenge. We found five subcategories within base challenge, or the challenge that is designed by the game creators. These are the numerical challenge, the challenge of luck, the challenge of skill, the challenge of time and the challenge of patterns. Furthermore, we found four subcategories within meta challenge, or the challenge that is designed by the players. These are the lusory challenge, the peripheral challenge, the hoarding challenge and the alacritous challenge. Since challenge is an integral component to the majority of games, finding these forms of challenge was necessary in understanding how players interacted with the game.

We consider that these definitions will become necessary for various other fields of research, such as genre study within video game research. Further research into challenge, such as dynamic difficulty studies, will surely benefit from this research as well.

References

1. Malone, T.: What makes computer games fun? In: Proceedings of the Joint Conference on Easier and More Productive Use of Computer Systems, Part-II. Human interface and the user interface, vol. 1981. ACM, New York (1981)
2. Cox, A.L., Cairns, P., Shah, P., Carrol, M.: Not Doing but Thinking: The Role of Challenge in the Gaming Experience. In: CHI 2012 (2012)
3. Brandse, M., Tomimatsu, K.: Empirical Review of Challenge Design in Video Game Design. In: Stephanidis, C. (ed.) Posters, HCII 2013, Part I. CCIS, vol. 373, pp. 398–406. Springer, Heidelberg (2013)
4. Stenros, J.: Playing the System. Using Frame Analysis to Understand Online Play. In: FuturePlay 2010. ACM, Vancouver (2010)
5. Bartle, R.A.: Designing Virtual Worlds. New Riders, California (2003)

6. Fahey, M.: Rockstar has Low-Down Dirty Red Dead Redemptiom Cheaters in its Sights, <http://kotaku.com/5592977/rockstar-has-low+down-dirty-red-dead-redemption-cheaters-in-its-sights> (retrieved January 2)
7. Hamilton, K.: GTA Online Will Launch Tomorrow Morning, <http://kotaku.com/gta-online-will-launch-tomorrow-morning-1430560826> (retrieved January 2)
8. CCP Games, Grief Play, <http://community.eveonline.com/support/knowledge-base/article.aspx?articleId=336> (retrieved January 2)
9. Salen, K., Zimmerman, E.: Rules of Play. MIT Press (2004)
10. Geurts, S.: Peripheral Play. Utrecht School of the Arts (2012)
11. Game Development Magazine. Salary Survey, UBM LLC (April 2013)
12. Gamefaqs. Final Fantasy the 4 Heroes of Light completion guide, <http://www.gamefaqs.com/ds/961297-final-fantasy-the-4-heroes-of-light/faqs/64035>