

Effects of Motivation on Player Retention in Video Games

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The purpose of this research was to examine the player retention rates of video and computer games that abide by two different design philosophies - one emphasizing challenges, the other emphasizing rewards. The general procedure included investigation of written works on these two philosophies and a study of retention rates and other related player statistics of games that fall into either category. A small, experimental game was developed and player response rates to either method of motivation were observed. The reward motivator was found to yield a higher average retention rate.

Keywords: games, player retention, design philosophy, challenges, rewards

Introduction

Video gaming is a \$67 billion global industry, and it is projected to grow even more in the coming years (Gaudiosi, 2012). On top of that, the reach of the gaming market is also increasing, with an expanding age range and a decrease in the gender gap of gamers. In short, this is a large, profitable industry that has the potential to reach a wide range of customers.

Certain games, especially those which are played online, are designed in such a way that the financial success of the game depends on the players' willingness to continue playing for extended amounts of time. These games may operate based on monthly participation fees or by persuading players to purchase in-game content, such as upgrades to a spaceship or virtual clothing for a character. In such cases, player retention is a much more important issue than it is for games that are simply purchased once. Such a game is only successful so long as it retains enough paying players to turn a profit. For example, the web game portal Kongregate turns its biggest profit from the 11% of players who are considered to be "devotees" - they spend 3000% more money on virtual, in-game purchases than the other 89% of players (Caoli, 2012).

Two common motivational factors in gaming are the challenge and the reward. The prevalence of these factors has been linked to major psychological needs - achievement needs and materialistic needs, respectively (Bostan, 2009). The question is raised, then, as to whether either motivational factor yields a greater player retention rate. In order to answer this question, the results of existing studies on player motivation and retention were

collected and comparatively analyzed. An experimental game was then developed and released in order to track player retention with regards to the presence of either motivator.

Literature Review

It is said that, in any game, the "game mechanics engage the player by offering choices and providing feedback" (Bateman, 2009, p. 4). However, the nature of both the choices and feedback are left for the developer to decide upon. A traditional view is that, as the player's skill increases, the difficulty of the game should increase, so that the player does not become too bored (not enough difficulty) or too frustrated (not enough skill) (Bateman, 2009). For example, in the arcade game *Pac Man*, the opponent ghosts become faster in successive levels, and the player must develop methods to better avoid them in order to progress further.

In this way, the player continues to play the game because he or she is still being actively challenged, and the motivation for play is the development of greater skills specific to that game. When the reward factor is included - for example, in the form of placement on a high score table - it typically serves to recognize the player's ability to overcome the challenges given in the game. The challenge aspect provides the incentive for the player, while the reward aspect provides feedback and acknowledgement for the player's accomplishments.

In recent years, though, there has been a rise in the prevalence of "casual games", which seek to incorporate traditionally non-gamer groups into the gaming audience. Those innovative casual games which reach out to new audiences have been more successful than games that focus on utilizing the latest technology in graphics or game engines (Wesley, 2010).

However, non-gamers may not have the same motivations for playing that traditional gamers do. The challenge aspect may not be as important to them. In order to reach new audiences, and in order to keep the attention of traditional audiences, several methods for holding a player's attention have been developed.

One method emphasizes the reward aspect, so that the player keeps playing to obtain more rewards. An example of this design can be seen in the achievement system of the Xbox 360, which has been seen as a sort of "loyalty program" that rewards the player for continuing to play Xbox games (Bogost, 2010). Players may complete specific challenges, which are often not necessary for completion of the game, in order to obtain "achievements" - visual "badges" that are awarded to them. For example, a player may receive an achievement for completing a certain stage, or for simply having played the game for twenty-four non-consecutive hours. Achievements also increase the player's global score, known as a "gamerscore," by some amount specific to the achievement. Thus, the game's replay value is extended.

Aside from achievements, players may also play in order to increase their in-game score or their character's "level." In a study by Debeauvais, Nardi, Schiano, Ducheneaut, and Yee(2010) of *World of Warcraft* players, it was found that the level of motivation for advancement was directly related to the number of hours played per week, with the most advancement-motivated players having a higher average than players who were purely motivated for different reasons. According to a study by Begy (2011), the playing

motivations of players of a different game, *Faunasphere*, also centered around advancement.

In many games which incorporate achievements, the challenge aspect is still incorporated. On the other hand, some games cut down on the challenge entirely and focus solely on the collecting of rewards. In Facebook games such as *FarmVille* and *FrontierVille*, gameplay revolves around the sending and receiving of gifts, collecting and profiting from animals, and profiting from crops. Animals and crops may be periodically "harvested"; the player clicks on them and obtains virtual money, which can be used to purchase more farm assets or decorations. In addition, players are required to return to the game within a small time frame, as crops will wilt if they are not harvested within a certain amount of time, and will grant no reward. The Chinese game *Happy Farm*, which is similar to *FarmVille*, takes this concept a step further and allows players to steal from other players while they are away, which further encourages players to keep coming back in order to protect their virtual property (Hjorth, 2011).

Despite the successes of companies that rely on these types of games, there are many who criticize this model. Some claim that "Facebook games seem to exist simply to 'exploit human psychology' in order to be financially successful" (Whitson & Dormann, 2011). The question then arises as to what the longevity may be of a game that heavily relies on this model. Zynga, the developer of Facebook games such as *FarmVille*, has been steadily losing millions of players; this is possibly due to the waning "novelty" of the games, as they have no focus on challenge, and it is also possibly due to Zynga's business

model, which emphasizes the attraction of new players rather than the retention of old ones (Tassi, 2012). Andrew Schneider, president of LiveGamer - a company that handles micro-transactions for many games - believes that social games will never make as much money as those games which target traditional gamers, partly due to a lower perceived player retention rate (Jarvey, 2010). Also, in a study by Andersen (2011), it was found that players were twice as likely to play a game longer if it had no optional rewards, such as the collection of coins, to distract from the gameplay.

However, in the case of Xbox 360 achievements, it has been noted that players will seek out achievements even if they are not "fun" to obtain, and that players themselves do not always understand why they want to keep playing (Jakobsson, 2011). This behavior was also noted by Wang and Sun (2011) in their study on effective uses of reward systems. Griesemer (2011) goes so far as to argue that Xbox 360 games have become "extrinsic" to the achievement system itself, which may have become a bigger draw. After all, Xbox 360 games that include achievements tend to sell more copies and get better reviews (Jakobsson, 2011). In order to better understand what motivates players, and thus to develop potentially more profitable games, it is important to understand the comparative merits of challenge-oriented and reward-oriented game design models.

Research Hypothesis

The challenge factor is a time-tested, traditional approach to game design, while games that focus purely on the reward factor are a more recent phenomenon. Numerous criticisms seem to suggest a growing disdain amongst gamers toward games that follow the latter approach. The proposed hypothesis was that games that emphasize the challenge factor have a greater average retention rate than games that place emphasis on rewarding the player.

Methodology

Design

An experimental game was developed in order to observe possible differences between player response rates toward either of the two motivational factors. The chosen style was that of a puzzle game, specifically that of "match-three" games such as *Bejeweled*. This choice was made due to the notable appeal of such games, as *Bejeweled* had sold over 50 million copies by 2010 (Alexander, 2010), and had been designed to be pleasing even to someone "who normally doesn't like games" (PopCap, 2013). The notion was that, by choosing this design as a model for the game, more individuals might be willing to participate in the experiment, and might not be dissuaded by the manner of play rather than the goals presented by the game. The game, entitled *CapSwap*, was written in ActionScript 3.0, using the FlashPunk library for entity management, user input, and graphical functions.

The game involved an eight-by-eight grid of colored capsules on a board. Any one capsule could be clicked with the mouse and dragged to an adjacent capsule in order to swap their positions. If a row or column of three or more capsules of the same color was formed as a result, then that array was cleared from the board, and more capsules fell down to take their places from the top of the board. Otherwise, the swapped capsules would return to their previous positions.

Two versions of the game were built - one which emphasized the challenge factor, and the other which emphasized the reward factor. The primary similarities between the

two versions were the style of play (match-three) and a five-minute time limit per session. Once the five minutes were up, the game would end, and the player would be returned to the main menu, where his or her progress would be displayed and the option to begin another session would be given.

In the challenge version, the players received score bonuses for matching colored capsules. A "level bar" was positioned below the board, which steadily depleted. If it were to be entirely empty, then the game would be lost. Each match increased the level bar. If the level bar was filled, the board was cleared entirely, the game level was increased by one, the board was replaced with a new arrangement, and the number of possible colors for capsules was increased, thereby making it more difficult for the player to find matches. Also, as the game's level increased, the level bar would deplete more rapidly.

Between the changes in the number of colors and the speed of the level bar's depletion, the game gradually became more challenging. The player's success was rated by his or her score. At higher levels, greater score bonuses were granted. The skill of a player who is able to advance further into the game was noted by these higher scores. On the main menu, the player's personal high score was displayed.

In the reward version, the number of capsule colors remained fixed at four, the lowest possible number, and the level bar did not steadily deplete, nor did the game end if the bar were to be empty. Because there were only four colors of capsules, matches were comparatively easier to make. Once the level bar was filled, the board would clear and the player would advance by one level, but other than a freshly arranged board, no other

changes in gameplay would occur. The player's level was saved and recorded, to be viewed on the main menu. No high score was displayed, and completing matches within the game yielded no visible score bonuses.

Other than filling the level bar and increasing his or her level, the player's other motivation was to collect "prizes." Prizes appeared as various colored shapes. They were displayed in a "cache" at the top of the board, and at the bottom of the main menu. Seven slots were available for seven unique prizes, but only the first six prizes could actually be obtained - the seventh prize was a red herring, so that players would not be encouraged to quit simply because they collected all of the prizes.

The prizes appeared randomly whenever a player completed a match. The frequency of appearance depended upon the score, of which the game was secretly keeping track. After 1,000 points were gained after loading the game, the first prize had a chance to appear, and subsequent prizes would randomly appear after each subsequent 2,500 points. When one of these requirements was made, there was a sixty-percent chance that the game would grant a prize to the player. However, the given prize was randomized, so it was possible for the player to receive the same prize multiple times. In this way, receiving a prize was mostly unrelated to the player's skill. Simply by playing the game, players had the possibility of obtaining prizes.

Participants

Players were given the opportunity to register for the game online. Players were sorted into the challenge or reward version in an alternating pattern so that the number of

registered players in either group would be roughly even. Players were only allowed to sign up using MSSU e-mail addresses in order to ensure that no one player had access to multiple accounts. On request, individuals who were not attending MSSU were granted accounts as well, which were sorted into either group in the same manner. Players were also asked to identify with a type of gamer (hardcore gamer, gamer, casual gamer, or non-gamer, from most enthusiastic to least).

Procedure

Each time a player lost or quit a game session, his or her date and time of access and the number of seconds played were recorded in a table in an online database. In this manner, not only the frequency but also the total duration of play time could be recorded per player. These statistics were then analyzed in order to attempt to distinguish any possible differences between player retention in each version.

Results

A total of 78 players registered for the game. Of those, 4 never activated their accounts, and 18 never left any play records. Because it is indeterminable as to whether those 18 never actually played the game or if they did play but exited the game improperly, failing to record statistics, they are excluded from the following analysis. This leaves a total of 56 players. Because the players who left no records were not evenly split between versions, this left 33 participants playing the challenge version and 23 playing the reward version.

On the whole, most players of both versions played for only one session on one day, and played for a total of 300 seconds, or 5 minutes - the length of one full session. The only exception was that non-gamers who played the reward version had a mode of 600 seconds and 2 sessions. Many players did, however, play more than once. Of those who played the challenge version, 36.36% played for more than one session, and 9.09% played for more than one day. Of those who played the reward version, 52.17% played for more than one session, and 13.04% played for more than one day. Figure 1 shows a breakdown of the number of sessions played per individual for each version.

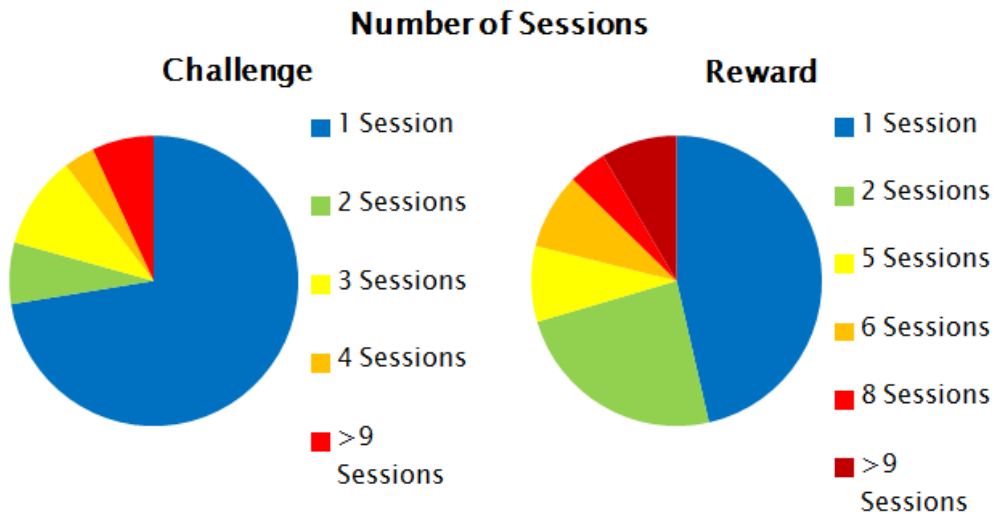


Figure 1. Average number of sessions played by version.

The average number of sessions for the challenge players was 2.67 and the average number of days was 1.21. The average number of sessions for the rewards players was 3.78 and the average number of days was 1.26. The total combined play time of all challenge players was 23,291 seconds, for an average of 705.79 seconds. The total combined play time of all reward players was 25,337 seconds, for an average of 1,101.61 seconds.

For those challenge players who played more than one session, the averages were 5.58 sessions, 1.58 days, and 1,449.92 seconds. The coefficients of variation were 1.54, 0.91, and 1.55, respectively. The averages for the reward players were 6.33 sessions, 1.5 days, and 1,853 seconds, respectively. The coefficients of variation were 0.93, 0.78, and 0.92.

ID	Gamer	Version	Seconds	Sessions	Days
31	Casual	Challenge	8341	32	6
37	Hardcore	Challenge	2530	10	1
64	Gamer	Reward	4800	16	2
30	Gamer	Reward	5720	20	5

Table 1. Exceptional players who played for more than 9 sessions.

Four players played more than 9 sessions. Their statistics are given in Table 1. Since they were the exception to the norm, and due to the high coefficients of variation, further analysis was performed on the two groups excluding those four exceptional players. The purpose of this was to examine data sets with lower coefficients of variation, indicative of a more normal distribution of players, to determine whether the inclusion of the exceptional players may have skewed the results. For those challenge players who 2 to 9 sessions, the averages were 2.5 sessions, 1.2 days, and 652.8 seconds. The coefficients of variation were 0.28, 0.35, and 1.36, respectively. The averages for the reward players were 4 sessions, 1.1 days, and 1,171.6 seconds, respectively. The coefficients of variation were 0.57, 0.29, and 0.56. These results are graphed in Figures 2 and 3.

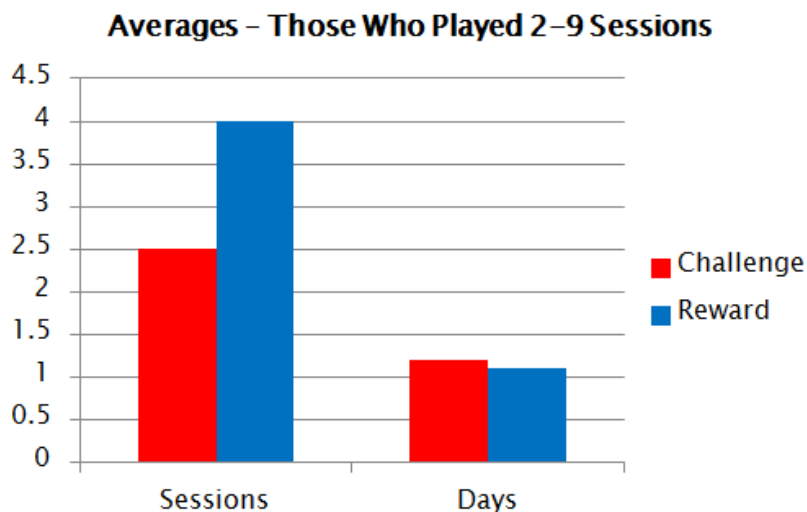


Figure 2. Average retention of players who played 2-9 sessions.

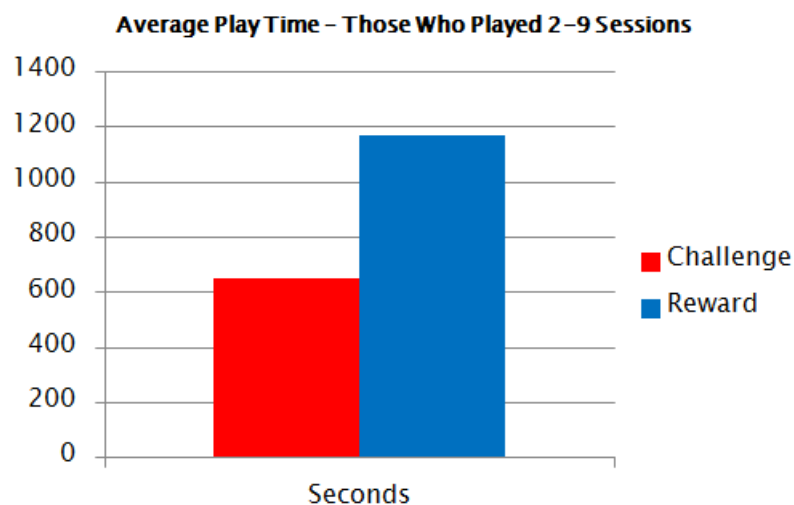


Figure 3. Average play time by players who played 2-9 sessions.

57.58% of the challenge players and 82.61% of the reward players expressed an interest in puzzle games. Those challenge players who expressed an affinity for puzzle games played an average of 897.42 seconds, 3.37 sessions, and 1.26 days, while those who did not played an average of 445.71 seconds, 1.71 sessions, and 1.14 days. Those reward players who expressed an affinity for puzzle games played an average of 1,217.68 seconds,

4.16 sessions, and 1.32 days, while those who did not played an average of 550.25 seconds, 2 sessions, and 1 day. These results are graphed in Figures 4 and 5 (P represents puzzle affinity; NP represents no puzzle affinity).

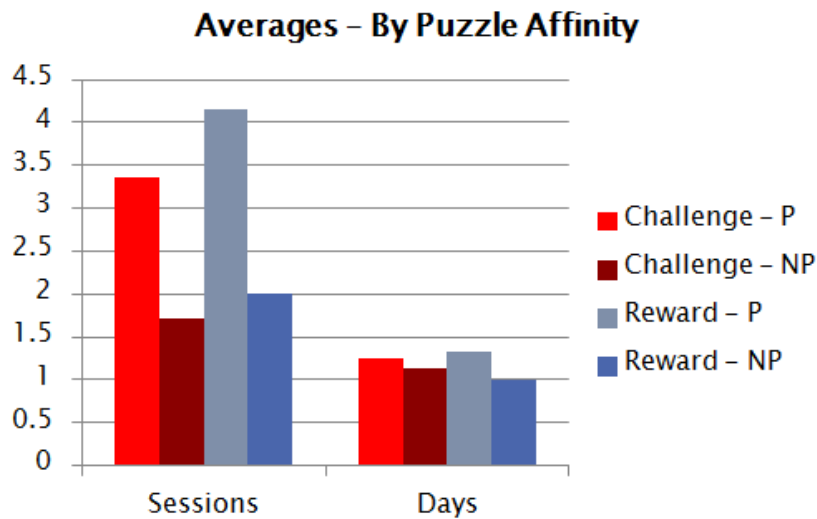


Figure 4. Average player retention by puzzle affinity and game version.

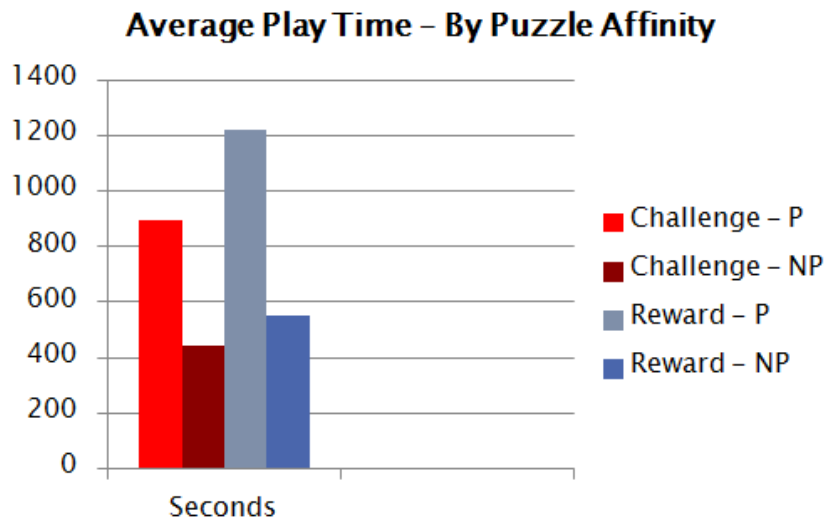


Figure 5. Average play time by puzzle affinity and game version.

Further analysis was performed on the players of both versions based on the "gamer type" with which they identified. The resulting averages are shown in Table 2. These

results are graphed in Figures 6 and 7 (C represents challenge players; R represents reward players).

Averages – By Gamer Type:

Gamer	Version	Seconds	Sessions	Days
Hardcore	Challenge	932.5	3.5	1
Gamer	Challenge	316.71	1.43	1
Casual	Challenge	1109.73	4.18	1.55
Non	Challenge	467	1.64	1.09
Hardcore	Reward	101	1	1
Gamer	Reward	1935.56	6.56	1.67
Casual	Reward	631.6	2.2	1
Non	Reward	500	1.67	1

Table 2. Average retention and play time by version and gamer type.

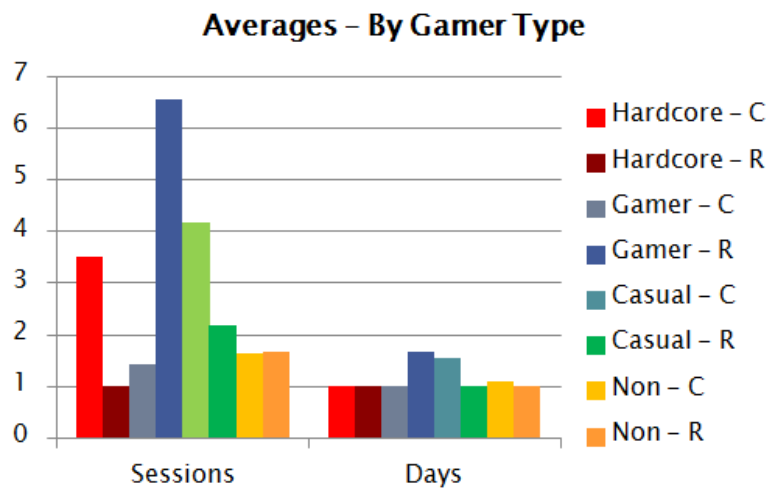


Figure 6. Average player retention by version and gamer type.

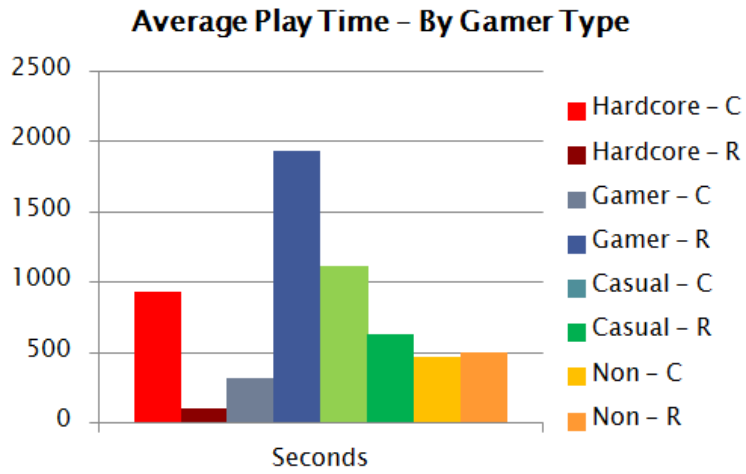


Figure 7. Average play time by version and gamer type.

Discussion

Analysis

In general, regardless of whether the exceptional players were included in the results, the average player retention for the reward version was greater than that of the challenge version. The number of players who played for more than one session was 15.81% higher for the reward version, and reward players played for an average of 6.6 minutes and 1.11 sessions more than did challenge players. Players who played for 2 to 9 sessions played an average of 8.65 more minutes and 1.5 more sessions than their challenge counterparts. The differences in the number of days played was negligible across the board; it was less than one regardless of which player groups were being compared.

As expected, players who indicated an affinity for puzzle games were more likely to play more often. Those who indicated an affinity for puzzle games and who played the challenge version played an average of 7.53 more minutes and 1.66 more sessions than those who did not indicate such an affinity. Those who indicated an affinity for puzzle games and who played the reward version played an average of 11.12 more minutes and 2.16 more sessions than those who did not indicate such an affinity.

The hardcore gamers actually played more of the challenge version, averaging 13.86 minutes and 2.5 sessions more than the one who played the reward version. However, there were four hardcore gamers who played the challenge version, and only one who played the reward version; the reward player only played one session for only 101 seconds. The difference between retention of non-gamers who played either version was negligible;

the reward players played for an average of 33 seconds and 0.8 sessions more than the challenge players.

Gamers who played the reward version played for an average of 26.98 minutes and 5.15 sessions more than those who played the challenge version. Excluding the exceptional players 30 and 64 from the reward group still yields a higher retention rate amongst the remaining reward players; they played for an average of 11.15 minutes and 1.86 sessions more than their challenge counterparts. Casual players who played the challenge version actually played for an average of 7.97 minutes and 1.98 sessions more than those who played the reward version. However, that group included the exceptional player 31. Excluding that individual shows that, when comparing the remaining normal players, casual players who played the reward version actually played for an average of 4.08 minutes and 0.8 sessions more than their challenge counterparts.

Limitations

There were several limitations on the methodology of this study. It is possible that they made an impact on the results. Primarily, the limitations involve size and a couple of design flaws.

Because the experiment only ran for one week, willing participants were left out of the data set. Since the game remained online and accessible after the initial week, eight students registered for the game after the results were collected. A longer period of time would have possibly allowed for more participants to contribute their time, and may have also allowed participants to contribute more of their time. If the experiment were to have

lasted for at least two months, then player retention might have been measurable as the number of individuals who began playing in the first month and continued to play in the second month.

Another limitation was that the player base was almost wholly comprised of MSSU students. In conjunction with this, the experiment was launched one and a half weeks before the last day of classes, which may have led to lower play rates. A wider audience, better timing, and longer duration may have allowed for more data to have been collected.

A more even separation of players might have helped to balance out the player groups. The registration script was designed to assign each new player to one version or the other in an alternating pattern, disregarding their answers to the questions on the form. A better method of handling this might have been to sort players into either the challenge or the reward version depending on their gamer type, whether or not they like puzzle games, and how many like-minded players were already assigned to either version. This may have helped to provide a more even distribution of players.

Finally, as mentioned earlier, 18 participants registered and activated their accounts, but left no records of play. It is possible that none of them ever played the game, but it is also possible that they did and, due to a severe design flaw, simply left no records. Play records were recorded when five minutes had passed, the level bar was emptied (in the challenge version), or if the player clicked on a button to exit the game prematurely, as they were instructed to do. This method was flawed, however, because the players who left no play records may have started their own sessions but exited the game improperly. For

example, leaving the page on which the game was located would not cause it to record any data. A better approach might have been to create the play record when a session was started, and update it with the duration of play when the session ended.

Conclusion

The proposed hypothesis was not supported by the findings of the experiment. Rather, the results indicate that, regardless of players' preference toward the chosen genre or the gamer type with which they identified, the reward motivator yielded a higher player retention rate than the challenge motivator. Due to the closed, short-term nature of the experiment, further research might be helpful in verifying this phenomenon in the long-term.

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