

RUNNING HEAD: ENJOYMENT THRESHOLD MODEL AND SERIOUS GAME DESIGN

Leveling Up: Game Enjoyment Threshold Model and Player Feedback
on the Design of a Serious Game¹

Hua Wang

University at Buffalo, the State University of New York

Marientina Gotsis

Maryalice Jordan-Marsh

Donna Spruijt-Metz

Thomas Valente

University of Southern California

¹ Authors Note: From Annenberg School for Communication & Journalism (Wang), University of Southern California, School of Cinematic Arts, Interactive Media Division, Creative Media & Behavioral Health Center, (Gotsis), School of Social Work (Jordan-Marsh), Keck School of Medicine, Department of Preventive Medicine (Spruijt-Metz, Valente), Los Angeles, California; and since August 2010 University at Buffalo, The State University of New York, Department of Communication (Wang), Buffalo, New York.

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Address correspondence to: Hua Wang, Ph.D., Department of Communication, 359 Baldy Hall, University at Buffalo, Buffalo, NY 14260. Phone: 716-645-1501, E-mail: hwang23@buffalo.edu.

Extended Abstract

With the advent of gaming technologies, more visibly successful applications, the increase of evidence on game effectiveness, and accumulated knowledge about game design principles and strategies, an emerging field of “serious games” is gaining momentum (Sawyer, 2009; Lieberman, 2009). Serious games are games developed with serious content or purposes beyond pure entertainment, such as games for learning, training, health promotion, and social change (Michael & Chen, 2005; Ritterfeld, Cody, & Vorderer, 2009). Although ever since the early days, game designers and developers have been working with experts from various disciplines and create meaningful game applications, it has been a great challenge to make serious games as seriously fun and engaging as commercially successful games (Shen, Wang, & Ritterfeld, 2009). In this paper, we first provide a brief review of theoretical efforts in understanding game enjoyment and the proposal of a game enjoyment threshold model. We then report how this model was applied in the feasibility study of a serious game. The empirical data were collected through semi-structured in-depth interviews and the transcripts were subsequently content coded in Atlas ti. Our empirical findings support the general framework of the threshold model and offer nuanced insights into the factors that influence gamers’ play experience.

Development of the Game Enjoyment Threshold Model

Klimmt (2003) proposed a conceptual model of game enjoyment and argued that during game play the enjoyability of a game may be determined by different factors at three levels: At the first and basic level, the play process can be viewed as a series of quick and direct feedback loops between the player and the gaming system resulted from unique technological affordances of digital games (e.g., interactivity) that enable players an experience of effectance. At the intermediate level, the play process is viewed as a sequence of interconnected episodes triggered

by the player's intrinsic motivations (e.g., curiosity) that unfold with a sense of suspense-relief and increased self-esteem. At the last and most complex level, the play process is viewed as a whole, characterized by the player's active role in engaging with the narrative and their experience of perceived alternative reality in the gaming world (e.g., presence). Klimmt's model focuses on the psychological processes during digital game play and the human computer interaction.

Wang, Shen, and Ritterfeld (2009) conducted a comprehensive literature review and a content analysis of 60 professional game reviews. The authors identified 27 fun factors, coded reviewer comments into three valence groups (positive, negative, and neutral), calculated their frequencies, and compared the categories most frequently used in general and for games of the highest and the lowest fun scores. These 27 fun factors were then classified into five groups and proposed as the Big Five of digital game enjoyment – namely, technological capacity, game design, aesthetic presentation, entertainment game play experience, and narrativity.

Technological capacity includes factors about the technical aspect of an application such as usability issues. *Game design* includes factors about the general design of an application such as game mechanics. *Aesthetic presentation* includes factors about the presentation of an application such as look and feel. *Entertainment game play experience* includes factors about player's entertainment experience of an application such as excitement. *Narrativity* includes factors about narrative elements in an application such as characters. The results of content coding in terms of valence suggested that some factors related to narrativity and game design tended to appear in positive comments more often while other factors particularly related to technological capacity were more likely to appear in negative comments. Further comparisons on the content coding of most fun and least fun games indicated that some factors related to entertainment game

play, experience and narrativity, were perceived to have either made games particularly entertaining or frustrating. Relative rankings of these fun factor categories implied that there are certain thresholds that a game has to pass in order to be playable or entertaining, and yet an additional set of factors is needed for a game to be considerably compelling and engaging.

Wang et al. (2009) arranged these patterns into a three-level model of game enjoyment, with a *playability threshold*, an *enjoyment threshold*, and a group of *super fun-boosting factors*. The *playability threshold* is based on common complaints related to technological capacity and basic game elements (such as usability, control, challenge, and visual presentation). These are things that are expected to be in place for a game to be playable, and serve as the prerequisites for game enjoyment. If they are not there, it is easy to generate a feeling of disappointment, frustration, and irritation. It is fairly understandable that not many people would be interested in playing a game that looks ugly, takes forever to load, has numerous glitches, and becomes easily repetitive. The *enjoyment threshold* constitutes common factors mentioned in both positive and negative ways and reflected in fun factors related to aesthetic presentation and game design (such as quality visual and audio presentation, complexity and diversity, mechanics, freedom, levels, balanced degree of challenge, and gratification). For example, the game should have decent graphic and sound effects; the player is given a variety of options to explore the game world at different levels, make decisions, and take actions; or their decisions and actions are reasonably connected to the consequences that follow, enabling the player to create a trajectory of personal experience through the game play. These things satisfy our innate human desires for discovery and problem-solving and create genuine feelings of pleasure (Gee, 2005). Finally, the *super fun-boosting factors* can make games extremely entertaining. These are the outstanding factors derived from the top games in our sample. These super fun-boosting factors are often related to

extraordinary game design elements (such as complexity and diversity, novelty, mechanics, and gratification), superior quality of aesthetic presentation (such as highly sophisticated, stylish, and immersive visual and audio environments), and particularly the role of narrative in games (such as storylines, characters, and humor) and player's social interaction during and after the game play experience.

This three-level threshold model of game enjoyment was developed based on prior research and an analysis of entertainment and commercial games. A preliminary assessment of the model hierarchy was partially supported by a case study of seven serious games (Shen, Wang, & Ritterfeld, 2009). However, further empirical testing was required directly from the game players themselves.

Applying the Game Enjoyment Threshold Model

The game enjoyment threshold model was used to evaluate player feedback in the feasibility study of a serious game, *Wellness Partners*. This game was purposefully developed as a web-based application that combines digital gaming and social networking to promote physical activity and a healthy lifestyle. The game design team led by the second author consisted of current students and alumni at the Interactive Media Division at the School of Cinematic Arts, University of Southern California. The primary participants were middle-aged university staff (egos) and they were asked to invite at least one family member or friend to enroll in the game as their wellness partners (alters). Players can accumulate points by sending status updates about their physical activities or setbacks. They can redeem their points to collect virtual objects or play animations of a virtual character related to healthy activities. A tag cloud is generated based on the frequency of physical activities reported by members in a playgroup.

Guided by the game enjoyment threshold model, the first author conducted semi-structured, in-depth interviews with 20 game players from March 31 to May 11, 2010 with a \$25 debit card as research incentive. They were selected based on a number of demographic and study attributes provide a representative sample. The final sample included 10 egos and 10 alters. Nine were male and 11 were female participants. Their age ranged from 23 to 54 years old with an average of 33.25. All of them had college education except one high school graduate. In terms of ethnicity, nine were White/Caucasians, five were Asian, four were Hispanic/Latino, one was Black/African American, and another one with mixed backgrounds. In terms of marital status, eight were single, 10 were married, one was living with a partner, and one was divorced. In terms of geographic location, 16 were local residents in southern California and four were living outside of the region. In terms of playgroup size, two interviewees started in a group of two but the partner dropped out, three interviewees participated in a group of two throughout the study, four were in a group of three, four were in a group of four, three were in a group of five, and four were in a group of six.

On average, the interviews took 37 minutes. They were either conducted in person or via telephone. All interviews were digitally recorded and transcribed for analysis. Some sample interview questions include: What did you like the most and the least about the game? What were the most interesting and most frustrating aspects to your experience? How can we improve the application to better serve a user like you?

Atlas-ti 6.0, a qualitative data analysis software, was used for the thematic and content analysis of interview transcripts. All the transcripts were transformed into one single plain text recognizable by the program and assigned as the “primary document’ for analysis. The text was read multiple times to identify themes and sub-themes. Participants’ comments were marked as

“quotations” and labeled with “codes” as the main steps for classification. The number of quotations were also tallied for each code.

The specific codes were developed based on the game enjoyment threshold model and refined through an iterative coding process. The final results are structured in a 5x3 grid: The five horizontal categories are *technological capacity*, *basic design*, *non-social elements*, *parasocial elements*, and *social elements* of game enjoyment experience. The three vertical categories indicating valence of game enjoyment are: *frustrating*, *interesting*, and *wishful*. Within these broad categories are sub-categories summarized within each cell of the grid (see Table 1).

Table 1. Category Labels by Game Enjoyment Threshold Model

	Frustrating	Interesting	Wishful
Technical Capacity	Access Login Loading Bug		Access
Playability Threshold			
Basic Design	Presentation Navigation Mechanics	Length Style Novelty	Levels Definition & Criteria Interface personalization Customization
Enjoyability Threshold			
Player Enjoyment (1) Non-social	Points reward	Points reward Reminder Tracking	Tip of the day Reward system Reminder Goal setting Feedback Tracking
(2) Parasocial	Virtual character	Virtual character	Robot personalization Robot interaction
(3) Social		Reading updates Sharing updates Impression management Vicarious experience Friendly competition Social interaction	Photo sharing Social interaction

Results of interview content coding suggest support the hierarchy of the game enjoyment threshold model. The comments regarding the frustrating aspects of their play experience mostly

clustered around technological capacity and basic design when the elements of playability threshold and enjoyability threshold were not fulfilled. The comments regarding the interesting aspects of their play experience appeared in the basic design category but mostly clustered around the non-social, parasocial, and social elements of the game play. This is consistent with the theoretical framework in the original model that when some basic game design elements are in place, players would start to find the experience interesting, but it is really those elements at the core of intrinsic motivation and (para)social interaction that make the game compelling and meaningful to the players. In addition, the wishful comments from the game players further demonstrated their desire to take advantage of more sophisticated serious games and tailor their play experience to develop healthy connections between their minds and bodies as well as their social networks both online and offline.

Key words: game enjoyment threshold model, player feedback, interviews, wellness partners

References

- Gee, J. P. (2005). *Why video games are good for your soul*. Australia: Common Ground.
- Klimmt, C. (2003). Dimensions and determinants of the enjoyment of playing digital games: A three-level model. In M. Copier & J. Raessens (Eds.), *Level up: Digital games research conference* (pp. 246-257). Utrecht, the Netherlands: Faculty of Arts, Utrecht University.
- Lee, K. M., & Peng, W. (2006). What do we know about social and psychological effects of computer games? A comprehensive review of the current literature. In P. Vorderer & J. Bryant (Eds.), *Playing video games: Motives, responses, and consequences* (pp. 325-346). Mahwah, NJ: Erlbaum.
- Lieberman, D. A. (2009). Designing serious games for learning and health in informal and formal settings. In U. Ritterfeld, M. J. Cody & P. Vorderer (Eds.), *Serious games: Mechanism and effects* (pp. 117-130). New York: Routledge.
- Michael, D., & Chen, S. (2006). *Serious games: Games that educate, train and inform*. Thomson: Boston, MA.
- Sawyer, B. (2009). Foreword: From virtual U to serious games to something bigger. In U. Ritterfeld, M. J. Cody & P. Vorderer (Eds.), *Serious games: Mechanism and effects* (pp. xi-xvi). New York: Routledge.
- Shen, C., Wang, H., & Ritterfeld, U. (2009). Serious games and seriously fun games: Can they be one and the same? In U. Ritterfeld, M. J., Cody, & P. Vorderer (Eds.), *Serious games: Mechanisms and effects* (pp. 48-62). New York: Routledge.
- Wang, H., Shen, C., & Ritterfeld, U. (2009). Enjoyment of digital games: What makes them seriously fun? In U. Ritterfeld, M. J. Cody & P. Vorderer (Eds.), *Serious games: Mechanism and effects* (pp. 25-47). New York: Routledge.