Fun Experience with Digital Games: a Model Proposition

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Abstract. Currently there is no accepted model of player experience in games. There are heuristics in the literature that help determine the quality of a video game. Some models try to assess enjoyment through flow, or extend current usability methods. Recent research on user experience describes key elements of a model of user experience with games, but do not take into consideration emotional reactions games triggered during this experience, and antecedent aspects of user profile that influences game players' preferences and may modify players' beliefs towards the title.
This framework extends current usability methods by creating a tool where the relationship among game components gets clear. User tests showed a variety of relationships established among game components that lead or interfere in fun with games in a given platform.

Keywords: playability; methods; usability; games; user evaluation.

1 Introduction

In order to understand the user's experience of fun with digital games, academics and practitioners alike are using a range of theories and methods. However, evaluating the success of entertainment technology remains an open challenge. The main issue making it difficult to create a good evaluation method for entertainment technologies is the need of a framework that acknowledges that entertainment interfaces are different from productivity interfaces, because their primary goal is to challenge and entertain the user. Although it is arguable that entertainment technologies can improve the user's performance on a given task, such as landing on a flight simulator, the user`s goal is to have fun, an emotional and cognitive experience resulting from the interaction with the game environment and with other players.

Human-Computer Interaction (HCI) theories and methods contributed to improve digital technologies since the 80s. However, HCI research is concerned with understanding how people make use of devices and systems that incorporate or embed computation, and how to make them more useful and usable [**1**]. Current usability methods are very useful to understand how game players can complete tasks in a game environment but do not have methods to deal with emotions such as pleasure,

fun and the like, important issues in technologies where the primary goal is to deliver a message of entertainment.

Considering that game is about fun and fun with games is an experience, it shifts focus from usability analysis to user experience analysis, because objective measures observe productivity and task completion, and game play is about an experience that transforms the attitude of the game player towards the game.

In the following section, the paper presents and discusses previous models to assess game enjoyment.

2 Previous Models

Previous models to assess game experience and enjoyment use a variety of concepts, methods and have different approaches to the problem: what are the elements of this experience and how are they related.

Since Sweester & Wyeth first proposed a model based on Flow – the GameFlow Model [**2**], many researchers started to rely on this concept in order to assess game players enjoyment during the game. To determine how elements of flow manifest themselves in computer games, Sweester and Wyeth [2] conducted an extensive review on the literature of usability and user experience in games. The result was the GameFlow model, an attempt to put together various heuristics into a concise model of enjoyment, which consists of eight core elements – concentration, challenge, skills, control, clear goals, feedback, immersion, and social interaction.

However, Flow has been proved to be an elusive construct to define. While Csikzentmihalyi [**3**] wrote extensively on the subject over the past 20 years, definitions provided in these sources, and by other researchers, always lack consistency and comprehensiveness. Existing definitions of flow are constructed in terms of a wide variety of constructs an individual tends to experience in the flow state. Some definitions include constructs that define or cause flow, while others specify outcomes that are experienced as a result of being in flow state [**4**]. Although the GameFlow model is a very interesting approach to assess game enjoyment, a key difficulty with this is the lack of consistency in operational definitions of flow constructs.

Fabriccatore, Nussbaum and Rosas [**5**] developed a qualitative design model elicit players' preferences, and describes the main elements that, according to players determine the quality of an action video game. The research is a qualitative approach and results in a series of specifications that focus on end-user needs. In order to conduct the research, they adopted the grounded theory method which allows researchers to work on an emerging theory while it comes from the subjects.

In this iterative process, researchers' theory is constantly revised and eventually modified as new patterns emerge from the analysis of data. Therefore, the methodology provides the means to shape a qualitative model based on empirical data gathered during playing sessions. In those sessions, players verbalized what determines quality in a game. However, two problems come from this methodology and model. First, considering that there are many different sorts of digital games, each model is tied to a game, and is useless for other games genres. Second, in order to

create a model for a given game genre many operational issues arise: number of participants, recruiting, time, budget, and modeling. The main outcome of this work is a set of design guidelines for game genre or heuristics for games, by genre.

Other important contribution comes from Pagulayan and team [**6**]. They extended the use of current usability methodologies in order to address some of the unique issues one can find in games. This methodology adapts some experimental psychology knowledge in order to improve user-centered design methods. On presenting a series of case studies, it is easy to notice that what they are really doing is comparing user needs and desires with designer expectations about the game outcomes, and then fixing problems based on this difference. Thus, every test and game development becomes a different case study, because it uses a different approach to point to problems. Because this approach is empirical, the result of the methodology relies too much on the practitioner experience and game developer team communication skills, making it difficult to reproduce their work, and repeat success stories of helping game designer improve their products.

There are some models of user experience with a HCI approach; some of them are very simplistic [**7, 8**]. Mark Hassenzahl [**9**] proposed a more complex model that tries to define key elements of user experience and their functional relation. The model addresses (a) the subjective nature of experience per se, (b) perception of a product, (c) emotional responses to products in (d) varying situations. The main contribution of this work is that it recognizes that the designer perspective is intended. It implies that there is no guarantee that the user will actually perceive and appreciate the product the way designers wanted it to be perceived and appreciated. The second most important statement is about the user experience. When users start using a product, he says, a process is triggered. This process is about how people construct an opinion about a product based on the particular combination of product characteristics, their personal standards and expectations, sometimes based on past experiences, and in a particular situation. Depending on the situation, emotional and behavioral consequences are completely different.

Because product interaction is a complex cognitive structure that evokes memories and symbolic values, Hassenzahl´s model distinguishes the product attributes in two categories: (1) pragmatic, referring to manipulation and fulfillment of individual's behavioral goals, and (2) hedonic, referring to attributes that stimulate, have some identification with individuals and provoke memories in them. Hedonic attributes emphasize individuals' psychological well-being. However, the model does not relate constructs with game experience in mind. It is a more broad view of user relationship with technological products.

Those previous models disregard the context of usage that may take attention and memory away from the game. These are just some of the reasons a new processing model is being offered to assess and understand user experience with digital games.

3 Model Proposition

Figure 1 illustrates the basic components of the Game Experience Model, which aims to:

1. Identify and describe the elements involved in the digital game experience;
2. Identify and analyze the relationship among those elements, indicating how they influence each other.

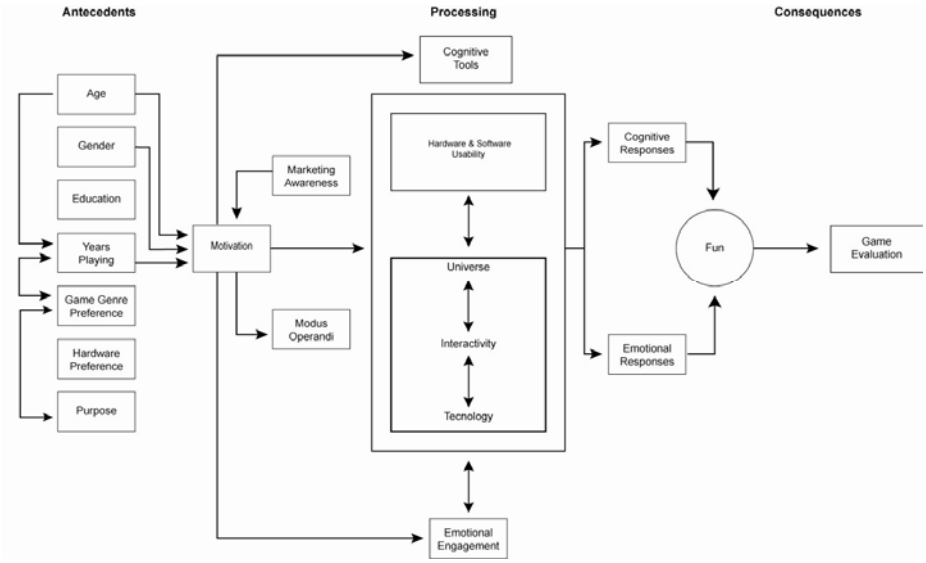

Fig. 1. This image illustrates the basic components of the Game Experience Model.

Three main ideas underline the model conception:

1. Experience with digital entertainment depends on three moments – before, during and after the experience;
2. Each element acts upon one or more elements, and modifies the results depending on how and when it happens;
3. Fun is the main result of this experience.

Basic constructs in the model are user profile, previous knowledge on games and marketing awareness, game genre preferences and purpose, antecedents' levels of motivation, modus operandi, process, and cognitive and emotional responses, and fun as a result of the game evaluation process. Following the figure, we begin by examining the antecedents, processing and consequences. In the antecedents subsection, this paper considers the components of user profile, needs and motivation.

In the processing subsection the paper presents suggestions about how the game elements and the player interact in order to lead to the final subsection that shows how emotional and cognitive responses build different degrees of fun.

3.1 Antecedents Hypothesis

Games are complex environments because they depend on hardware and software performance, context of usage, and the game player profile. Regarding hardware and

software, game producers control the product attributes, such as graphics, sound, the platforms available to play the game, and the whole marketing awareness campaign.

Although game players can ignore advertisements, the game play cannot happen without their action [**10**]. The model proposition considers the game audience before they begin game play because the user profile influences their choices about which game to play and where they play it. In this model, user profile comprises: 1) user demographics (age, gender, education), 2) Internet and handheld related issues (why, where, what, how the player uses these), and 3) game activity (previous experiences, hardware preferences, years playing digital games, frequency, preference in socialization level, genre preference, and purpose).

User profiles give an insight about the game player as a consumer. Traditional demographic traits such as age, sex, education levels, and income no longer help us predict consumer buying habits, because it is no longer possible to infer habits or predict behavior from age and gender, for example. Non demographic traits such as values, tastes, and preferences are weak on predicting what any of these people are likely to purchase. The model acknowledges that by correctly identifying groups that were potentially receptive to a particular game genre, or have interaction preferences in terms of hardware, socialization, and purposes, one can better understand the relationship of consumers to a specific game and game play appreciation [**11**]. As a result, the first hypothesis (H1) questions if user profile really influences the game play appreciation or the fun derived from it.

Game genre preference is a very sensitive topic, because game genre definition varies depending on the source, and games are usually classified in arbitrary, contradictory or overlapping ways, mainly because of marketing purposes [**12**]. In order to increase understanding we will use a set of genre categories comprised of: action, adventure, educational, emulator, fighting, puzzle, racing, role playing, shooter, simulator, sports, strategy, traditional, serious, massive multiplayer [**13**]. Game genre and purpose add attributes to the user profile that help understand the way a game player makes decisions.

The model considers that user purpose and motivation are different constructs. Literature **r**eview shows that the two words have been used as synonyms, but some distinction is necessary. Purpose is an outside aim or goal that defines product requirements to provide social or aesthetic utility to express one's actual or ideal self-image, role position, or feelings toward group members[**14, 15, 16**]. Motivation is a psychological state, and reflects the desire to consume products for their cognitive [**17**] or sensory stimulation [**18**]. Thus, motivation is related to factors that arouse, maintain and channel behaviour towards a goal, moderating the link between product exposure or game play, and the game appreciation process [**19, 20, 21, 22**]. The second hypothesis (H2) questions if user profile is related to motivation and the third tests if years playing games, game genre preference and purpose define user profile.

Because game players tend to transition either from a playful behavior to a more serious one, and it interferes with the goal-directness, the model uses the *Modus Operandi* concept. Murgatroyd [**23**] conceptualized goal-directness as a *continuum* ranging from "Telic" to "Paratelic," where telic refers to high goal directness that we called "serious" and paratelic refers to low goal-directness, which we called "playful." The telic mode tends to be more serious minded and focused on the future, while individuals in paratelic mode tend to be more playful, light hearted, orienting actions

towards the present. Rodgers and Shelton [**24**] believe that a more serious, goal-oriented mode might translate into a greater cognitive effort being placed on reaching a goal, which is a futuristic outlook, and a lesser cognitive effort being devoted to other tasks such as interacting with others and paying attention to context distractions such as noise. On the other hand, users on a paratelic mode may be more curious, and apt to explore the virtual environment. These considerations make it necessary to understand if motivation triggers cognitive tools and emotional engagement (H4).

The "Antecedents" part of the model intends to capture the elements that build game player choices and lead to a certain behavior during a game play as follows.

3.2 Processing Hypothesis

Processing refers to the period when the player is actually engaged in the task. The model was created using the developers´ point of view, whose objective is to encourage the game experience in order to reach fun. Processing depends on motivation, that affects the direction of the attention and the amount of memory allocated to the tasks. According to Bettman [**25**], motivation affects both direction and intensity of behavior. Consistent with this notion, advertisement processing models propose that motivation affects two dimensions of processing: direction of attention and intensity of processing [**26, 22**].

Attention, defined as the general distribution of mental activity to the tasks being performed by the individual [**27**], reflects both that which receives mental activity (direction) and the duration of the focus. As a limited cognitive resource [**21, 28**], attention can be allocated in varying degrees to a primary task or to secondary ones such as daydreaming, conversation, or other environment stimuli.

In this concept, as the perceived degree of relevance of a game task outweighs a secondary task, motivation to process game content increases. As a result, greater attention is allocated to the game task in detriment of secondary tasks [**29**]. The selective aspect of attention is under conscious control and is directed toward stimuli of greater relevance. However, it is also recognized that stimuli must contain properties that elicit attention [**30**]**.** As attention to the stimulus increases, greater amounts of working memory may be allocated to process information. The term "processing capacity" intends to reflect the amount of working memory allocated to process stimuli. In earlier models, focus (in our terms "attention") and the extent of processing (in our terms "capacity") were both considered under the generic designation of "attention"[**28**].

Not only does the engagement with the game require the use of cognitive tools, it simultaneously elicits emotions on the user. Actually, game design aims to emotionally engage users, and also make them react cognitively and physically as a result of interaction with the games interface, where the story and the multimedia act as stimulus.

As a result, it is possible to see how game players express their emotions during the interaction. The emotional engagement is usually expressed through a combination of verbal and facial expressions and gestures [**31**]. However, there are emotions that provoke a low level of arousal and valence [**32**], such as feeling gloomy or bored,

making it hard for observers to gain access to gamers` emotional states. According to [**33**] emotional states are at the core of human emotional experience, and affect the experience results. Emotions are also acknowledged as factors that influence the attitude towards a brand, and hence it is logical to think that emotions influence the attitude towards a product [**10**].

The game play experience happens through the games pragmatic and hedonic' attributes. The model assesses pragmatic attributes through game interface and device interface usability. It is well known that low usability of any sort of interface limits the user's capacity to reach goals trough task completion, and lowers user satisfaction.

Hedonic attributes are comprised of the game's universe, interactivity, and technology to promote aesthetic pleasure [**34**]. The universe constructs are: (1) the plot, its development and possible outcomes, (2) boundaries or rules, including rules for game economics, (3) characters, because they will evoke the gamers self or memories, (4) ability to "make believe", referring to the level of detail with which the whole game universe is developed and presented to the game user in the virtual environment. Some may call it degree of realism, but since we are talking about a fantasy, it doesn't seem right to me.

Interactivity is a group of features that trigger user actions and reactions, and are related to: (1) the game challenge in terms of objective (get the black belt in martial arts, for example), (2) pace or rhythm in which the game player achieves short term goals, (3) responsiveness: how the game reacts to players' actions, including saving past moves.

Technology attributes are those that rely on technological limits or advances to perform, and are comprised of: (1) technical issues- correctness (the functions are adapted to the tasks the users are doing), availability (the functions are available in a simple manner), reliability, security & integrity (functions perform as expected, information is correct, saving and retrieval of information is correct), robustness (the system is capable of handling technical and user-generated errors), (2) multimedia – graphics, sound and camera angle, (3) degree of realism with which an action is presented to the user, for instance, if the game player needs to use a gun, the gun performance must be as close to real life performance as possible (Fullerton et al., 2004). It is unclear whether the game universe, interactivity and technology (hedonic attributes) are related and influence each other (H6), and if the influence of Usability and Hedonic attributes are related (H7).

3.3 Consequences Hypothesis

MacInnis and Jaworski [**10**] proposed that responses to ads are cognitive and emotional. Cognitive responses are thoughts, including inferences, during exposure. Emotional responses are feelings elicited during ad exposure. The model assumes that similar phenomena happen during game exposure. This model considers fun as the result of game experience, thus it depends on the emotional engagement and cognitive tools usage level. As a consequence, the game is evaluated as a product. The last hypothesis states that Fun is the result of game experience through hedonic and pragmatic game attributes, mediated by cognitive and emotional tools (H8).

4 User Study

Eighty two male and female participants aged 15 to 35 took part in the experiment. All participants were frequent computer users, as well as regular game players. Participants played action games, because of their popularity. They played for one hour on environments full of noise and movement, alone. All participants filled 3 questionnaires: the first captured profile information, the second looked for expectations about the game, and the third captured user perception of the game experience. The first two (profile and expectations) were filled before starting to play the game, and the third right after finishing playing the game. Questionnaires rated statements using a Likert Scale, 7 corresponding to "strongly agree" and 1 to "strongly disagree."

5 Comparison of Conceptual Model with Tests Results

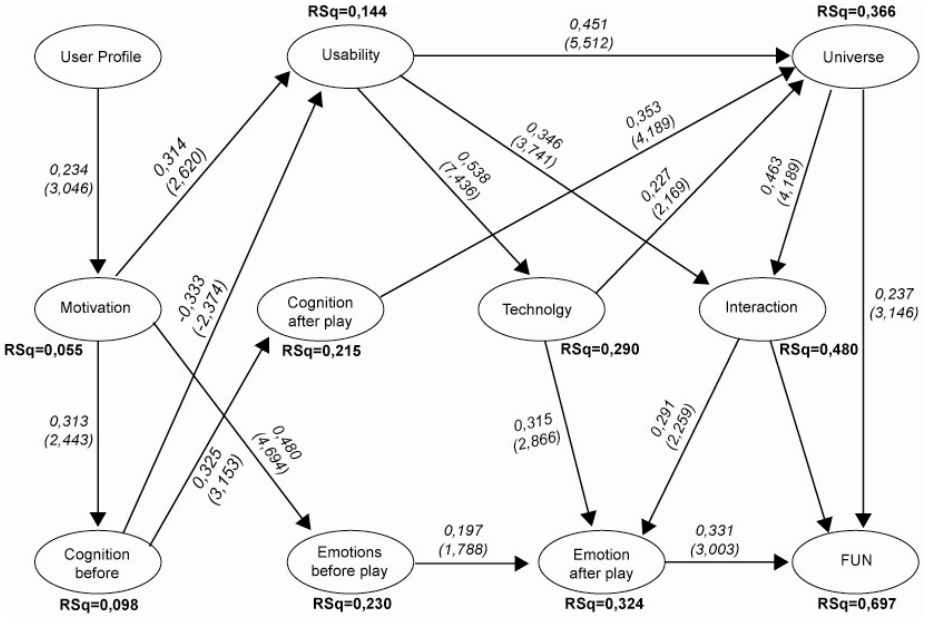

Fig. 2. This image demonstrates subjective data results from the questionnaires analyzed using Structural Equation Modeling statistical technique.

In most cases, the hypotheses were supported by results (Fig.2). There was no direct path from user profile to fun (H1). User profile was related with motivation (H2), but did not explain motivation. Table 1 showed that "years playing games," game genre preferences and purpose defined user profile (H3). Table 2 demonstrated the existence of a link between age and years playing games (H4).

Motivation did not strongly explain cognitive tools and emotional engagement before the player experimented the game (H5), maybe because the results were based

on a non realistic situation. Subjects were recruited and asked to play a game title that may not motivate as much as a free choice. However, emotions and the state of cognitive tools are related with pragmatic and hedonic attributes in different degrees, demonstrating that the game experience transforms emotions and cognition resulting in fun. Motivation was related with usability and explained 14% of its appreciation, leading to conclude that motivated players could overcome usability shortcomings. Usability, technology and interactions are related (H6). A good technology directly corresponded to a better universe appreciation, and the universe explains why people interact with the game (H7). A greater usability directly corresponds to a greater interactivity, technology and universe appreciation, but the opposite situation does not exist: an extremely well produced game with poor usability will not lead to fun (H8).

Results showed that emotion leads and explains fun, while cognitive tools do not explain fun. However, cognition explains 14% of usability, and game universe explained 21% of cognitive changes after playing the game. An explanation for those results is that cognitive tools were used to engage players with the multiple tasks, but they did not directly trigger fun, cognitive tools are just a way to experience the game play, with its hedonic and pragmatic attributes. In turn, those attributes transform emotions and lead to fun.

From results and present analysis it is possible to say that the processing of communication messages in digital games is different from traditional and on-line advertisement processing, because the ludic experience poses a different interactive situation for users. The game experience is a more complex setting, and changes the role of emotional and cognitive tools on motivation, and game attributes are responsible for transforming the players' mood leading to fun.

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