The Effect of Age, Gender, and Previous Gaming Experience on Game Play Performance

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Abstract. It is common sense that people don't play games that are too difficult for them. Thus Game developers need to understand the performance abilities of players. Several studies suggest a clear dissimilarity in video game playing abilities between different genders and age groups. In this paper, we report on a study investigating impact of age, gender and previous gaming experience on gameplay performance. The study explored the performance of 60 kids 6-16 years old within three video games: Rock Band 2, Lego Star Wars and Kameo. The paper outlines clear impact of age and gender and less prior gaming experience on performance parameters: score and game progression.

Keywords: Game play performance, player modeling, game design.

1 Introduction

One of the enjoyable aspects of games is challenge [1]. There is evidence showing that users enjoy games that they perform well in, but have not yet mastered [2-5]. Keeping the right balance in game is increasingly difficult due to the divide between gamers, casual gamers, and non-gamers. Thus developers need to know their users' behavioral abilities. Few researchers developed models that explain what players do in different game environments [6-8]. Some studies explored users' behaviors within virtual worlds and Massively Multiplayer Online Role Playing Games [9, 10] or mobile learning environments [11]. Other have argued the influence of gender, age, family race/ethnicity, and socioeconomic status on game play [12-16]. Chan found males play video games more than females [12]. Klimmt and Hartmann found boys and girls often prefer different games, females dislike games with violent content, lacked meaningful social interaction and had characters that were sexual stereotypes [14]. Other studies [18, 19] reported girls are motivated by 2D and easy, while boys by 3D and challenging. Also games with high level of competitiveness and task fulfillment are known to not attract female players as much as male [20]. In this paper, we explore performance as we believe performance is a key to motivation. As Lucas and Sherry [15] argue it is not gender that determines performance, but there are some underlying behavioral abilities that need to be examined.

2 Study Design

We had 60 participants: 18 females (average age=9.81), 42 male (average age=10.4) in 26 sessions. We chose cooperative popular games due to the results of our questionnaire which revealed kids in the age 6-16 often play together. Thus all sessions were cooperatively played a rhythm based game: *Rock Band 2 (RB)* and two action/adventure games: *Lego Star Wars (LSW)* and *Kameo* with 2-4 players (friend/family). We videotaped the sessions and interviewed players after each game using a structured questionnaire. We annotated videos with a set of defined metrics that evaluate player performance including difficulty level, level completed, number of points earned, number of deaths, etc. Analysis measured skills at the individual level as well as influence of the partner. We defined 'previous gaming experience' as a quantitative measure associated with the amount of times for the types of games they reported play. We used 14 genre classifications namely First Person Shooter, Role Playing Games, Sports/Racing, Music/Rhythm, etc. Questionnaire asked for their favorite games, genre of games they enjoy most, rate of play (hours/week), and length of a typical play session. This is limited as participants underestimate their time of play [17]. Questionnaire's results indicated *females spent less time playing video games ($p<.05$)*. We found no significant age difference between genders.

3 Result

Findings regarding *Rock Band 2* (Rhythm based game). 46 participants ($n_{female}=11$) completed the song, mean age:10.21, while 14 ($n_{female}=7$) failed, mean age:8.28. Those failed only tried the Easy mode. ANOVA analysis revealed *age played a significant role for males ($p<.05$)* but not for females. Also there was a gender difference for those completed the song ($p<.05$), but not for those failed. For those completed the song *females scored significantly lower than males*. Analysis showed *there was a significant strong positive correlation between score and age for females $r=.746(7)$, $p(\text{two-tailed})<.05$ and a weak positive correlation for males $r=.478(33)$, $p(\text{two-tailed})<.01$*. On the other hand, for participants who failed the song, *percentage of completeness was higher for females. There was a significant positive correlation between age and percentage of song completeness for males $r=.896(5)$, $p(\text{two-tailed})<.01$, but not for females*. Regarding prior gaming experience, *there was a positive correlation between time spent playing games and score but only for males*.

Findings regarding *Lego Star Wars* (3D action/adventure game). 54 participants ($n_{female}=16$; $n_{male}=38$) played for average of 10:01 minutes. *More males finished the level than females ($p<.05$)*. To keep consistency we isolated the participants who played the game before; 28 ($n_{female}=4$) participants have played the game before, while 26 ($n_{female}=12$) did not. Analysis indicated older participants without *LSW* experience could complete the level. However, there were several cases which had experience with *LSW* but didn't complete the level. Analysis of exceptions indicated partners' experience level greatly affected the females, but not males. *We concluded for males, age and previous experience were factors affecting their game*

performance, while for females, partners also had an effect. There were 12 obstacles, required participants to (a) move objects using force ability, (b) pass platforms using special abilities e.g., high jumps. The mean for number of obstacles solved was 9.4 and for number of deaths was 6.4. In these two parameters, experience with *LSW* as well as gender played significant roles ($p<.05$); *females solving fewer obstacles and dying frequently*. Regarding the impact of age on number of obstacles solved, *there is a significant positive correlation for males r=.396(38), p(two-tailed)<.05, but not for females*. Completeness time of obstacles was not appropriate. They involved fighting, solving, and collecting items. Players spent time on different activities. Also analysis showed no significant differences for time on game genre and obstacle resolution.

Findings regarding *Kameo* (3D action/adventure game). 56 ($n_{female}=16$; $n_{male}=40$) participants played same level for an average of 9:17 minutes. Only 7 male could finish the level. Overall *older participants finished the level*. Similarly, we isolated participants who played the game before; 9 (all male) played it before, while 47 ($n_{female}=16$; $n_{male}=31$) did not. There were 9 obstacles required participants to (a) perform character shifts, (b) understand capabilities of characters, (c) shift to appropriate character, and (d) use environment to jump. The mean for number of obstacles solved was 4.37 and for number of deaths was 1.23. *Prior experience with Kameo increased the number of obstacles solved ($p<.05$) but didn't have an effect on the number of deaths ($p>.05$)*. Regarding gender, *females cleared less obstacles than males ($p<.05$) while no significant difference for the number of deaths ($p>.05$)*. Regarding age and number of obstacles solved, both genders showed significant positive correlation: males r=.587(40), p(two-tailed)<.01 and females r=.655(16), p(two-tailed)<.01. However only males showed positive correlation between number of deaths and age r=.571(40), p(two-tailed)<.01. This meant *older participants solved more obstacles, and thus had more encounters with enemies*. Similarly, analysis showed no significant differences for time on game genre and obstacle resolution.

4 Conclusion

In this paper, we reported the impact of age, gender, and prior gaming experience on game play performance of 60 kids. Not surprisingly, we found significant gender and age influence on performance. For all games used within the study, the percentages of males who completed the songs (*RB*) or levels (*LSW* or *Kameo*) were higher than females. Females scored lower than males (*RB*) and solved smaller number of obstacles (*Kameo* and *LSW)*. In *RB* age had significant impact on score for females, but not for males while in *Kameo*, it had impact on number of obstacles solved for both genders and in *LSW* only for male. It is interesting that in *LSW*, the number of obstacles solved by females was affected by their partners' skills and performance. Also time spent playing video games had effect on scores of males in *RB*. This was surprising to us as we expected to see more impact of previous gaming experience. These results play a significant role within the game design and development process, as they give designers some guidelines for more gender and age inclusive designs.

However, more studies with more and mature players in each game genre are needed to investigate the conclusiveness of prior gaming experience.

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