An Exploration of the Tendency to Online Game Addiction Due to User's Liking of Design Features[*]

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ABSTRACT

As online games become increasingly popular, the problem of game addiction has received much attention. The game industries have, understandably, employed various design strategies in order to increase consumer's engagement and loyalty. Unlike previous studies which have investigated factors for game addiction from user's background or motives, this research explores the relationship between game addiction and user's liking for the design features. World of Warcraft (WOW) is a very popular role-play online game worldwide as well as in Taiwan, therefore, this game was chosen as a research subject.

Two sets of variables were measured. One was the game addiction set with five variables: compulsion, withdrawal, tolerance, interpersonal/health and time management. The other was the design set also with five variables: narrative, aesthetics, character, interface and interaction. All the five design features were preferred highly, while the difference by gender was only found in narrative. By way of canonical correlation analysis, the variables of design set aesthetics, character and interaction were strongly associated with the variables of addiction set compulsion, withdrawal and tolerance. This research found that male players dominated WOW and most of them were youngsters, but there was still a small portion of adults aged above thirty. Finally, the academic and practical implications of the findings by current research were discussed.

Key words: game addiction, online game, game design.

1. INTRODUCTION

Technology has advanced so fast that we seem to be always amazed by new, astonishing features as well as some societal problems. For example, internet addiction was just formally known as a sort of pathological behavior and now, due to electronic game's excessive use, online game addiction and related problems are gaining more attention and becoming a popular research topic. As seen in previous research conducted by Funk, 36% of boys spent 1-2 hours per week at home playing games, while 29% spent 3-6 hours. The comparable figures for girls were 42% and, 15% respectively (Funk, 1993). Also, a significant percentage of enthusiastic gaming teenagers spent much more time playing games in internet cafés than in school or on related activities (Lo, Wang & Gang, 2005).

The negative influences on physical and mental functioning due to excessive use of games are noted. Too much time on games impacted sight and weight loss and resulted in confusion of reality and illusion, as well as immature human relationships (Matsushita & Matsushita, 1997). Buchman and Funk (1996) found

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that boys were more easily addicted to games and spent more time staying in electronic game shops than girls. They also suggested that players involved in violent games had aggressive inclinations. Irwin and Gross (1995) conducted an experimental study and found that individuals involved in violent games expressed more aggressive language and behaviors. They suggested that these boys were more hostile than those playing non-violent games. Two recent studies focusing on online games also concluded that there are negative impacts on academic performanceas well as deterioration of interpersonal relationships and physical health (Chuang 2006; Wan & Chiou, 2006).

Other research has tried to explore reasons for game addiction since this is the cause of so many problems. Game addiction was found to relate to the variables of personal sensation seeking and boredom (Chiu, Lee & Huang, 2004). Based on a two-factor theory of human needs, one research indicated that an online game addict's psychological needs were associated with "dissatisfactory" factor. On the other hand, a non addict's needs were close to "satisfactory" factor (Wan & Chiou, 2006). With regard to the flow theory, some researches suggested that the more optimal flow state the users experienced, the more likely they would continue browsing behaviors or game playing (Dickey, 2005; Webster, Trevino & Ryan, 1993). Factors associated with game addiction were complicated, whereas previous studies focused on player's characteristics, backgrounds, and psychological motives. Nowadays, games, especially online multiple-player games, are much more graphic and interactive than earlier computerized games. Due to the advancement of technology, online games have rushed into a new era with fascinating and illusory design effects. Computer designs have been found to have many important influences on a user's psychology, partricularly perception, cognition, rehabilitation and so on (Hult, Irestig & Lundberg, 2006; Thompson, Ennis, Coffin & Farman 2007; Tam & Ho 2006; Rizzo & Kim, 2005; Richards & David, 2005). It is for this reason current research indicates that the relationship between a user's liking of the design factors and addiction is worthy of our attention and investigation.

Online games have developed with electronic and internet technologies, and have attracted a large number of players. According to a survey by DFC Intelligence, the worldwide online game market is forecast to grow from $3.4 billion in 2005 to over $13 billion in 2011, and the leading category, by a large margin, remains multiplayer online games (MMOGs) (DFC Intelligentce, 2006a). In most of such games, players inhabit a three-dimensional virtual world and create their own characters. More precisely, these types of games are often called "massively multiplayer online role-playing games" (MMORPGs). MMORPG dwellers have to collaborate with others to explore a world full of monsters and enemies in order to transfer to higher levels and gain experience by accomplishing a complex goal. An experienced player would encounter more intelligent and dangerous enemies as well as a harder journey. MMORPGs are endless.

According to statistics, there were estimated to be over "3.4 million MMORPG players in Taiwan, 4 million in Korea, 2 million in the United States, and 7.7 million in China" (Chuang, 2006). In order to keep consumers engaged in games or to increase consumer's loyalty, game developers have employed various

design strategies, depending on game genre. Generally speaking, design strategies leading to engagement were grouped into five critical factors: narrative, aesthetics, character, interface, and interaction (Dickey, 2005; Mulligan & Patrovsky, 2003; Choi & Kim, 2004).

World of Warcraft (WOW), a very successful multiple player online role-playing game, provides a very good example of the five design factors. WOW was developed by Blizzard Entertainment, Inc. Since its debut in 2004, this game has become the most popular MMORPG. Blizzard's official website recently announced that WOW had reached a new milestone, surpassing 9 million subscribers worldwide (Blizzard Entertainment, 2007). In addition to North America and Europe, it is played in Australia, New Zealand, and most regions of Asia: China, Korea, Thailand, Malaysia, Taiwan, Hong Kong, and Macau. According to a report by DFC Intelligence, WOW is the first online game to produce over 100 million dollars in each of several different markets in its first year alone (DFC Intelligence, 2006a). This game is the best-selling PC game of 2005 and 2006, and remains at the top of the weekly PC game sales charts. The popularity of WOW is perceived as a success impossible to surpass (DFC Intelligence, 2006b). Features of this game introduced on its official website actually reveal how the five design factors of engagement are employed by the game industry (Refer to: http://www.worldofwarcraft.com/info/basics/guide.html).

1.1 Narrative

The Warcraft series of games has actually been developed over a period of ten years. Therefore, WOW has a giant, perfect, and fascinating background as well as construction. With such integrity, players experience heroic exploits on epic battlefields. Only by completing a wide variety of challenging quests, do players get to know the continuing story and go on their journey to encounter more dangerous and captivating challenges.

1.2 Aesthetics

Strong visual appeal is of central importance to the WOW experience. Inside the 3D virtual world, players step through a multitude of different regions. Each region has its own visual style - vast, varied, and beautiful, such as lush forest, snowy mountains, and much more exotic areas.

1.3 Character

With the choices of 10 races and 9 classes, players create their own character. Each race has its own bright characteristics, history and talents. Each race also has a list of class options. A character's class determines his or her master skills and spells. In WOW, players are allowed to create their own unique character role.

1.4 Interface

WOW offers players easy-to-use features and tools to locate and engage with other players, such as chat channels, or animated and audible character expressions. Players can also customize the game's interface to best suit their needs. In general, WOW offers an interface as friendly as possible to make the game easy to access.

1.5 Interaction

One important feature of WOW is the facilitation of extensive in-game socializing. Players assume a character role and undertake grand quests and epic battles with thousands of players in a fantastic world. Most challenges are designed to be conquered with others, so each player has to seek out the help of other characters. Players who try to rise through the levels by fighting alone will not advance as fast as those who cooperate with other characters. Therefore, players often form friendships or forge alliances to compete with enemies. Beside the interaction between user vs user, user vs system is also available. After competing quests, players are given experience rewards or material rewards, such as potions, armor, or weapons.

Obviously, online game developers have put lots of efforts into keeping player's engagement or loyalty by utilizing the five design factors. In contrast to previous research, this study explores users' tendency to addiction from their liking of design features instead of their background or motivation. In order to make the survey questions as concrete as possible, the MMORPG World of Warcraft (WOW) is chosen as a sample subject since this game is very popular in Taiwan, with one hundred and ten thousand players being online simutaneously (Gamebase, 2006). The findings of this research will offer a valuable reference guide for parents and adolescents in selecting a suitable on-line game as well as offering guidance for game developers who believe in social responsibilities.

Overall, this research has the following objectives:
(1) to investigate current conditions of WOW playing in Taiwan;
(2) to survey a user's liking for the design features;
(3) to explore differences in users' liking of the design factors by gender;
(4) to test relationships between design factors and addiction tendency.

2. MATERIALS AND METHODS

The following paragraphs describe sample subjects, measures, and data analysis.

2.1 Sample Subjects

Since the present research used World of Warcraft (WOW) as a subject, samples were WOW players. Links to the online questionnaire designed by this research with a simple explanation of the study were posted on the WOW discussion board of Gamebase, National Taiwan University's BBS, and Taiwan's largest gaming website, Bahamut. Over a period of three weeks, 1674 people answered the questionnaire.

2.2 Measures

To achieve the research objectives, a survey questionnaire with three parts was designed, including (1) demographics and WOW playing; (2) liking of the design features; (3) addiction tendency. The first part was composed of questions for gender, age, education, average hours per day playing WOW, and place to play WOW.

To measure a user's liking of the design features, twenty four questions for five design factors were developed from prior discussion (Mulligan & Patrovsky, 2003; Xu, 2004), and the author's understanding of WOW. They were formatted as five-point Likert-type questions ranging from 1 (strongly disagree) to 5 (strongly agree).

With regard to game addiction tendency, the Chinese Internet Addiction Scale (CIAS) developed by Chen, Weng, Su, Wu and Yang (2003) was modified into an online game addiction scale by using "World of Warcraft" to substitute for the term "internet" in the questions (Appendix A). The reliability and validity of this scale has been established by previous research sponsored by the National Science Council of Taiwan. This scale includes two parts with five subscales: core symptoms (tolerance, compulsion, and withdrawal symptoms); related problems (interpersonal and health-related problems, and time management). The scale has a total of 26 items: five items for compulsion, withdrawal symptoms, and time management problems respectively, four items for tolerance, and seven items for interpersonal and health-related problems. Items were also formatted into a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).

2.3 Data Analysis

All analyses were performed using the SPSS 11.0 statistical program. Factor analysis extracted user's liking of design factors. Principle component analysis and varimax rotation were used to find variable groups, and the retention of factors was specified with an eigenvalue greater than 1.0. Five factors were extracted as expected, and the original twenty four items were reduced through factor analysis to nineteen items with relatively high or acceptable Cronbach Alpha coefficients, as shown in Table 1. This indicated that the measure was reliable and valid to proceed with further analysis.

Descriptive statistics were employed to explore general current conditions of WOW players and playing. The t-test was used to further test the difference in user's liking of design features by gender. Finally, canonical correlation was

implemented to examine the relationship between two sets of variables (design vs addiction) as each set contained more than one variable (Thompson, 1984; Vorderer, Hartmann & Klimmt, 2006).

3. RESULTS

Table 2 demonstrates the general backgrounds and game playing conditions of WOW players in Taiwan.

The percentage of male players was 90.5, with females being only 9.5%. User's age ranged from 12 to 40, but the majority were in the nineteen to twenty four age range (49.64%). More than half users had a college or university education. Most people reported spending more than four hours per day playing WOW. A great deal of users played at home instead of other places.

Table 3 shows users' liking for the design features. Except aesthetics which had mean score 3.99, user's liking for the other four design factors was above 4 which indicated "agree" to "strongly agree" in the scale.

Table 1. *User's liking of design factor loadings*

	Loading	Eigenvalue	Variance	α
Factor 1: Interaction		**5.57**	**23.22**	**.91**
To trade with other players	.78			
To talk to other players	.78			
To team up with other players	.73			
To join a guild with other players	.71			
To bargain with other players	.55			
Factor 2: Character		**3.70**	**15.42**	**.86**
Distinct and various talents	.81			
Multiple arms and equipments	.75			
Distinctive features for each race or profession	.74			
Multiple magic to choose	.67			
Various races and professions to choose	.64			
Factor 3: Aesthetics		**2.43**	**10.11**	**.84**
Lifelike geographic scenes and realistic climate changeover	.84			
3D world with splendid light effects	.81			
The integrity visual aesthetics	.80			
Factor 4: Narrative		**1.78**	**7.42**	**.79**
Complete story background and huge historical construction	.86			
Complicated quests woven smoothly with history background and development	.85			
Factor 5: Interface		**1.66**	**6.91**	**.65**
Easy to control a character to attack the enemy	.73			
Easy to control a character to move or act	.73			
Free to change the visual angle	.62			
Easy to select any function by access folders	.61			

Table 2. *World of warcraft user's backgrounds and game playing*

Background	Total	Percentage
Gender (N=1674)		
Male	1,515	90.50
Female	159	9.50
Age (N=1674)		
12 or below	8	0.48
13-18	292	17.44
19-24	831	49.64
25-29	426	25.45
30-39	115	6.87
40 or above	2	0.12
Education (N=1674)		
Elementary	12	0.72
junior high	74	4.42
senior high	349	20.85
collage or university	1,078	64.40
Post graduate	161	9.62
Hours per day on playing WOW (N=1674)		
less than 1 hour	169	10.10
1-2 hours	228	13.62
2-3 hours	264	15.77
3-4 hours	329	19.65
More than 4 hours	684	40.86
Place to play WOW (N=1674)		
Home	1,410	84.23
School dormitory	178	10.63
office	8	0.48
Internet cafe	74	4.42
others	4	0.24

Table 3. *User's liking of design factors*

Design factors	Number	Min.	Max.	Mean	S.D.	Variance
Narrative	1,674	1.00	5.00	4.31	0.73	0.53
Aesthetics	1,674	1.00	5.00	3.99	0.73	0.54
Character	1,674	1.00	5.00	4.36	0.56	0.31
Interface	1,674	1.00	5.00	4.30	0.68	0.47
Interaction	1,674	1.00	5.00	4.28	0.62	0.39

Differences in liking of design factors by gender were examined by t-test, as shown in Table 4. The difference in narrative by gender was significant, $t(1672) = 3.35$, $p \leq 0.01$. Males' liking of narrative ($M = 4.33$, $SD = 0.72$) was stronger than females' ($M = 4.13$, $SD = 0.78$). With regard to the other four design factors, gender did not make a significant difference.

The canonical correlation analysis was conducted to answer the question regarding the relationship between user's liking of the five design factors and the five dimensions of addiction. One significant canonical function emerged (Wilks'

lambda = 0.97, $F(25,6182) = 2.23$, $p < 0.00$). The canonical correlation was 0.29 (R-square = 0.08). Canonical loadings were used to explain this canonical function.

Table 5 contains the canonical loadings for the two sets of variables. Variables in the design set that had apparently high loadings on the canonical variate were aesthetics (0.79), interaction (0.78), and character (0.61). Comparatively, narrative and interface had very low loadings which were 0.32 and 0.37 respectively. The addiction variables; compulsive (0.89), tolerance (0.76), and withdrawal (0.67) had loadings apparently higher than interpersonal and health (0.32), and time management (0.21). Thus, the canonical variate revealed that aesthetics, interaction, and character were positively associated with compulsive, tolerance, and withdrawal addiction.

Table 4. *Differences in user's liking of design factors by gender*

Design Factors	Gender	No.	Mean	S. D.	T test
Narrative	M	1,515	4.33	0.72	3.35**
	F	159	4.13	0.78	
Aesthetics	M	1,515	3.99	0.73	-0.38
	F	159	4.01	0.80	
Character	M	1,515	4.36	0.55	0.52
	F	159	4.34	0.64	
Interface	M	1,515	4.30	0.68	0.26
	F	159	4.24	0.70	
Interaction	M	1,515	4.28	0.62	0.36
	F	159	4.26	0.67	

Note. $**p \leq 0.01$.

Table 5. *Canonical loadings between design factors and addiction tendency*

		Canonical Loadings
(Design Factors)		
Narrative		.32
Aesthetics		.79
Character		.61
Interface		.37
Interaction		.78
Variance	37.00%	
(Addiction Tendency)		
Compulsive		.89
Withdrawal		.67
Tolerance		.76
Interpersonal and Health		.32
Time Management		.21
Variance	39.17%	

4. DISCUSSION

Computer games prevail and have become one of the most popular entertainments. Little wonder the computer game industry has grown so fast to become a billion dollar business and its on-going grows seem certain (Vorderer et al., 2006). However, excessive use of computer games cause both personal and social problems for users. Most studies have tried to find reasons for game addiction from player's motivation. Since game industries are devoted to utilizing design factors in order to increase player's engagement and loyalty, this research offers a new dimension by exploring player's game addiction through the relationship with preference for design factors. The online role playing game World of Warcraft (WOW) is a very popular game worldwide, and Taiwanese WOW players were chosen as research subjects. The questions became relevant because subjects could relate to the questions through their game playing experiences.

This research contains a few limitations. First, this research has the inherent disadvantage of being reliant on volunteer participants to answer an online questionnaire. There is a large body of literature discussing possible biases involved in using volunteers as research participants. Volunteers have been found to differ from non-volunteers on personality variables (Bogaert, 1996; Dollinger & Frederick, 1993). A further problem is associated with the difficulty of getting an idea of the sampling frame. It is difficult for a researcher to learn how many people saw the announcement, and what types of people saw the announcement. Without this information, measuring the extent of sampling bias is problematic. For example, did more males than females see the announcement and volunteer to take part? Or did those who had a particular interest in the research area respond? (Hewson, 2002) For future research, researchers might diminish the problem by using some approaches which could increase the possibility of access to non-volunteers (Bordia, 1996; Strauss, 1996). Next, the reliability level of the questionnaire regarding the interface was rather low compared to the reliability level for other design features. Thus, the questions of the interface dimension can be improved in a future study. Third, this study used World of Warcraft as an example. However, there are various subcategories of on-line games. Therefore, the results of the present study are not appropriate for on-line games in general. Future studies could re-test the results by different genre or category of on-line game.

Despite the limitations, current research provides valuable references and academic implications. It reveals that online games are no longer an attraction only for children or teenagers. Users aged over thirty account for seven percent in the sample. Males dominate in WOW's playing. This corresponds with many precedents which have observed a substantial gender difference in computer gamers (Brown, Hall, Holtzer, Brown & Brown, 1997; Cassell & Jenkins, 1998; Lucas & Sherry, 2004). Why aren't computer games attractive to females? Four content ingredients were indicated from some studies: gender stereotype portrayal, violence, lack of social interaction, and competition (Lucas & Sherry, 2004; Gorriz & Medina, 2000; Smith, Lachlan & Tamborini, 2003; Agosto, 2002). Except the lack of social interaction, WOW contains all the other three ingredients. In this case,

it is not beyond expectation that WOW has been a realm dominated by males. All five design factors utilized appeal to users; however, only narrative shows a significant difference by gender. Men's liking of the narrative is stronger than women's. The reason might be, as just mentioned, that the storyline includes negative gender role portrayal, violence, and competition.

Finally, this research suggests that a user's preference for aesthetics, character, and interaction is strongly related with the game addiction in compulsive, withdrawal, and tolerance symptoms. This finding is significant in two ways. First, game addiction was evaluated on two levels (core and related problems) with five variables (compulsive, withdrawal, tolerance, interpersonal/health, and time management) instead of one variable, as in most precedents. The results are going to give a more complete picture of the problem. By way of canonical correlation, core symptom variables had much higher loadings than related problem variables. It manifests a question worthy of future efforts. Is it because players were too devoted to the game that they became insensible to the related problems, or because the game (World of Warcraft) was not available long enough for players to be aware of the related problems? Second, findings of this research, to some extent, are parallel to several studies done on users' characteristics or motivations. Armstrong, Philips and Sailing (2000), concluded that people with deficient social skills or insufficient self-confidence were more likely to be addicted to the Internet; they would regard the Internet as a good form of compensation. Correspondingly, a user's liking of interaction in design was found to be associated with addiction in the present study. When Wang and Chiou explored the relationship between game addiction and psychological motives (Wan & Chiou, 2006); they pointed out that many games fulfilled a user's need of self-actualization by allowing the user to play different roles. This is parallel to the current findings that a user's liking for a design character is positively related to addiction. Based on Uses and Gratifications theory, Song, Larose, Eastin and Lin (2004) suggested that the gratification of aesthetic experience was significantly related to internet addiction tendency. Similarly, a user's liking of aesthetics in design was found to have a high loading. In general, the results from this research broaden the horizon to view the addiction problem in cyberspace. In terms of practical contribution, game industries get more specific ideas to design healthier games. Or, further researches can be conducted to explore what type of design elements in aesthetics, character, and interaction can decrease the tendency for game addiction.

Appendix A: Translation of Online Game Addiction Questionnaire

Compulsion

1. I have tried to spend less time playing WOW, but I failed.
2. I can't control the impulse to play WOW.
3. Every morning when I wake up, the first thing on my mind is WOW.
4. When I log out of WOW for something else, I can't help logging in again.
5. My life will be tasteless without WOW.

Withdrawal

1. I feel uncomfortable when unable to play WOW.
2. I feel uneasy when unable to get online to WOW.
3. I feel like I am missing something if I do not play WOW for a period of time.
4. No matter how tired I am, I am energetic when I play WOW.
5. I am in a low mood when I do not play WOW.

Tolerance

1. The average number of hours weekly that I spend on WOW is much longer than before.
2. The time I spend on WOW keeps increasing.
3. I have to spend more and more time on playing WOW, or I feel so unsatisfied.
4. The actual time I play WOW is always much longer than I expect when I log in.

Interpersonal and Health Related Problem

1. Because of playing WOW, my interaction with friends is less.
2. Because of playing WOW, my relaxing time has decreased.
3. Although there are negative influences on my interpersonal relationship, I still spend lots of time on WOW.
4. There are some negative impacts on my school learning or job due to playing WOW.
5. My interaction with my family members has decreased because of playing WOW.
6. Playing WOW has made my health deteriorate.
7. I feel unwell because of being devoted to playing WOW.
8. Time Management
9. I am listless during the day time because of staying up late to play WOW.
10. I sleep less than 4 hours because of playing WOW.
11. I save my sleeping time in order to play WOW longer.
12. Some people tell me that I spend too much time on playing WOW.
13. I skip meals because of playing WOW.

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