How Does Conscientiousness Impact on Computer Game Play?

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Abstract: With the rise of social media and mobile computing, hedonic components and gamification play a more and more important role in the success of e-business systems. In addition, as a majority of users of e-business have game play experiences, understanding their behavior is essential. This research attempts to investigate user behavior in computer game play and the findings will likely shed lights on how to design gamification features in e-business systems. Based on a conceptual framework of computer game play proposed by Fang, Chan, and Nair (2009), an online survey was designed and conducted to investigate the relationship between personality traits and players' choice of games. Results suggest that the personality trait, conscientiousness, has an impact on how players choose games. Findings and their implications were discussed.

1 INTRODUCTION

The popularity of digital (computer and video) games has reached phenomenal proportions. Based on the statistics provided by Entertainment Software Association (2017), 65 % of American households play computer or video, and their worldwide markets are expected to grow strongly also in the future. Computer games have become a major form of entertainment. In addition, digital games are used increasingly for therapeutic, educational, and work-related purposes (Griffiths, 2003; Robillard et al., 2003). Given the prominence of computer games for entertainment, researchers need to acquire a better understanding about computer game players and their play experience. However, as Bateman and Boon (2006) stated in the preface of their book, "a certain mystery still surrounds game design, and although much has been written on the subject, the formal study of game design practices in a definite sense is still in its infancy."

Based on a conceptual framework of computer game play proposed by Fang, Chan, and Nair (2009), this study investigates the relationship between the personality trait, conscientiousness, and players' choice of games. The key research questions are: 1) what types of people play what games? And 2) Does the personality trait, conscientiousness, matter in players' choice of games? We expect that findings of these important questions will no doubt help game developers improve design of computer games and also improve their marketing plan. In addition, the findings will likely shed lights on how to design gamification features in e-business systems.

2 BACKGROUND LITERATURE

Much of the Psychological Research on Games Has Been Focusing on Negative Effects of Violent Video Games Although Some Recent Studies Have Changed This Tone and Started to Investigate Individual Differences among Game Players. in This Section, We First Review Prior Research on Personality and Computer Game Play. then We Examine the Big-Five Personality Model and Its Personality Traits.

2.1 Personality and Computer Game Play

Previous research has consistently shown that exposure to violent video games is significantly linked to increases in aggressive behavior, aggressive cognition, aggressive affect, and ardiovascular arousal, and to decreases in helping behavior (Anderson and Dill, 2000). Anderson and Dill (2000) also suggest that the positive relationship between violent video game play and aggressive behavior and delinquency is stronger for individuals who are characteristically aggressive and for men. Furthermore, a few other studies show that

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personality is linked to gaming behaviors. Fetchenhauer and Huang (2004) indicate that the justice sensitivity could be used to predict decisions in a number of games using theoretical paradigms (dictator games, ultimatum games, and a combination of these two games). Douse and McManus (1993) suggest that players of a fantasy Play-By-Mail game were less feminine, less androgynous, and more introverted than matched controls. The fantasy game players showed lower scores on the scale of empathic concern, and were more likely to describe themselves as "scientific," and to include "playing with computers" and "reading" among their leisure interests than players in the control group. In a more recent study, Whang and Chang (2004) explored the lifestyles of online game players. Based on an online survey, they classify lifestyles of game players into three groups: single-oriented players, community-oriented players, and off-real world players. Players in each group display distinct differences in their values and game activities, as well as in their anti-social behavior tendencies. This study further suggests that differences in game players' lifestyles reflect not only their personality but also their socio-economic status within the virtual world constructed through game activities.

Bateman and Boon (2006) applied to Myers-Briggs Type Indicator (Briggs, 1989) to games and conducted a survey to investigate game player types. The survey had two components: a 32-question Myers-Briggs personality test and a short questionnaire to determine elements such as game purchasing and playing habits. About four hundred participants took part in the study. Based on cluster analysis results, Bateman and Boon (2006) identified the following four play styles:

Type 1 Conqueror play involves winning and beating the game.

Type 2 Manager play revolves around a strategic or tactical challenges.

Type 3 Wanderer play in which players search for a fun experience.

Type 4 Participant play.

Within each of these four types, players were further categorized into two subtypes: hardcore and casual players.

Bartle (2009) recognizes four types of game players who play games in the virtual world: 1) Achievers like acting on the virtual world. Their aim is usually to succeed in the context of the virtual world. 2) Explorers like interacting with the virtual world. They act in order to find out things about the virtual world and how it works. 3) Socialisers like interacting with other players. They like talking, being part of a group, and helping others. 4) Killers like acting on other players. Sometimes, this is to gain a big bad reputation, but other times it's to gain a big good reputation.

More recently, Fang and Zhao (2009) find: 1) Sensation seeking has a significant and positive effect on enjoyment of computer game play through enhanced engagement during game play for action/ adventure/shooting/fighting, role playing, and sport/racing games. 2) Sensation seeking has a significant and positive effect on enjoyment of computer game play through enhanced cognition values for family entertainment/simulation games. 3) Self-forgetfulness has a significant and positive effect on enjoyment of computer game play through enhanced engagement during game play for role playing games.

Despite some of the groundbreaking work in prior studies, few research has systematically examined what role player's personality plays in choosing games to play. This paper reports the first attempt to address this research question.

2.2 The Big-five Personality Mode

Personality can be defined as a stable set of tendencies and characteristics that determine the commonalities and differences in people's psychological behavior (thoughts, feelings and actions) that have continuity in time. Personality is one of the most elusive areas of psychology, difficult to understand, and difficult to test. Nevertheless, psychologists have developed several theories to explain personality based on two principles: core of personality and periphery of personality. Core of personality addresses the inherent attributes of human beings which do not change over the course of living. They are used to explain the similarities among people. Periphery of personality, on the other hand, focuses on learned attributes. It helps to identify the differences among people.

Over the years, the big five-factor personality model (Digman and Takemoto-Chock, 1981; McCrae and Costa, 1985; Peabody and Goldberg, 1989; Thurstone, 1934; Tupes and Christal, 1961) has gained acceptance among researchers because it establishes a common taxonomy (Goldberg, 1990). It contains the following five dimensions (or traits) of personality:

- Extraversion: this factor has been the largest. It contrasts traits such as talkativeness, liveliness, and outgoingness versus shyness, quietness, and passivity.

- Agreeableness: the second factor. It contrasts traits such as kindness and gentleness with rudeness and harshness.
- Conscientiousness: the third factor. It includes traits such as organization, discipline, and thoroughness versus sloppiness, laziness, and unreliability.
- Emotional stability (versus neuroticism): the fourth factor. This factor contains traits such as relaxedness, versus moodiness, anxiety, and touchiness.
- Intellect or imagination: the fifth factor. It has traits such as philosophicalness, complexity, and creativity versus shallowness and conventionality. This factor also has another name, openness to experience.

The Big Five model has been researched and validated by many different psychologists and are at the core of many personality questionnaires. According to McCrae and Costa (1985), the conscientiousness factor can be further refined into six facets: competence, order, dutifulness, achievement striving, self-discipline, and deliberation.

In this study, we applied the big-five personality model in gaming and focus on the third trait: conscientiousness.

3 THEORETICAL FRAMEWORK

Bateman and Boon (2006) identify conqueror play as one game play style. Players in this play style aim to win and beat the game.

One of the four player types proposed by Bartle (2009) is achievers whose aim is usually to succeed in the context of the virtual world.

Based on media enjoyment theories, personality theories, and the technology acceptance model, Fang et al., (2009) propose a conceptual model of computer game play as depicted in Figure 1.

The prior research on computer game play strongly suggests that achievement in games is an important element in the play experience and personality traits may impact on play experience. Conscientiousness, as the third personality factor in the Big-Five personality model, relates to personality facets: competence, order, dutifulness, achievement striving, self-discipline, and deliberation. Therefore, we hypothesize that conscientiousness will affect players' choice of games.

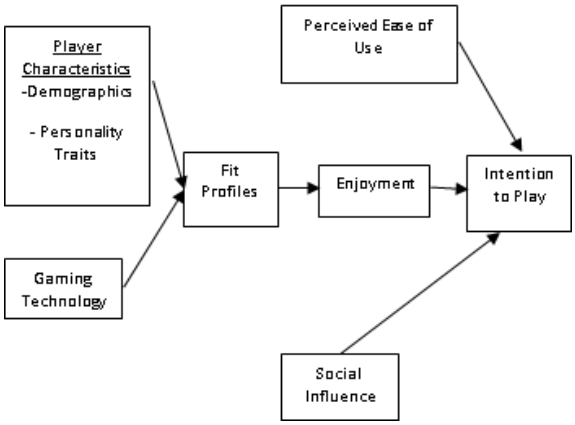

Figure 1: A framework of computer game play (Fang et al., 2009).

Hypothesis 1: Computer game players will choose games whose plots and stories are compatible with players' conscientiousness trait.

H1a: Computer game players who have a high score of conscientiousness will likely play a game whose plots and stories are conventional and orthodox.

H1b: Computer game players who have a low score of conscientiousness will likely play a game whose plots and stories are unconventional and unorthodox.

4 METHOD

An online survey was conducted to test the hypothesis. The survey questionnaire contains three types of questions: questions about player's demographics and gaming experience, questions about personality traits, and questions about enjoyment of playing a particular computer game.

Game enjoyment was measured by an 11-item instrument proposed by Fang et al., (2008).

Personality traits were measured using the 50 item IPIP (Goldberg et al., 2006) inventory available at http://ipip.ori.org/. Since its inception in 1999, IPIP has been used in over 60 studies and translated in over 20 languages.

In the beginning of the survey, a participant was first asked to answer questions about his/her demographics and gaming experience such as how often and how long he/she has played computer games. Then the participant would answer 50 questions about his/her personality. Upon finishing the personality questions, the participant was instructed to choose one or more games that he/she regularly plays and assess his/her play experience by answering questions about game enjoyment. If the

participant chose more than one game, only one game could be assessed at a time. All the personality and enjoyment questions were randomized for each participant to avoid order effect. Participants were not allowed to skip any questions.

5 RESULTS

5.1 Participants and Descriptive Statistics

The survey was conducted in four universities in three different countries: US, Korea, and China. In total, 1096 computer game players responded to the survey. Table 1 presents the descriptive statistics of participants' demographic information.

Table 1: Demographic Information of Participants.

Variables		
Gender	Male (%)	85.2
	Female (%)	14.8
Culture	American (%)	85.6
	Korean (%)	10.3
	Chinese (%)	4.1
Age	Mean	25.7
	Std.	6.99
How long have you been playing computer/video games?	Mean (years)	14.8
	Std.	8.94
How many hours on average do you play?	Mean	2.81
	Std.	2.126
How often do you play computer/video games?	Daily (%)	41.3
	Weekly (%)	40.7
	Monthly (%)	9.0
	Seldom (%)	9.0

5.2 Validation of Survey Instrument

A factor analysis was conducted to establish the discriminant and construct validity. Only items highly loaded (loadings > 0.5) on one of the following constructs were retained in the analysis: extraversion, agreeableness, conscientiousness, emotional stability, intellect, affect, behavior, and cognition. The first five constructs are the big-five personality factors and the last three are the factors of game enjoyment.

Reliability analysis was performed. Cronbach's Alpha values were calculated to check the internal consistency of the items. Table 2 shows Cronbach's alpha values of all eight constructs. All of these alpha values were above 0.7 and satisfactory.

Table 2: Cronbach's Alpha Values.

Construct	Cronbach's Alpha
Extraversion	0.893
Agreeableness	0.788
Conscientiousness	0.779
Emotional Stability	0.876
Intellect	0.786
Affect	0.731
Behavior	0.823
Cognition	0.730

Therefore, the survey instrument was valid and reliable.

5.3 Pair-wise Comparison Analysis

In order to detect personality differences among players of different games, pair-wise comparisons of conscientiousness scores among different game titles were performed. The following procedure was used in this analysis: 1) All responses were grouped by game titles. Different editions of the same game title were assigned the same title with the assumption that these different editions should have the similar characteristics and can be categorized as the same kind of game. For example, "Call of Duty", "Call of Duty 2", and "Call of Duty 3" were assigned the same title "CallofDuty". 2) Game titles that were assessed by at least 10 different game players were selected for this analysis. 3) Pair-wise comparisons of conscientiousness scores were performed among all game titles with at least 10 responses. Table 3 presents the pair-wise comparison results.

Table 3 clearly shows that players of different game titles have different conscientiousness scores. It indicates that the personality trait, conscientiousness, may actually affect players' choice of games. To understand the true differences among different game titles, the two games falling in the two opposite clusters 1 and 3 respectively, "LegendofZeldaTwilight" and "SimCity", were compared.

In the cluster 1, "The Legend of Zelda: Twilight Princess" is is an action-adventure game developed by Nintendo Entertainment Analysis and Development. The story focuses on series protagonist Link, who tries to prevent Hyrule from being engulfed by a corrupted parallel dimension known as the Twilight Realm. To do so, he takes the forms of both a human and a wolf, and is assisted by a mysterious creature named Midna. This game involves fantasy violence and animated blood. As shown in Table 3, players of this game title had lower conscientiousness scores than those of other game titles. Therefore, hypothesis H1b is supported.

"Sim City" is a city-building simulation game. The objective of the game is to design and build a city. There is no doubt that its objective is more conventional and orthodox than "The Legend of Zelda: Twilight Princess". Players of this game had higher conscientiousness scores than those of other games. Therefore, hypothesis H1a is also supported.

A correlation analysis reveals that no significant correlations were found between the conscientiousness scores and scores of enjoyment-related constructs: affect, behavior, and cognition. The correlation analysis suggests that the differences presented in Table 3 were not related or confound to enjoyment of game players.

Table 3: Pair-wise Comparisons of Conscientiousness Scores Among Different Game Titles.

Genre	N	Subset		
	1	1	2	3
LegendofZeldaTwilight	20	2.842857		
WarcraftIII	44	3.214286	3.214286	
ElderScrollsIVOblivion	29	3.221675	3.221675	
Quake	14	3.255102	3.255102	
NeedforSpeed	33	3.264069	3.264069	
WorldofWarcraft	97	3.269514	3.269514	
Battlefield	28	3.290816	3.290816	
SuperMario	34	3.298319	3.298319	
Sims	23	3.304348	3.304348	
Fallout	20	3.307143	3.307143	
SidMeiersCivilization	15		3.323810	
StarCraft	62		3.327189	
HalfLife	41		3.344948	
GuitarHero	24		3.351190	
ResidentEvil	22		3.370130	3.370130
CounterStrike	30		3.385714	3.385714
SuperSmashBros	29		3.389163	3.389163
LegoStarWars	14		3.397959	3.397959
Diablo	44		3.405844	3.405844
FIFA	40		3.417857	3.417857
AssasinsCreed	40		3.432143	3.432143
Bioshock	23		3.447205	3.447205
Halo	66		3.456710	3.456710
FinalFantasy	28		3.464286	3.464286
Civilization	14		3.479592	3.479592
Crysis	11		3.519481	3.519481
MarioKart	15		3.533333	3.533333
Doom	23		3.552795	3.552795
GrandTheftAuto	54		3.558201	3.558201
MaddenNFL	38		3.601504	3.601504
DevilMayCry	22		3.603896	3.603896
Rainbow	13		3.604396	3.604396
CommandandConquer	25		3.605714	3.605714
CallofDuty	115		3.658385	3.658385

Note: The score was out of 5 (maximal score) and p value < 0.05

6 CONCLUSIONS

The online survey we conducted presents compelling evidence that the personality trait, conscientiousness, impacts on game players' choice of game. The implications of this finding to developers of computer games are profound. By changing the design of plots and stories in a game, a game designer can turn it to serve a completely different audience. On the other hand, the plots and stories can also be used to guide marketing efforts.

However, the findings from this study are far from conclusive due to some limitations: 1) the participants might not be representative although we tried very hard to draw players from different geographic regions and different institutions. 2) The measurement of personality might not be sufficiently accurate since we only measured the high-level big-five personality factors but not the finer personality facets within each big-five factor. 3) The sample size was still relatively small in terms of number of assessed game titles and number of responses for each game title.

As future steps, we will continue to: 1) refine the personality instrument to measure finer personality traits, and 2) collect more data to build a larger and more representative sample.

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