Perceived vs Real Lagging in PUBG

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Abstract. Lagging in video-games is common and may compromise gaming performance. Different players might experience lagging but interpret it very differently; they may not perceive lagging or not attribute the lagging to correct issues. As one of the most popular games in 2017, PlayerUnknowns Battleground, a.k.a. PUBG, has both huge player community and problems in performance. We choose PUBG as an example game to investigate how players perceive lagging, how players tackle lagging, and how lagging affects players retention to the game. We will gather and analyze players comments on lagging from forums and communities, and interview individual players to investigate players thoughts on lagging. Finally, we will discuss how our results have implications for both game research and the industry.

Keywords: competitive game · lagging · player experience.

1 Introduction

Competitive video games have been beyond popular nowadays, where players can immerse into a virtual world, compete with others with skills. However, unlike any other types of video game, competitive games have to consider more to make sure the in-game competition to be fair and balanced, because players fair competition is the biggest joy coming out the game. The experience of competitive games does not solely depend on the game quality. Running state, including frame rate drop, discontinuous animation or internet delay, may also contribute to players motivation whether to continue playing or quit.[1] Among these factors, we would like to investigate the lag, which concludes a experience that the game does not run smoothly and creates huge hindrance and dissatisfaction to players in their gameplay, and how it affects players experience specifically.

Lag, laggy, or lagging, are all colloquial words from game players when describing discontinuous game play, and players perceive lags for different reasons. Discontinuous game play happens very randomly and comes from vastly different reasons. Typical reasons include bad network connection, unstable servers, overheated hardware, sudden load of excessive data, turbulence of local internet, etc.[2] However, many players cannot tell why they are experiencing unsmooth gameplay, and they usually conclude it with simple .word like laggy. In some situations like when player just put on their gun and aim at enemy, a sudden lagging would effect players' performance[3] and it also bothers many players and profoundly affects their motivation to play.

PUBG(PlayerUnknown's Battlegrounds) is one of the most popular games in 2017. Bluehole, a small Korean game producer, became the biggest star in the game industry last year because of PUBG's rampage. However, as the number of players increased, many issues have been raised and complained, such as the expensive hardware requirements, poor internet server, and cheats and hacks. We decide to focus on PUBG because its community has often complained about lagging, and lagging represents precision and accuracy in eye-hand coordination, like shooting at targets. We investigate the role of lagging in PUBG, how players perceive it, and how detrimental it is to user experience.

We think it essential to talk about whether lagging is an issue to frustrating players because we suppose some game companies and designers may concern about it. If lagging is one of the major issues that make a player continue playing, developers should concentrate more efforts on game efficiency, not only game quality, or make a better balance between them.

2 Related Work

Previously among studies of lag problems in gaming, many researchers focus on how different level of lags can degrade players performance, by comparing objective player performance data in scenarios with and without lags.[4] What they did not do is to reflect the players subjective thoughts towards the game.

To the best of our knowledge, the first systematic study of the effects of packet loss and latency on gaming performance and experience dated back to 2003. The study was on the game Unreal Tournament 2003[5], a popular first person shooter game at the time, under various levels of packet loss and latency. They applied the study on both study-oriented, limited map and real games. The study found that players will not be significantly affected under 5 percent of packet loss, and will have much worse performance in controlled shooting and normal gameplay if latency is longer than 100ms.

Similar studies vary in the genres or titles of games, including Warcraft III, Online Madden NFL Football, Fortnite[6], and even some cloud-based games.[7]. In most of them, the researches found similar results and consolidate the existing consensus that poor running conditions would degrade the players performance in games.[8]

3 Qualitative research

To gather the PUBG players' opinions and perceptions, we conducted interviews with individual players and a questionnaire survey on the players' community. The goal is to know the general statistics of the hardware they are using, their experience of PUBG, their perception and attitudes towards different issues of PUBG, etc. Then we summarized the responses and obtained qualitative research results. [9]

3.1 Participants

In total, we did seven interviews and received 20 survey responses. The mean age is about 23. Two of the interviewees are female, 18 are male. Since PUBG is a hardcore competitive shooting game, the community mostly made up by male players. All interviewed players play PUBG in North America server and Asia server.

3.2 Apparatus

We used different online VOIP software, including Slack, WeChat, Steam voice chat, to do online interviews, and also did face-to-face interviews. Some of the interviews are audio recorded and transcripted. Besides, we sent out survey questionnaires with the same questions given out to the interviewees. We will use the combined results of both interviews and questionnaire responses for the qualitative research.

3.3 Procedure

First, we ask them some questions about their basic info like other research does. Then we ask them about daily game-playing preference. Here, we suppose that all our interviewers have played PUBG before. Next, we will ask them about their feelings about PUBG, what they like this game or that they dont like, and for these no longer playing, why did they quit, etc. After that, we raise the question about lagging, if it happens during the game process, and how this issue affects them. Finally, we collect their response to the issue, like whether they will report to the company or just withstand, or even quit playing because of lagging.

4 Usability research

After doing qualitative study, we then get down to usability research to find real reaction of players when they encounter lagging. With the help of specific software and hardware, we can simulate different lagging conditions, which makes our experiment feasible.

4.1 Participants

The participants are all male college students, ages from 18 to 25. Most of them used to play PUBG regularly, but have quitted. One of them never played PUBG before but plays other competitive games regularly. They were familiar with lags during their gameplay.

4.2 Apparatus

We continue to work with the game PUBG as the competitive game example. The game was run on a high-end gaming laptop that meets the recommended requirement for hardware of PUBG.

We use a piece of software called clumsy to reproduce internet delay and packet loss, which are two of the main symptom that players might experience with poor network connection. With clumsy, we can easily apply different combinations of delay or percentage of packet loss to all internet traffic of the system to simulate the bad connection.

We use laptop because of its easiness to reproduce sudden frame rate drop. When we unplug the power cord, the computer would run with battery and power saving mode will be enabled, which will decrease performance significantly to save power, and thus the game would run in lower frame rate (approximately from about 60fps to 30-to-40 fps). Through plugging and unplugging the power cord, we could simulate sudden frame rate drop to some extent.

4.3 Procedure

First, we welcomed and thank the participants and introduce them to the purpose of the study and the tasks. Then, we informed consent and explained the structure of the experimental session. Participants are supposed to play PUBG for approx 20 min. At min 5, we increase the delay to 50 ms. At min 10, we increase the delay to 80 ms. We return to 0ms after 1 min. At min 12, we unplug the power cord, making the computer running in power saving mode. We plug in the power cord again after 30 secs (to decrease frame rate). At min 15, we increase the delay to 100ms, and return to 0ms after 10 sec. We repeat this process 3 times until min 19. Then we gradually increase the delay to 150ms and last to the end.

The lagging can be a mixture of different measures, such as packet loss, sudden disconnection, etc. The number 50ms, 80ms and 150ms are the empirical numbers that players categorize delay. 50ms is slightly above optimal gameplay (5-30ms) but negligible. 80 ms is somewhat noticeable delay that can affect gameplay. 150ms or above delay is devastating and all real-time gameplay cannot run smoothly or the player cannot react to the stimulus in the game in time.

We randomly switch the order of different stimuli among all participants to ensure the independence of the order itself. After the first play, we ask the participant about the game experience in general and reveal that we are doing research on lagging. If he or shes still interested, we do a short shooting range test. They are supposed to use whatever weapon to shoot moving 20m, 50m, and 100m target, under normal, 50ms, 80ms and 150ms delay. One of each. We ask at which point he or she found unacceptable.

5 Analysis

We aggregated all the responses in Excel, analyzed the data, and got a rough overview of both parts of the data.

5.1 Qualitative study

We collected twenty two responses from the questionnaire we sent out. Three-fourths of the players have ever experienced lagging in the game. Nvidia GTX1000 series are the most common graphics cards the players use to play PUBG. They all complained that lagging is one of the major issues in the game, but it did not make them quit. Since the majority of them are using above-recommended hardware (Nvidia GTX1000 series) to run PUBG, and should not have a problem running PUBG smoothly, they attribute the lagging to the poor internet connection the most. Four of the interviewees upgraded their computers in order to play PUBG with better performance.

5.2 Usability study

Our interview had six participants, and all of them finished the procedure of the interview. Everyone reported they have a good gameplay under normal level of delay (50ms). One participant complained when delay was raised to 80ms, which typically indicates minor lag. Five out of the six participants complained when delay was raised to 150ms, and two of them complained significantly that they could not stand to keep playing.

6 Results

From our both studies, we found that lagging is a noticeable and bothering factor that degrade real time competitive game players' experience. Since they have to receive stimulus and make reaction in very short time, a more-than-slight level of lag can make them fail to do that. However, players have different sensitivity towards various levels of lag. Some players would feel they are hindered only because of a minor lag, other players might live with longer lag that the previous type of players cannot stand. But after all, all players stated that if the lag is noticeable to them, it will downgrade their satisfaction.

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