

Level Up: A Study of Achievement Seekers in Battlefield 3

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Abstract:

Purpose: This research aimed to observe the effects of player's achievement orientation on four features, namely player's age, play hours, personality traits and nationality. Player's achievement orientation is determined by the player's in-game behavior in obtaining reward features in Battlefield 3.

Design/methodology/approach: We used players' in-game statistics and questionnaire data. The data were gathered using 'PsyOps' – a research-based website.

Findings: With regards to the four features: 1) age - the results show that there is a difference in reward characteristics collected by young and adult players. Younger players tend to be more interested in rewards that require exceptional skills. Meanwhile, older players appeared to be more interested in rewards that are based on time employment; 2) play hours - the logarithmic regression showed that the reward feature could explain 64.4% of the variance in play hours feature. In addition to this, we also revealed the possibility to measure a player's achievement orientation from their in-game behavior by developing the rating of a player's achievement orientation; 3) personality traits - it was revealed that the Big Five personality traits do not appear to be a robust predictor of a player's in-game behavior; and 4) nationality - we revealed that nationality did have a substantial impact on in-game achievement orientation, as shown by the Kruskal- Wallis H test.

Research limitations/implications: The data collection process took place in summer of 2012, eight months after the game was released

Practical implications: Moreover, a Mann-Whitney post-hoc test revealed that Finland has a significant difference of achievement orientation features compared to other countries tested. From tests performed, Finland is by far the most achievement-oriented country.

Originality/value: This research could determine user's achievement orientation, which can make them play the game better. This could be used in a daily life situation to make a student or worker to perform better at school and office respectively.

Keywords: Online Games, Achievement Orientation, Reward, Motivation, In-Game Behaviour

I. INTRODUCTION

In recent years, sales of video games have been dominating the revenue of the entertainment industry. In 2014, Newzoo reported that the global revenue in the video games sector hit 83 billion USD. In the report, it mentioned that the United States, China, Japan, South Korea, Germany, United Kingdom and France are among the top selling countries. To satisfy

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consumer desires for in-game experiences, game developers have been continuously innovating game features. Previous studies mention that video game features (e.g., storylines, social features, rewards and penalties) are the primary determiners involved with retaining player engagement in video games (Griffiths et al., 2004a; King et al., 2010; King et al., 2011). This research investigates which game features are particularly motivating to which kind of players. In so doing, this research will describe the player motivation to an online game as well as the research questions of this research.

King, Delfabbro, and Griffiths (2011) in their research on online video game features, report that the strongest motivation for players to engage in online games is the reward feature. They further explain that reward features consist of earning experience points (“XP”), finding rare items, leveling up, and meta-game rewards (such as “bragging rights”). Reward features may be designed in such a way that they retain a player’s involvement with the video game even when not actually playing the game (King et al., 2010). King and Delfabbro (2009) reported that players often engage in repetitive actions in the game to attain a particular reward.

In terms of player motivation, Yee (2006a) mentions three components that motivate a player to play an online game: (1) achievement (i.e., advancement, mechanics, and competition), (2) social (i.e., socializing, relationship, and teamwork), and (3) immersion (i.e., discovery, roleplaying, customization, and escapism). For the purpose of this research, we will focus on five subcomponents of player motivation, namely advancement, mechanics, discovery, role-playing, and customization. *Advancement* refers to a player’s desire to progress rapidly within the game and accumulate in-game achievements. *Mechanics* refers to a player’s interest in exploring the rules and system to optimize the character. *Discovery* refers to a player’s interest in finding and knowing things that most other players do not know. *Role-playing* refers to a player’s enthusiasm in establishing their storyline with a certain character. *Customization* refers to a player’s desire to customize the appearance of their character.

Furthermore, demographic factors (i.e., age and gender) and in-game behavior (i.e., playing time) are strongly related to a player’s motivation to engage in an online game (Yee, 2006a). Griffiths et al. (2004a) show a difference in motivation between adolescent and adult players of *Everquest*. Previous studies on *Battlefield 3* show that as people get older their speed and effectiveness in playing games deteriorate. Additionally, aging causes a downward trend in achievement-based gaming motivation (Tekofsky et al., 2015). Beyond those mentioned here, there are very few other studies that investigate the relationship between age and reward features within online games. This research will firstly examine the relationship between age and a player focus on rewards in online games, as stated by the first research question: **RQ1: How does a player’s age relate to reward features?**

Several previous studies have shown that the average time for playing online games ranges from 20 hours to 25 hours per week (Yee, 2006b; Cole & Griffiths, 2007; King et al., 2011). However, for addictive players the number of hours could increase dramatically – Van Rooij et al. (2011) even found up to 63 hours per week. One possible explanation for the prolonged play hours mentioned in King and Delfabbro (2009) study are the meta-game features, which often encourage a player to play longer than intended. According to King et al. (2010), video games commonly feature ratio reinforcement schedules to retain a player’s interest in the game and therefore engaged in longer play hours. There are two types of ratio reinforcement schedules as follows. Firstly, *fixed ratio* – from which a player, for example, may earn a particular reward for playing 10 hours as a helicopter’s pilot. Secondly, *variable ratio* – where a video games may be programmed to reward a player with experience points (Chumbley & Griffiths, 2006; King et al., 2010). Apart from those mentioned in here, there are very few other studies which investigate the relationship between play hours and reward features within online variables, as stated by the second research question: **RQ2: How does a player’s play hours relate to reward features?**

Several previous studies have revealed that the Big Five personality inventory, consisting of the traits namely openness, conscientiousness, extraversion, agreeableness, and neuroticism (OCEAN), have been influencing people in playing online games (van Lankveld et al., 2009; Tekofsky et al., 2013b; Spronck et al., 2012). *Openness* refers to a player's interests in novel stimuli. *Conscientiousness* refers to a player's tendencies to adhere to personal and social rules. *Extraversion* refers to a player's behaviors in seeking for positive stimuli and excitement. *Agreeableness* refers to a player's propensities of willingness to cooperate, as well as friendliness. *Neuroticism* refers to a player's tendencies to experience a negative emotion such as fear and anger. Apart from several previous studies cited in here, there are no other studies that observe the relationship between the Big Five personality traits and a player's achievement orientation in online games. This research will observe the relationship between these two variables, as stated by the third research question: **RQ3: How does a player's personality traits relate to achievement orientation?**

Bialas et al. (2014) explain that cultural background has some influence in a player's in-game behavior in online games environment. Griffiths et al. (2004b) show that cultural background determines the age distributions of the players. Van Rooij et al. (2010) explain that there is a vast array of ethnicity with differing compulsive internet usage among the participants. Despite the few mentioned here, there are no other studies that observe the effect of cultural background and achievement orientation. This research will observe the effect of these two variables, as cited by the fourth research question: **RQ4: To what extent does a player's cultural background determine his/her achievement orientation?**

To assist us in observing the relationship between the Big Five personality traits as well as cultural backgrounds and achievement orientation, the notion of achievement orientation need to be determined.

II. LITERATURE REVIEW

Reward Features in Online Games

In the online game environment, there are several methods for awarding a skilled player with a reward. A reward feature refers to a reinforcement which is given to a video game player who satisfactorily fulfills a specified challenge, e.g., winning a game or accomplishing a particular task. In *Battlefield 3*, for instance, a player who has completed a particular task will be rewarded with improved weapon equipment (e.g., a scope for a better long range shooting). For completing the mission or just playing the game, depending on the game's genre, a player may also be rewarded with experience points or XP (King et al., 2010). Once a player has accumulated a certain amount of XP, the player will reach the next level in the game. This change is usually indicated by the game stating: "*Level Up*" or "*You Have Been Promoted*". Skinner and Ferster (2015) introduce Operant Conditioning theory which encompasses a schedule of reinforcement. A schedule of reinforcement refers to the rules that regulate the distribution of rewards to individuals. In video games environment, there are two components of a schedule of reinforcement which are related to reward features, namely variable and fixed ratio reinforcement schedules (Chumbley & Griffiths, 2006; King et al., 2010). *Variable ratio* reinforcement schedule refers to the reinforcement that occurs after a given number of responses, where the number of reinforcement is unpredictable from one reinforcement to another. For instance, a video game may be programmed to reward a player with a particular item 10% of the time. *Fixed ratio* reinforcement schedule refers to the reinforcement that occurs within a fixed period of time. As an illustration, in *Battlefield 3* a player may earn a *Helicopter Service Medal* as a form of reward for having played 10 hours as a helicopter pilot.

Commonly, a considerable time investment is required to obtain such rewards. A player needs to adapt to the game rules to develop skills in the game. After a player developed their skills as well as strategies, the player can start seeking reward features that would enable them to upgrade their game character to be more proficient (King et al., 2010). As skills develop, there will be a difference in the amount of time spent in obtaining medals. It is believed that a skilful player will spend less time in order to obtain significant reward features than novice player. In addition, individual preference is also believed to influence the type of rewards that a player wants to focus on (Staewen et al., 2014). In summary, several factors influence a player's behaviors to obtain a reward, namely player's skills, strategies and tactic, play time, and individual preference.

With regards to play hours, the average play time for playing online games ranges from 20 hours to 25 hours per week (Yee, 2006b; Cole & Griffiths, 2007; King et al., 2011). The high number of average playing time can be explained by the time needed to adapt and master the game. Reward features also encourage a player's engagement with an online game (King & Delfabbro, 2009; King et al., 2010). To obtain reward features players may set up their strategies differently than they would normally do when playing the game without seeking rewards. This behavior is commonly-known as meta-game. In this research, *meta-game* refers to a behavior of the player where he/she actively seeks and learns the rules of the game in depth, retains knowledge from past experience, and develops a tactical strategy to master the game and therefore obtain reward features. King and Delfabbro (2009) explain that a meta-game features play a major part in determining the excessive amount of time spent playing an online game. In *Battlefield 3*, meta-game behavior may be seen in how a player sets up their strategy to obtain particular reward features. For instance, to obtain *Melee Medals*, a player may strategically play in a game-mode that only allows players to use a knife as their weapon. It is argued that the task completion process in online games be more important than the reward themselves (King et al., 2010).

Regarding a player's age, there are very few studies that explain the relation of age and reward features in video or online games. In neuroscience studies, it is found that for adults phase, older people tend to be less focused on rewards (Dreher et al., 2008). Previous studies in human resource management revealed that reward preferences, in an employment environment, are also influenced by an employee's age (von Bonsdorff, 2011). Von Bonsdorff (2011) further explains that there are different preferences of reward focus in particular age groups.

Motivation for Playing Online Games

Players have different types of motivation for playing online games. For instance, a player may play an online game in order to socialize through the environment. A player may also play an online game due to the desire to compete with other players. Finding rare items in online game may contribute to the motivation of a player. An empirical model of online games player's motivation was given by Yee (2006a). Yee mentions three components that motivate a player to play an online game, namely achievement, social, and immersion. *Achievement* refers to a desire to gain power, develop tactics and challenge other players. *Social* refers to a desire to have a meaningful social relationship with other players. *Immersion* refers to a desire to explore the game features.

Each of Yee's motivation components has subcomponents. The achievement component consists of advancement, mechanics, and competition. *Advancement* refers to a player's desire to progress rapidly within the game and accumulate in-game achievements. *Mechanics* refers to a player's interest in exploring the rules and system to optimize the character. *Competition* refers to a player's desire to challenge other players. The social component consists of socializing, relationship, and teamwork. *Socializing* refers to a player's interest to chat with other players. *Relationship* refers to a player's interest to establish a real relationship with other players. *Teamwork* refers to a player's satisfaction from being a part of a group. The immersion component consists of discovery, role-playing, customization, and escapism. *Discovery* refers to a player's

interest in finding and knowing things that most other players do not know. *Roleplaying* refers to a player's enthusiasm for establishing their storyline with a particular character. *Customization* refers to a player's desire to customize the appearance of their character. *Escapism* refers to a player's preference to use the online game as a temporary relief from daily activities.

Previous studies on achievement component reveal that male players tend to be more achievement oriented than female players (Yee, 2006c), while previous studies on motivation and reward explain that a player's satisfaction of obtaining rewards will motivate them to spend a considerable amount of time (Przybylski et al., 2010). Przybylski et al. (2010) also explain that much time is spent by players to develop strategies and tactics to get the rewards, which is often referred to as the *meta-game* behavior. High-achiever players are often highly motivated to develop the most efficient and effective way to conquer the objective or gain a reward.

Regarding age and motivation, Tekofsky et al. (2015) reveal that aging causes a downward trend in achievement-based gaming motivation. The achievement-based motivation is expressed by kills and score. The results show that older players have lower kills and score ratio than younger players. Tekofsky et al. (2015) observe players' behavior using the in-game behavior statistics. Furthermore, Yee (2006c) reveals that age of male players is negatively correlated ($r = -.27$) with their achievement. Yee's uses a questionnaire based method to show the relationship between age and achievement components.

Achievement Orientation

Elliot (2005) defines achievement goals as motivation for taking on challenging behavior or how individuals respond to given stimulus. Achievement goals focus on personal motivation to succeed or avoid failure in doing a task or activity (Elliot, 2005; Durik & Harackiewicz, 2003). Elliot and McGregor (2001) explain that there are two types of achievement goals, namely performance and mastery goals. *Performance goals* refer to people who are focused on the demonstration of competence, ability, and skill to be judged by others. *Mastery goals* refer to people who are focused on the development of competence through task mastery, e.g., develop new skills, improve competences, and so forth. Wigfield and Eccles (2000) explain that individuals' beliefs on valuing the activity will influence their performance. Elliot and Church (1997) describe that an individual who is achievement oriented will enjoy challenges of the task. In contrast, an individual who is not achievement oriented will avoid challenges on their task.

Previous studies on massively multiplayer online role-playing games (MMORPGs) found that male players tend to be more achievement-oriented than female players (Yee, 2006a; Yee, 2006c). Yee (2006c) reveals that older players tend to be less achievement-oriented than younger players. Dreher et al. (2008) explain that the physical deterioration of the brain plays a part in determining achievement orientation for adults. As a consequence, older people tend to be less focused on a reward.

Player Personality

Humphreys and Revelle (1984) defined personality traits as the consistent outline of personal behavior in different situations. A player's personality is discussed in terms of the Big Five personality inventory, consisting of the traits openness, conscientiousness, extraversion, agreeableness, and neuroticism (OCEAN). *Openness* refers to a player's interests in novel stimuli. *Conscientiousness* refers to a player's tendencies to adhere to personal and social rules. *Extraversion* refers to a player's behaviors in seeking for positive stimuli and excitement. *Agreeableness* refers to a player's propensities of willingness to cooperate, as well as friendliness. *Neuroticism* refers to a player's tendencies to experience a negative emotion such as fear and anger. Developed by Costa and McCrae (1995), the Big Five personality inventory is a robust way to explain human behavior in different situations and given particular stimuli.

Regarding online games, previous studies have used the Big Five personality inventory to explain players' behavior in online games environment (van Lankveld et al., 2009; Tekofsky et al., 2013b; Spronck et al., 2012). Van Lankveld et al. (2009) attempted to measure a player's personality by monitoring behavior in a virtual environment. In van Lankveld et al. (2009), participants were observed concerning their in-game behavior. The extraversion inventory was observed in three categories, namely choice and action, certain behavior, and conversation. Van Lankveld et al. (2009) found that the extraversion inventory can be analyzed in a virtual environment. Furthermore, Spronck et al. (2012) observed player's in-game behaviors and personality profiles using contemporary commercial video game, *Fallout 3*. Spronck et al. (2012) observed participants with two methods of data collection; questionnaire-based and use of a player's in-game behavior data. They found that the Big Five personality traits have some effects on players' in-game behavior. The effects were particularly strong on openness and neuroticism inventories. Zweig and Webster (2004) observed the relationship between goal orientation and the Big Five personality traits and revealed that there is a significant correlation between the Big Five personality and achievement orientation factors, with a significance $p < .05$. These previous studies are employed as the basis for this research to find the relationship between a player's personality traits and achievement orientation.

Nationality Effects on Online Game

The previous studies have shown that nationalities or cultural background have an effect on how people respond to given situation and stimuli. The cross-national differences have determined people's preferences and beliefs to respond to particular situation and stimuli. Previous study mentions that there is an effect of nationality difference on in-game behaviour (Bialas et al., 2014). Bialas et al.'s (2014) observed the nationality difference in a player's play style. They used in-game behavior data to observe the nationality differences and play style variables. Three components were observed in this study, namely competition, cooperation and tactical choice. They revealed that nationality differences affect *Battlefield 3* players' play style. The results show a significant effect on two components, namely competition and cooperation. A MANOVA analysis show significant nationality differences at $p < .001$. Hofstede (1985) investigated the influence of nationality difference in an organizational value system. Concerning nationality difference and achievement orientation, Hofstede (1985) explains that nationality differences do affect an individual's achievement orientation, as illustrated by the difference in work ethics between Swedish and American employee. The achievement orientation is represented by the masculinity-femininity index, where *masculinity* refers to a preference for achievement, assertiveness, and material success, whereas *femininity* refers to a preference for a relationship, modesty, caring for the weak and the quality of life.

Battlefield 3

For this research we used *Battlefield 3* game. *Battlefield 3* is First-Person Shooter (FPS) game which was released in October 2011 as part of the *Battlefield* sequels. *Battlefield* has had 34 sequels and was developed by Electronic Arts Digital Illustrations Creative Entertainment AB (DICE) and published by Electronic Arts (EA). *Battlefield 3* itself has DLC (downloadable content) expansion packs which were released between December 2011 and March 2013, namely: Back to Karkand, Close Quarters, Armored Kill, Aftermath, and End Game. Electronic Arts announced that up to Q4 2013, *Battlefield 3* had approximately generated over 120 million USD in revenue (Nunneley, 2013).

III. Research Methodology

The data collection process took place in Summer 2012, eight months after the *Battlefield 3* game was released. It took a six-week period to collect the data. The data were gathered using 'PsyOps' – a research-based website. Participants were asked to answer some demographic questions (age, player name, gaming platform and country of residence) and personality questions (the 100-item IPIP4). Ethical approval was obtained from a consent form. The consent form would allow

participants' in-game statistical data to be retrieved from public database websites.⁵ This data collection method is believed to be non-intrusive to the player's in-game experience, as the retrieval happens without interrupting players during play time. There were 13,367 participants who submitted their data. For the purpose of this research, there were 9,996 participant data used. The remaining data could not be accessed because the data were corrupted due to an unexpected change in the website.

The data analysis process consists of three steps. First, explains the filtering process of six features used in present research (*age, play hours, medals, platform, personality traits and country of residence*). Second, determines achievement orientations rating based on in-game behaviors. We determine this using two features, namely *play hours* and *Medals*. The achievement seeker orientation will be divided into two types, namely achievement seekers and non-achievement seekers. The achievement seeker orientation will be represented by the *Achievement-oriented* feature. *Achievement seekers* refers to players who have a positive score on the Achievement-oriented feature. *Non-achievement seekers* refers to players who have a negative score on the Achievement-oriented feature. Third, statistical analysis approaches. We statistically analyze the data in six steps. The first step focused on analyzing sample characteristics. The second step focused on analyzing the relationship of age and play hours to Medals, Task-based medals, Time-based medals, Weapon-based medals, Vehicle-based medals, Performance-based medals, Mastery-based medals, and Rare-based medals. The third step focused on investigating the results of the first research question. The fourth step focused on investigating the results of the second research question. The fifth step focused on investigating the results of the third research question. The final step focused on investigating the results of the fourth research question.

IV. FINDINGS

1.1 Sample's Characteristics

The data normalization process yields 7855 players. The average age of players is 25.51 ($SD = 8.42$) years-old. On average, the players spent 279.72 ($SD = 156.42$) hours on playing *Battlefield 3*. The average number of medals that players obtain is 24.99 ($SD = 9.42$). Figure 1 indicates the distribution of age and play hours in the sample. Concerning age, one thing to consider as a bias is the truthfulness of players in filling the online questionnaire. The complete statistical results of mean and standard deviation are exhibited in Table 1.

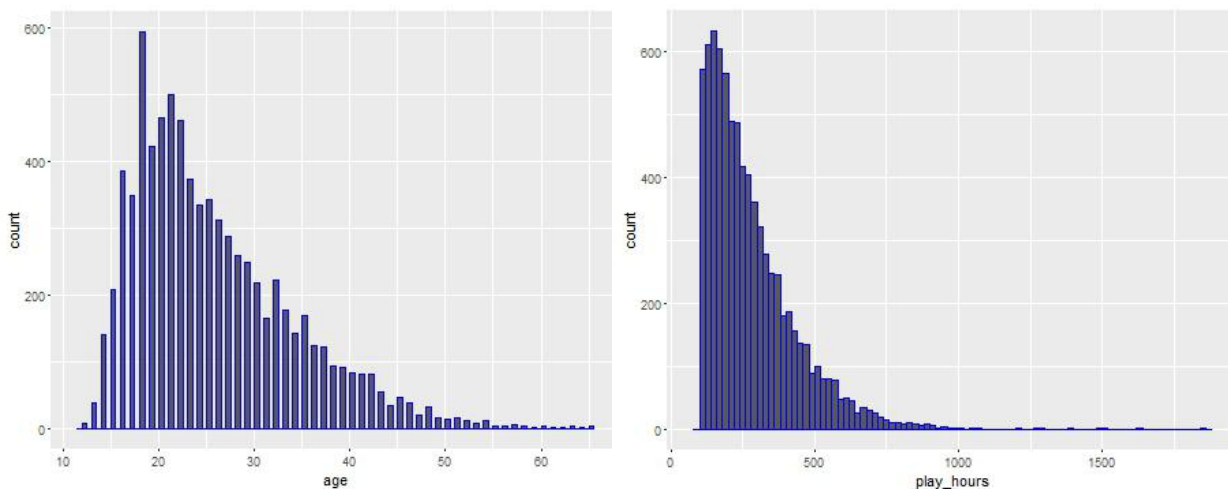


Figure 1: Age and play hours distribution in the sample

Platform distribution is not evenly distributed, with 3,070 PC players, 2,579 PlayStation 3 players and 2,206 Xbox 360 players. The age distribution shows that PC has the oldest age average ($M = 26.09$, $SD = 8.70$), PlayStation 3 comes as

second ($M = 25.55, SD = 8.48$) and Xbox 360 as the youngest ($M = 24.65, SD = 7.87$). To compare the effect of platform on Medals feature, a Kruskal-Wallis H test was performed. There is a statistically significant difference of platform on medals as determined by Kruskal-Wallis H test. The Kruskal-Wallis H test showed that there was a statistically significant difference in Medals feature between the different platforms, $\chi^2(2) = 38.90, p < .001$, with a mean rank Medals feature score of 3742.93 for PC ($Mdn = 24$), 3965.16 for Xbox 360 ($Mdn = 26$), and 4116.52 for PlayStation3 ($Mdn = 26$). Figure 2 shows that PC has the lowest median of medals collection. A Mann-Whitney post-hoc test reveals that there is a statistically difference of across platforms: PC-PlayStation 3 ($U = 3579342, r = .09, Z = -6.22, p < .001$), PC-Xbox 360 ($U = 3197481, r = .05, Z = -3.46, p = .001$), and PlayStation 3-Xbox 360 ($U = 2737874, r = .03, Z = -2.24, p = .03$).

Table 1: Statistical frequency table of features in the dataset

Variable	M	SD
Age	25.51	8.42
Play Hours	279.72	156.42
Medals	24.99	9.42
Medals task-based	21.63	7.33
Medals time-based	3.37	2.87
Medals rare	1.21	1.61
Medals weapon-based	4.52	2.45
Medals vehicle-based	1.02	1.14
Medals performance-based	2.82	1.44
Medals mastery-based	1.53	1.29

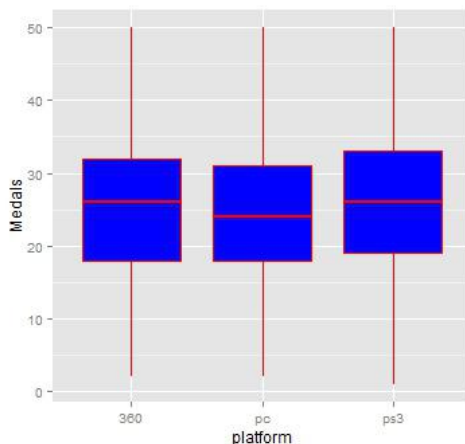


Figure 2: Platform's boxplot by medals

1.2 Relation of Reward Features

Age: In general, age shows a weak relationship with various reward features. The correlation of Age and Medals is $-.08$ ($p < .001$). The correlation is slightly increased for Age and Task-based medals ($r = -.18$, $p < .001$). For Weapon-based medals the correlation is $-.20$ ($p < .001$) and for Performance-based medals it is $-.14$ ($p < .001$). Interestingly, Age and Time-based medals have a positive correlation ($r = .23$, $p < .001$). The correlation between Mastery-based medals also shows a positive correlation ($r = .22$, $p < .001$). These results mean that older players prefer to gain Time-based type of medals, whereas younger players obtaining more Task-based medals.

Play hours: Table 2 shows that the all of the reward features are strongly, positively correlated with play hours. Play hours and Medals have correlation of $r = .82$ ($p < .001$), Time-based medal have $r = .92$ ($p < .001$), Task-based medals ($r = .69$, $p < .001$), Weapon-based medals ($r = .54$, $p < .001$) and Performance-based medals ($r = .53$, $p < .001$). The results show that the more a player is spending their time in engaging in the game, the more likely they will obtain medals (we agree that this a rather trivial conclusion, but at least it is very clear).

Table 2: Spearman's correlation between features

Variable	Age		Play hours	
	r	p	r	p
Medals	-.08	***	.82	***
Medals task-based	-.18	***	.69	***
Medals time-based	.23	***	.92	***
Medals weapon-based	-.20	***	.54	***
Medals vehicle-based	.15	***	.66	***
Medals performance-based	-.14	***	.53	***
Medals mastery-based	.22	***	.83	***
Medals rare	.02	*	.61	***

* $p < .05$ ** $p < .01$ *** $p < .001$

Platform: There was a statistical difference across platforms. Table 3 shows the Spearman's correlation between features by platform. The Spearman's correlation of platforms and reward features indicates that was a small difference across platforms.

Table 3: Spearman’s correlation between features by platform

Variable	Age						Play hours			
	Xbox		PS3		PC		Xbox		PS3	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Medals	-		-		-		.83	***	.81	***
Medals task-based	.18	***	.23	***	.14	***	.72	***	.68	***
Medals time-based	.21	***	.23	***	.24	***	.92	***	.92	***
Medals weapon-based	.21	***	.25	***	.16	***	.56	***	.55	***
Medals vehicle-based	.12	***	.19	***	.14	***	.70	***	.70	***
Medals performance-based	.12	***	.22	***	.07	***	.54	***	.49	***
Medals mastery-based	.21	***	.22	***	.23	***	.83	***	.82	***
Medals rare	.01		.02		.05	**	.63	***	.63	***

* $p < .05$ ** $p < .01$ *** $p < .001$

1.3 Sample’s Characteristics

Linear regression analysis was performed to predict the age variance on Medals, Task-based medals, Task-based medals, Time-based medals, Weapon-based medals, Vehicle-based medals, Performance-based medals, and Mastery-based medals features. The linear regression results show that all of the reward features have a significant effect ($p < .001$) to age as it is displayed in Table 4. However, one needs to take into consideration that the significant effect might occur because of the large number of samples in the dataset. The entire model shows a small amount of age variance that can be explained by the medals. Only 1.4% of age variance can be explained by Medals feature ($R^2 = .01$, $F(1,7853) = 110.84$, $p < .001$). The variance slightly increased for several of the more detailed features. For instance, 5.2% of age variance that can be explained by Task-based medal feature ($R^2 = .05$, $F(1,7853) = 432.10$, $p < .001$) and 3.9% of age variance can be explained by Time-based medal feature ($R^2 = .04$, $F(1,7853) = 315.87$, $p < .001$). Furthermore, 4.8% of age variance can be explained by Weapon-based medal feature ($R^2 = .05$, $F(1,7853) = 396.37$, $p < .001$).

Table 4: Linear regression results between features

Variable	R^2	<i>B</i> intercept	<i>B</i> slope	<i>SE</i>	t- value	<i>p</i>
Age - Medals	.01	28.36	-.13	.01	-10.53	***
Age - Medals task-based	.05	26.70	-.20	.01	-20.79	***
Age - Medals time-based	.04	1.66	.07	.00	17.77	***
Age - Medals weapon-based	.05	6.15	-.06	.00	-19.91	***
Age - Medals vehicle-based	.01	.62	.02	.00	10.28	***
Age - Medals performance-based	.03	3.57	-.03	.00	-15.59	***

Age - Medals mastery-based	.04	.77	.03	.00	17.64	***
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* $p < .05$ ** $p < .01$ *** $p < .001$

1.4 Logarithmic Regression

Logarithmic regression analysis was used to predict the variance of play hours on Medal feature. The reason to use a logarithmic regression rather than a linear regression here, was that a visual inspection of the data points seemed to indicate that a logarithmic relationship was expected (see Figure 3). Also, since the number of medals has an upper limit while play time has not, linear regression is unsuitable in any case.

In the total sample, 64.6% of the variance in play hours can be explained by the Medals feature ($R^2 = .65$, $F(1,7853) = 14306.53$, $p < .001$). We can explore player's achievement orientation by using the residual model from logarithmic regression line as it is illustrated in Figure 3. For example, for a player who obtains a positive rating and scores more than or equal to five of residual calculation can be classified as an achievement-oriented player. On the other hand, a player who obtains a negative rating and scores more than or equal to five of residual calculation can be classified as a non-achievement oriented player.

The achievement-oriented rating model is explained as follows: $RATING = y - \hat{y}$

While:

y = a player's Medals feature

$\hat{y} = -57.89 + 15.06(\log_e(x))$

x = a player's Play hours feature

Table 5: Logarithmic regression results

Variable	R^2	B intercept	B slope	t-value	p
Play hours - Medals	.65	-57.89	15.06	119.61	***

* $p < .05$ ** $p < .01$ *** $p < .001$

Furthermore, we assess the achievement-oriented score to correlate it with the age feature. The result of Spearman's correlation of age and achievement-oriented features shows a moderately large negative effects ($r = -.39$, $p < .001$). This result supports the previous finding that reveals the age as a predictor of a player's achievement orientation.

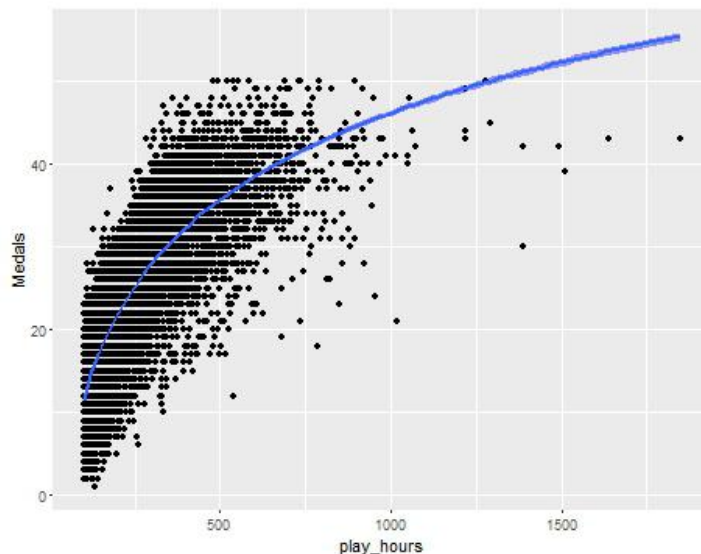


Figure 3: Logarithmic regression plot and line of play hours and medals

1.5 Personality Traits

Correlation of the Big Five personality traits and Medals feature and Achievement-oriented feature shows a very weak correlation as shown in Table 6. Regarding the Medals feature, a significant effect ($p < .05$) occurs in four features of the Big Five personality traits (e.g., conscientiousness ($r = -.03, p = .013$), agreeableness ($r = -.06, p < .001$), openness ($r = -.04, p < .001$), and neuroticism ($r = -.02, p = .037$)). These three correlation features show a negative direction. The effect sizes are very small, though. Regarding the Achievement-oriented feature, a significant effect ($p < .001$) can be found for four personality traits, namely conscientiousness ($r = -.08, p < .001$), extraversion ($r = -.07, p < .001$), agreeableness ($r = -.07, p < .001$), and openness ($r = -.05, p < .001$) with a negative direction. Again, effect sizes are quite small.

Table 6: Spearman’s correlation of personality traits

Variable	Medals		Achievement-orientated	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Openness	.04	***	-.05	***
Conscientiousness	.03	*	-.08	***
Extraversion	.01		-.07	***
Agreeableness	.06	***	-.07	***
Neuroticism	.02	*	-.02	

* $p < .05$ ** $p < .01$ *** $p < .001$

1.6 Country Differences

In this section, we will present the results of the effect of country on a player’s achievement orientation. The country with the youngest players in the database is the Netherlands ($M = 23.06, SD = 8.48$), while the oldest are found in the Great Britain ($M = 26.64, SD = 9.18$). Concerning play hours, Australia has the highest average of playing time ($M = 286.02, SD = 156.46$), while the Netherlands has the lowest average ($M = 247.03, SD = 129.97$). For the Medals feature, Finland has the most average medals’ obtained ($M = 26.32, SD = 7.10$), while the Netherlands has the lowest average ($M = 23.88, SD = 8.62$).

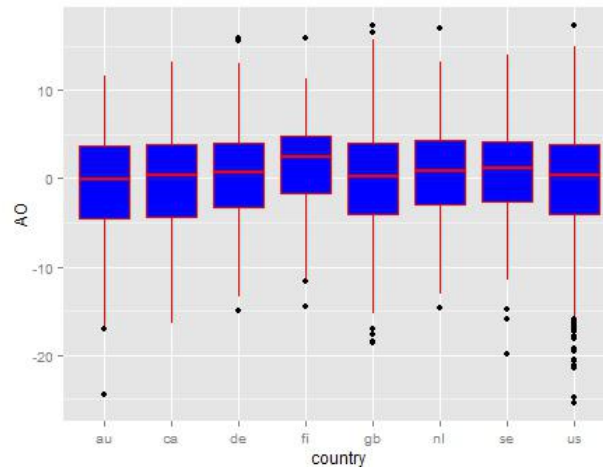


Figure 4: Country’s boxplot by achievement oriented

Table 7 shows Finland as the most achievement-oriented country ($M = 1.61, SD = 5.03$), and the Netherlands comes as the second most achievement-oriented ($M = .59, SD = 5.33$). Australia becomes the least achievement-oriented country by scoring the average of $-.74 (SD = 5.12)$. Figure 4 displays the boxplot distribution by achievement oriented score by country.

Table 7: Country ranked by achievement-oriented average

Country	<i>M</i>	<i>SD</i>	<i>Mdn</i>	<i>Rank</i>	<i>Mean</i>
1 Finland ($N = 195$)	1.61	5.03	2.40	3582.97	
2 The Netherlands ($N = 217$)	.59	5.33	.88	3244.68	
3 Sweden ($N = 261$)	.55	5.29	1.17	3234.82	
4 Germany ($N = 314$)	.50	5.39	.70	3179.32	
5 Great Britain ($N = 920$)	-.14	5.57	.28	3026.45	
6 United States ($N = 3445$)	-.26	5.79	.35	3020.75	
7 Canada ($N = 426$)	-.32	5.86	.43	3020.60	
8 Australia ($N = 336$)	-.74	5.12	-.03	2888.62	

A Kruskal-Wallis H test was conducted to determine if players’ achievement orientation was different for eight different countries. The test showed that there was a statistically significant difference in Achievement-oriented feature in the eight countries, $\chi^2(7) = 28.89, p < .001$, with a mean rank Achievement-oriented score of 3582.97 for Finland, 3244.68 for the Netherlands, and 3234.82 for Sweden. A Mann-Whitney post-hoc test reveals that there are several statistically differences

across countries. Table 8 shows the complete results of a Mann-Whitney post-hoc of country on Achievement-oriented features. The results show that in particular Finnish players are more achievement-oriented than players from the other countries tested.

Table 8: Mann-Whitney post-hoc test results

Country	Z score and p value							
	1	2	3	4	5	6	7	8
1 Australia	-							
2 Canada	-.99	-						
3 Finland	4.41***	3.63***	-					
4 Germany	-2.11*	-1.21	-2.57*	-				
5 The Netherlands	-2.35**	-1.44	-2.03*	-.45	-			
6 Sweden	-2.39**	-1.55	-2.21*	-.40	-.06	-		
7 Great Britain	-1.22	-.07	4.02***	1.33	1.67	1.71	-	
8 United States	-1.31	-.01	4.30***	1.53	1.81	1.89	-.10	-

* $p < .05$ ** $p < .01$ *** $p < .001$

V. DISCUSSION

The aim of this research is to observe the achievement orientation from four perspectives, namely age, play hours, personality traits and cultural background. The discussion of the results begins with the correlation between age and reward features in *Battlefield 3*. In general, aging causes a descending trend in player's achievement orientation. This result is in accordance with recent studies indicating that aging causes a downward trend in achievement-based motivation (Tekofsky et al., 2015; Tekofsky et al., 2013a).

We found evidence that a player's age determines the player's reward orientation. In younger players, there is a tendency to obtain task and performance related medals. These results may be explained by the fact that Task-based medal feature requires good cognitive performance (e.g., reflexes) to obtain. Younger players are believed to have better cognitive performance compared to older players (Tekofsky et al., 2015). Cognitive performance is also believed to influence a player's play style. Our findings support the previous study on *Battlefield 3* that states that, as people get older, their speed and effectiveness in playing games deteriorates (Tekofsky et al., 2015; Tekofsky et al., 2013a). Performance-based medals, that younger players tend to achieve more, are believed to require a high motivation and strong skills (Tekofsky, et al., 2015). Our findings in this regard are consistent with Yee's study which found that aging causes a declining trend in the player's motivations (Yee, 2006c).

With regards to older players, the findings indicate that there is a tendency to obtain the Time-based medals. These medal subcategories (e.g., Time-based, Vehicle-based and Mastery-based medals feature) require a player to spend a decent amount of play time in a particular vehicle and character. This could be due to the fact that aging causes a descending trend in cognitive performance, therefore older players prefer to achieve (or are better at achieving) the type of medal that require less cognitive performance. From these observations, it can be concluded that there is a preference difference in reward

features for younger and older players, which further supports the idea that age influences the individual preference of focusing their goals on obtaining particular rewards (van Bonsdorff, 2011).

The second research question in this research seeks to determine the extent of play hours in relation to reward features. The results show an obvious relationship between a player's play hours and reward features. This present research reveals that there is a strong correlation between play hours and all medals subcategories. In addition, logarithmic regression revealed that 64.6% of the variance in play hours can be explained by Medal features. These results may be explained by the fact that a player needs to develop skills, strategies and tactics, as well as learn the rules of the game to obtain medals. This process is known as *meta-gaming* behavior. These results support previous research on play hours behavior which links the amount of time spent playing the game and *meta-gaming* behavior (King & Delfabbro, 2009).

Moreover, this research reveals that a player's play hours and reward feature (in-game behavior) enable us to determine a player's achievement orientation. We were able to demonstrate that achievement orientation supplies an indication for preference. Therefore, by examining the achievements of their players, game developers may modify their reward features so that a game increases the player's satisfaction.

The third research question aimed at determining the relation between a player's personality traits and his/her achievement orientation. The results of this research show that there is a significant effect ($p < .001$) on the relationship between four of the Big Five personality traits (openness, conscientiousness, extraversion, and agreeableness) and a player's achievement orientation. However, all the observed relationships have a weak correlation. It has been suggested that the Big Five personality inventory is a reliable predictor of player's in-game behavior (Spronck et al., 2012). In the case of this research, the Big Five personality traits do not appear to be a robust predictor of player's in-game behavior.

The fourth research question in this research intended to observe the effect of cultural background and player's achievement orientation. Current research found that cultural (nationality) differences do have an impact on player's achievement orientation. Kruskal-Wallis H test revealed that there is a significant difference in players' achievement orientation in the eight countries investigated (i.e., Australia, Canada, Finland, Germany, the Netherlands, Sweden, the Great Britain, and the United States). A Mann-Whitney post-hoc test revealed Finland as the highest country whose players are the most achievement-oriented. There are three possible explanations concerning this matter: (1) the average age of Finland's players are among one of the youngest; (2) Finland's game industry has been flourishing in the past decades; and (3) *Battlefield 3* is a Scandinavian-based game, therefore Finnish players have a closer cultural distance to the game. In summary, the significant difference in players' in-game behavior affected by different cultural backgrounds supports previous findings (Bialas et al., 2014).

This present research has three limitation issues, concerning a bias on player's age responses, the data collection method, and the analysis of the data. First, it is important to bear in mind the possible bias in player's age responses. As it is shown in Figure 1, there is a surprisingly high number of players who claim their age as 18 years old, and a surprisingly low number of players who claim their age as 17 years old. One possible explanation for this is that players who are aged under 18 could have manipulated their age so that they meet the minimum age requirement of 18-year-old to play *Battlefield 3*. Second, in regards to player's achievement orientation the present research can only measure the in-game behavior of the players. To quantify player's achievement orientation, this research used play hours and medal features in in-game data statistics. It would have been preferable if a player's achievement orientation could also have been determined via a questionnaire, but such data was not available. Third, this present research only focuses on observing the end product of

achievement orientation. We believe that observation of the progress of achievement orientation, rather than just the end result, would be beneficial to further the study of this field.

VI. CONCLUSION

This research showed that there are clear connections between the achievement orientation of players, their age, and their time spent playing. Moreover, small correlations were also found between a player's achievement orientation, personality, and country of origin. Besides the fact that this provides interesting knowledge on player interests, and the fact that it confirms some findings of previous research on age and player motivation, the results show that game developers should keep their player base demographics in mind when designing particular features of their games.

The Relation between Age and Reward Features

In regards to the first research question: "*How does a player's age relate to reward features?*", in general older players tend to be less achievement oriented than younger players. This was shown by the negative correlation between age and Medal features. It is found that age accounts for 1.4% of the variance in the Medals feature. Interestingly, when the Medals feature is subcategorized, age becomes a considerable determiner of a player's reward orientation. It was discussed that younger players are more likely to obtain reward features that are based on tasks (i.e., Task-based medal, Weapon-based medal and Performance-based medal), while it was revealed that older players are more likely to obtain reward features that are based on time (i.e., Time-based medal, Vehicle-based medal and Mastery-based medal). Linear regression found that age accounts for 5.2% of variance in Task based, and 3.9% of variance in Time-based medal features.

Regarding achievement orientation, it was found there was a strong relationship between age and a player's achievement orientation. The finding shows that aging causes a downward trend in achievement orientation. It can be concluded that age functions as a predictor for determining *Battlefield 3* reward and achievement orientation.

The Relation between Play Hours and Reward Features

Logarithmic regression was used to answer the second research question: "*How does a player's play hours relate to reward features?*" The results showed that 64.6% of the variance in play hours can be explained by the Medals feature. It was also found that it is possible to predict a player's achievement rating based on the residual score of participants on the logarithmic regression line. This finding may be useful for other studies in determining a player's achievement orientation based on in-game behavior. All eight reward features show a large correlation effect ($r > .50$). Future study of this research question would be a useful way of providing more evidence on how player's rating on achievement orientation can be determined. To summarize, these findings have considerable implications to the understanding of how to determine a player's achievement orientation based on in-game behavior.

The Relation between Personality Traits and Player's Achievement Orientation

The third research question is "how does a player's personality traits relate to achievement orientation?" It was discussed that the Big Five personality traits explain only a little of player's achievement orientation. It is possible that more could be explained if behavioral data on a player that is not directly derived from gameplay would be included, but such data was not available. Further study should be undertaken to explore how the Big Five personality traits relate to a player's behavioural data

Cultural Background and a Player's Achievement Orientation

The fourth research question is "*To what extent does a player's cultural background determine his/her achievement orientation?*" It was discussed that a Kruskal-Wallis H test showed that there was a statistically significant difference in a

player's achievement orientation in the eight countries used in the research. A Mann-Whitney post-hoc test reveals that Finland has a significant difference with all other countries, making Finland by far the most achievement-oriented country.

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