

An Online Survey System on Computer Game Enjoyment and Personality

Xiaowen Fang, Susy Chan, and Chitra Nair

School of Computing, College of Computing and Digital Media
DePaul University, USA

xfang@cdm.depaul.edu, schan@cdm.depaul.edu, nair1@depaul.edu

Abstract. This paper discusses the development of an online survey instrument to measure the game enjoyment and player characteristics like age, gender and personality traits. A research framework of game play is proposed based on a review of prior research on computer game enjoyment, game characteristics, personality theories, effects of computer game play, and technology acceptance model. The proposed framework suggests that an appropriate fit between characteristics of the player and gaming technology will result in greater enjoyment while social influence may moderate effects of the fit. The survey will allow the researcher to establish the fit profiles between player characteristics and game play.

Keywords: computer games, game play, personality, enjoyment.

1 Introduction

The popularity of digital (computer and video) games has reached phenomenal proportions. In 2008, over 260 million video and computer games were sold in the United States alone and 65 % of American households play computer or video games (Entertainment Software Association, 2008). Furthermore, their worldwide markets are expected to grow significantly 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 ([1] and [2]). Given the prominence of computer games for entertainment, researchers need to acquire a better understanding about the relationship between gaming technology and player enjoyment.

Studies in the past have explored the violent nature of video games and its impact on game players ([3], [4], [5], [6], [7]). Only a few IS studies have investigated factors affecting user acceptance of computer games. Hsu and Lu (2004) incorporate technology adoption model (TAM) ([8]) with social influence and flow experience when studying user acceptance of online games. They have found that social norms, attitude, and flow experience explain about 80% of game playing. Choi and Kim ([9]) suggest that people continue to play online games if they have optimal experiences while playing the games. This optimal experience can be attained if the player has effective personal interaction with the system or pleasant social interaction with other players connected to the Internet. Personal interaction can be facilitated by providing appropriate goals, operators, and feedback. Social interaction can be facilitated by providing appropriate communication places and tools.

It will be important from the perspective of practitioners in computer game industry to understand the player characteristics and personality differences in their target audiences. A comprehensive framework for examining the interaction between player characteristics and game features is needed for a better understanding of the process of game play and its impacts on players.

Based on literature review, we propose a framework of computer game play. As discussed in section 4, this framework emphasizes a fit between the player's characteristics, such as personality, and game technology could lead to enjoyment. This paper reviews relevant research for the framework and discusses the development of an online survey system to investigate computer game enjoyment and personality traits. In the following sections, we will discuss: (1) theories and research findings of computer game enjoyment and media enjoyment, (2) game players' characteristics; (3) computer game play; (4) the proposed framework, (5) research method, and (6) next steps.

2 Background Literature on Game Play and Enjoyment

This section provides a review of studies in game play and enjoyment, video game preference, and several theories about media enjoyment.

2.1 Game Play and Enjoyment

Player enjoyment is central to playing computer games ([10] and [11]). Few studies to date measure the player's emotional responses, or game enjoyment, during game play ([12], [13], and [14]). In spite of a rising interest in academic game research, the actual experience of playing digital games is underrepresented in the gaming literature ([12]).

Rajava and colleagues ([14]) have measured psychophysiological responses (facial EMG, skin conductance and cardiac RBI to game events) in the video game *Monkey Bowling 2*. Their study tests the premise that emotions would be expected to play an important role in gaming behavior and enjoyment. They note that different video game events elicit a reliable psychosociological response and arousal, and there may be large individual differences in the player's emotional response to games and game events.

Emri and Mayra ([15]) have studied immersion in the game world and proposed a model consisting of three different components of immersion: sensory, challenge-based and imaginative immersion (SCI-Model). Sensory immersion refers to multi-sensory properties of a game; challenge-based immersion involves cognitive and motor skills of the games; imaginative immersions refers to immersions within the fantasy world created through the game and depends on the richness of the narrative structure of the game.

Klimm ([16]) proposes that game enjoyment is based on three experiential factors: experience of affectence or immediate feedback to the player as a causal agent, feelings of suspense, relief and self esteem, and the feeling of being drawn to a fictional world.

Karolein and colleagues ([12]) suggest that the social context (game competition between friends) and negative experiences such as in-game frustration or tension should be examined to understand the overall game experience. They used the focus group methodology and summarized their findings into a comprehensive categorization of digital game play experiences. Based on their categorization, fun, amusement, pleasure and relaxation are the in-game experiences of enjoyment and the feelings of being energized, satisfaction, and relaxation are the post-game experiences.

Other researchers have also investigated the emotional responses during game play. Chumbley and Griffiths ([17]) have found that skill and in-game reinforcement characteristics significantly influence a number of affective measures, most notably excitement and frustration. Some researchers have used physiological responses to objectively evaluate a player's experience with entertainment technology ([18] and [19]).

2.2 Video Game Preference

Research on video game uses and gratifications has focused on the main appeal of video games. Based on a survey of 244 10- to 24-year olds, Selnow ([20]) isolates five gratification factors that attract players to arcade video game play. These factors show that a video game: (1) is preferable to human companions, (2) teaches about people, (3) provides companionship, (4) provides activity/action, and (5) provides solitude/escape. Another study of video games ([21]) reveals a similar set of gratifications for arcade game use: excitement, satisfaction, and tension reduction. A survey conducted by Phillips, Rolls, Rouse, and Griffiths ([22]) suggests several uses of video game play, including "to pass time," "to avoid doing other things," "to cheer oneself up," and "just for enjoyment." Furthermore, Griffiths's ([6] and [23]) research on video game addiction includes additional uses and gratifications: arousal, social rewards, skill testing, displacement, and stress reduction.

In several comprehensive studies, Sherry and his colleagues ([24], [25], and [26]) have enumerated a set of video game uses and gratifications based on focus group research and surveys of over 1,000 participants ranging in age from 10 to 24 years old. These factors include *competition*—to prove to other people who have the best skills and who can react or think the fastest; *challenge*—to solve the puzzles to achieve goals such as reaching the next level or beating the game; *social interaction*—to use video games to interact with friends and learn about the personalities of others; *diversion*—the use of games to avoid stress or responsibilities and to fill time, relax, escape from stress, and/or because there is nothing else to do; *fantasy*—to do things they normally would not be able to do, such as driving race cars, playing professional football, or flying; and *arousal*—the stimulation of emotions resulting from fast actions and high quality graphics.

Grodal ([27]) explains that much of the fascination with video games can be attributed to the ability of players to control the game in terms of outcomes (i.e., deciding how the "plot" will unfold), the speed at which the game progresses, and mastery of the game or mastery over other players. Grodal further argues that video games are a tool for emotional control, whereby desired arousal levels can be maintained through playing. As such, video games are enjoyed most when the level

and speed of the game match the player’s optimal mental and motor capacity. Vorderer, Hartmann, and Klimmt ([28]) have provided support for the idea that game play is more enjoyable when there are a variety of ways to solve a challenge offered in a video game.

2.3 A Tripartite Model of Media Enjoyment

Based on a review of various terms for capturing the concept of media enjoyment, Nabi and Krcmar ([30]) introduce a tripartite model of media enjoyment— affective, cognitive, and behavioral dimensions of enjoyment (Figure 1). In this conceptual model, the underlying affective dimension focuses largely on empathy; positive and negative moods and specific affective states (e.g., horror, sadness, and suspense) could also be considered to feed this component. The cognitive component focuses primarily on judgments of game characters’ actions, though other judgments, like general enjoyment as attitudes toward story assessments (e.g., perceived realism, story coherence, message quality) or more personal evaluations (e.g., relevance, similarity) could also be included in this category. Finally, the behavioral component is logically connected to selective exposure in terms of the player’s viewing intent as well as behaviors during viewing, including the act of viewing itself. A player’s affective, cognitive, and behavioral reactions are influenced by a number of other factors including prior knowledge, direct experience, personality traits, and current mood. However, these factors are expected to operate by influencing the three components of enjoyment, which, in turn, serve to inform perceptions of enjoyment.

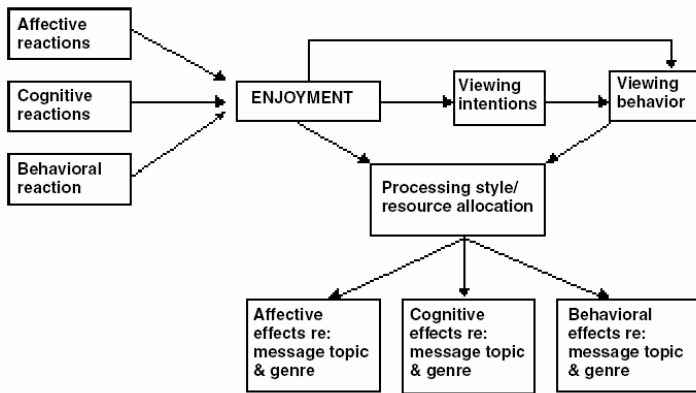


Fig. 1. A tripartite model of media enjoyment ([30])

3 Research on Game Player’s Characteristics

Several individual characteristics may influence enjoyment of computer game play. A literature review reveals gender, age, and personality as key characteristics.

3.1 Gender

One of the most consistent results in studies of video game usage is the striking difference between boys and girls in the amount of play (e.g., [22] and [23]). Some scholars argue that this difference may be due to access. The annual Annenberg Public Policy Center survey on family media use points out that video games are played in 76% of homes with at least one boy, as compared to 58% of homes with at least one girl ([35]). Other studies emphasize that the gender gap in game use may have less to do with access than the content of the games ([36] and [37]). Bonanno and Kommers ([38]) discover that a high percentage of females prefer puzzle, adventure, fighting, and managerial games, and males prefer first-person shooters, role playing, sport, and strategy games. They suggest that these tendencies can be viewed as a process of accommodation to different underlying gender-related neurocognitive processes.

3.2 Age

An online survey conducted by Griffiths, Davies, and Chappell ([39]) compares adolescent and adult online game players. Significant patterns emerge among adolescent gamers. They were more likely to be male, less likely to gender swap their characters, and more likely to sacrifice their education or work to play video games. In relation to favorite aspects of game play, significantly more adolescents than adults claimed violence as their most favorite aspect of playing. Results also show that, in general, the younger the player, the more time they spent each week playing online games.

3.3 Personality

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 ([40]). 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 ([41]) based on two principles: core of personality and periphery of personality ([40]). 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.

There are many personality theories: psychoanalytic theories, biopsychological theories, behaviorist theories, cognitive theory, humanistic theory and many more ([42]). Personality type and trait theories have served as the basis of several personality tests widely used commercially and in academic research.

Type theory focuses on personality type or the psychological classification of different types of people. It originated from the ideas of Swiss psychiatrist Carl Jung. The basic assumption is that the personal unconscious is a potent part of human

psyche. Reliable communication between the conscious and unconscious parts of the psyche is necessary for wholeness ([43]).

Myers Brigg Type Indicator or MBTI ([44]), one of the most widely used instrument for non-psychiatric populations in the area of counseling and personality testing ([45] and [46]) is based on Jungian based type theory. The inventory has four bipolar discontinuous scales: Introversiion-Extraversion, Sensation-Intuition, Thinking-Feeling and Judging Perceiving. Respondents are classified into one of 16 point score obtained for each scale.

Carlson ([47]) points out that although MBTI has been used unsystematically in a wide range of areas, it has a favorable validity assessment. However, critics of this tool ([48], [49], [50], and [51]) have reported its psychometric shortcomings and observed that the types are quite strongly stereotyped by professionals. Another personality type theory is Type A and Type B personality theory ([52]). Jenkins Activity Survey ([53]) is a self administered questionnaire to assess an individual's A/B type. Type A tends to be intense and hard-driving while type B people tend to be relaxed and less competitive, and lower in risk. Though widely used in clinical setting, Type A/B theory has been reported as having questionable perspective validity ([54], [55], and [56]).

Trait theory addresses personality traits, or a person's habitual patterns of behavior, thought, and emotion ([57]). Trait theorists generally assume that traits are relatively stable over time; they differ among individuals and influence behavior. Many studies and questionnaires are based on the trait theory, for example, a 300 item Adjective Checklist -ACL ([58]), Catell's 16 PF ([59]), 44 Item Trait Descriptor Adjectives (TDA) ([60]) .

Over the years, the five-factor model (e.g. [61], [62], [63], [64], and [65]) has gained acceptance among researchers because it establishes a common taxonomy ([66]). It contains the following five dimensions of personality: Extraversion - outgoing and stimulation-oriented vs. quiet and stimulation-avoiding ; Neuroticism - emotionally reactive, prone to negative emotions vs. calm, imperturbable, optimistic; Agreeableness - affable, friendly, conciliatory vs. aggressive, dominant, disagreeable ; Conscientiousness - dutiful, planful, and orderly vs. laidback, spontaneous, and unreliable ; Openness to experience - open to new ideas and change vs. traditional and oriented toward routine.

The Big Five traits have been researched and validated by many different psychologists (e.g. [67], [65], [68], and [69]) and are at the core of many personality questionnaires. Many studies have also established that four constructs of MBTI converge with the Big Five traits (e.g., [70]).

Among the many measurement questionnaires, NEO-PI-R developed by Costa and McCrae ([71]) is well validated and widely used. International Personality Item Pool (IPIP) ([72]) also gained significant attention over the past decade. It is available over the internet and includes over 2000 items. The rationale for the collaboratory effort was to allow faster and continuous refinement of the set of personality scales by other scientists over a public domain. It is non proprietary and allows free use of items and constructs by researchers.

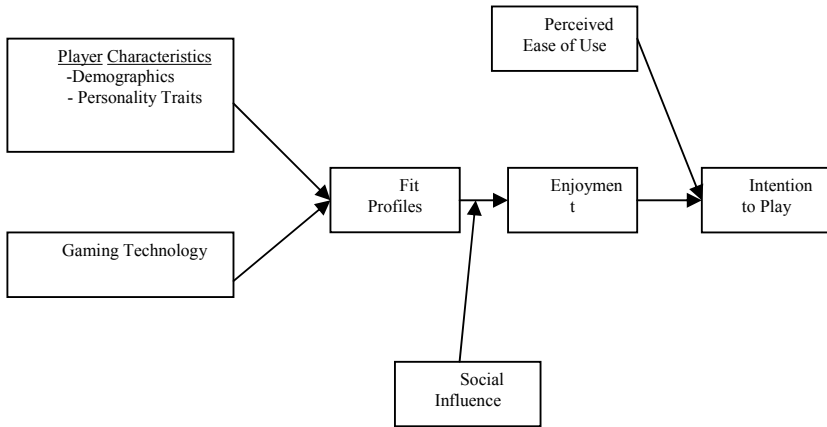


Fig. 2. A framework of computer game play

4 A Framework of Computer Game Play

Based on media enjoyment theories, personality theories, and the technology acceptance model ([8]), we propose a conceptual model of computer game play as depicted in Figure 2. This framework suggests that enjoyment derived from game play is the result of a fit between characteristics of the player and elements of gaming technology. The better the player-technology fit, the more enjoyment. Social influence will moderate the effects of player-technology fit. Based on this framework, enjoyment and perceived ease of use are two determinants of user intention to play computer games. This framework conceptualizes the impact of player characteristics and social influence on game play enjoyment that have been observed in many earlier studies ([3], [4], [5], [7], [9], [22], and [23]). Furthermore, the framework incorporates the gaming technology and its interactions with the player in affecting enjoyment of game play and intention to play. The following sections (4.1 to 4.6) discuss the main constructs of this framework.

4.1 Fit

Fit has been examined in some detail in the strategic management literature. Three definitions of fit in structural contingency theory have been identified: fit as congruence, fit as interaction, and fit as internal consistency ([73]). Venkatraman ([74]) has extended these ideas to six unique perspectives on fit in the strategy literature: fit as moderation, as mediation, as matching, as gestalts, as profile deviation, and as covariation. The most promising perspective for player-technology fit in a gaming context is the idea of fit as an *ideal profile*. From this perspective, fit is viewed as feasible sets of equally effective alternative designs of games. Each design should be internally consistent and matched to a player’s characteristics. This conceptualization of fit translates well into a gaming environment. The player-technology fit can be defined as ideal profiles composed of an internally consistent set of player characteristics and gaming elements that affect game play enjoyment. A higher degree of adherence to an ideal profile increases the game

play enjoyment. A test of player-technology fit would require three steps: (1) identifying distinct player characteristics, (2) specifying ideal gaming technology for each set of player characteristics, and (3) testing player enjoyment resulting from player-technology alignment.

4.2 Enjoyment

Strong empirical evidence indicates that the motivational basis of human activity relies on two rather independent systems: a so-called approach system and an avoidance system ([75]). Activation of the approach system results in pleasure, whereas activation of the avoidance system leads to pain ([76]). Research in psychology and neuroscience most often uses the term *pleasure* to describe agreeable reactions to experiences in general. Most communication researchers have used the term *enjoyment* to describe and explain such positive reactions toward the media and its contents. Our framework uses enjoyment to describe and explain positive reactions derived from game play.

The tripartite model of media enjoyment proposed by Nabi and Krcmar ([30]) suggests three types of reactions to enjoyment: affective, cognitive, and behavioral reactions. Their model effectively conceptualizes player reactions to enjoyment as discussed in other media enjoyment theories such as model of complex entertainment experience ([29]), transportation theory ([31]), disposition theory of drama ([32]), and flow theory ([33]). These three types of reactions to enjoyment can be applied to develop an instrument to measure the degree of enjoyment derived from game play.

4.3 Player Characteristics

Previous research has shown that game play is linked to gender (e.g., [22] and [23]), age ([39]), and personality ([3], [4], [5], and [7]). Media enjoyment theories also imply close relationships between a player's personality and enjoyment ([29], [30], [31], [32], and [33]). In our proposed framework, a player can be described in terms of gender, age, and personality traits.

4.4 Social Influence

Various theories suggest that social influence is crucial in shaping user behavior. For example, in the theory of reasoned action (TRA) ([77]), a person's behavioral intentions are influenced by subjective norms as well as attitude. Hsu and Lu ([78]) indicate that social influences, including perceived critical mass and social norms, significantly and directly, but separately, affect player attitude and intention of playing online games. Choi and Kim ([9]) also note the importance of social interactions on continuing to play online games. Our proposed framework of game play posits that social influence impacts enjoyment as a moderator. It moderates the effects of player-technology fit.

4.5 Extending TAM to Game Play

The technology acceptance model (TAM) ([8]) is one of the most widely used models for IT adoption. According to TAM, an individual's IT adoption is influenced by

perceived usefulness and perceived ease of use. Perceived usefulness (PU) is defined as the degree to which a person believes that using a particular system would enhance his or her job performance. Perceived ease of use (PEOU) refers to the degree to which a person believes that using a particular system would be free of effort.

In a gaming context, perceived usefulness is no longer applicable and therefore not an appropriate measure of extrinsic motivation ([79]). Enjoyment is deemed as a more appropriate measure of extrinsic motivation to play games because enjoyment measures how the gaming technology helps achieve the task-related objective -- enjoyment -- and it becomes an outcome expectancy.

5 Method

5.1 An Online Survey System

In order to test the framework depicted in Figure 3, an online survey system will be developed to continuously collect data on player characteristics and the enjoyment of playing different computer games. This survey system is hosted on a permanent web server. It will allow researchers to establish the fit profiles between game technology and player characteristics. We have set up a web server and are in the process of completing a website for online surveys. The online survey system will also allow researchers to conduct longitudinal studies.. The initial survey we plan to conduct contains three types of questions about each player: demographics and gaming experience, personality traits, and enjoyment of playing a particular computer game. The instruments measuring computer game enjoyment and personality traits are discussed next.

5.2 Game Enjoyment Instrument

Based on the tripartite media enjoyment model, we have developed an 11-item instrument ([80]) to measure computer game enjoyment following the method recommended by Moore and Benbasat ([81]) for measurement development. We developed an initial set of 60 items to measure affective, cognitive, and behavioral dimensions of game enjoyment. Afterwards, we conducted expert consultation, exploratory and confirmatory card sorting, and an extensive survey. These steps resulted in an 11-item instrument with strong validity and reliability measures.

5.3 Personality Instrument

Personality traits will be measured using the 50-item IPIP inventory in the five domain constructs -- E: Extraversion vs. Introversion; A: Agreeableness vs. Antagonism; C: Conscientiousness vs. Lack of direction; N: Neuroticism vs. emotional stability O: Openness vs. closedness. IPIP items have been developed to measure the constructs in several inventories, for example, NEO-PI-R ([71]), 16 Personality Factor Questionnaire -16PF ([82]), Hogan Personality inventory-HPI ([83]) etc. Tables comparing the psychometric characteristics of the original scales with IPIP item are available for all the major inventories on the website: <http://ipip.ori.org/newValidity.htm>

6 Next Steps

This paper presents a conceptual framework of computer game enjoyment. Based on the framework, we propose to design and conduct online surveys to understand the role of player characteristics and personality differences in game enjoyment. An appropriate fit between characteristics of the player and gaming technology could result in greater enjoyment. A study of such nature has not been done before. We have developed an instrument to measure game enjoyment. The next step is to establish the relationships between player characteristics, personality traits in particular, and game enjoyment. The findings are expected to have profound implications to future development of computer games. Based on our research finding, we plan to conduct additional studies to validate our proposed framework of game play.

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