Psychologically structured approach to user experience in games

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ABSTRACT
User experience (UX) in digital games has recently become a common topic of research. Despite association between psychology and experiences is clear, results have often been inadequately explicated by using psychological terms. In this study we explore the variety of experiences (i.e. positive and negative) that are received from playing digital games. The main aim is to integrate gamers’ descriptions of their UX to theoretical constructs in psychology to reach a more analytic approach to the topic. The results suggested that user experiences are versatile in nature but they consist of four major constructs: cognition, motivation, emotion and focused attention. In addition to the main findings, gender was related on how gaming was experienced. As a conclusion, this study offers a solid and empirical-based terminology for communicating about UX in games. Also, the results can be utilized in developing models and measurement tools for UX in games in future.

1. INTRODUCTION
Games are nowadays more popular than ever before. It can be seen on the economical and cultural level as well as in individuals’ habits of allocating time. From the perspective of gaming industry it is essential to aim at end products which produce a wide range of positive user experiences (UX). Likewise there are other professions and positions where games’ relevance to individuals should be extensively understood (e.g. education, therapy and parenting). Regardless of different aims and interests in these areas they all benefit from getting a coherent view and terminology for defining UX in games. Psychologically valid terminology helps in knowledge building and communicating within and between the areas. This study examines the most common experiences that are reached by gaming and combines them with a psychologically meaningful framework.

1.1 Definition and measurement of experience
Human experiences are mental representations that emerge from physiological conditions in a body and are enabled by interaction between individual and environment. In fact, this interaction causes a continuous stream of experiencing [7]. Single experiences with a clear beginning and end, however, can stand out from the continuous stream. Psychophysiological measures can reveal experiential content to some extent but current technologies are not advanced enough to reveal the vast and rich amount of details in experiences. This is the reason for the unavoidable need to still approach individuals’ experiences by using traditional methods such as interviews and questionnaires.

Experiences are subjective by nature and thus a challenging subject for research. However, investigating them is equally important to investigating behavior because experiences are in an essential role when behavioral actions are planned [13]. For example, sensations that a given environment elicits may be close to each other between individuals, but they probably bring different thoughts and feelings into awareness and thus may cause a wide diversity of behaviors [9].

Categorizing experiential components is somewhat artificial and simplifies the phenomenon of experiencing. Nevertheless, a solid view of the content and the structure of the concept is a necessity when the concept is taken for the closer inspection and focus of empirical research. Mental activities have claimed to be consisting of cognition, emotion and motivation [10]. As well, this division is used here for defining experiences.

The core of cognition is in perceptions, thoughts and memories. Perceptions are individually meaningful interpretations of sensa-
tions that emerge from environment and body [9]. Thoughts, in turn, are comprised of processing perceptual and memory-based material.

Motivations are reasons and roots for actions and they may vary by quantity and quality [14]. Aims, expectations, beliefs and the subjective value of actions are closely tied to motivations [8]. Sometimes actions may feel worth executing because of themselves and in these cases the term of intrinsic motivation is often used [14].

At last, emotions give the final tone to experiences. They are basically alterations in nervous system, which may emerge either directly or via cognitive processing [6]. Wide variety of emotions is usually explained by using two psychological dimensions, arousal and valence [1].

1.2 Games and UX
Studies of UX in games have mostly focused on positive experiences such as fun or enjoyment. However, it is likely that gaming causes also negative experiences. Especially in the context of game research studying positive experiences is only the other side of the coin. Even if the aim is to develop an appealing game, it should be taken into account if there are some features that pose negative experience for players.

Three concepts that have widely been adopted to game research are presence, immersion and flow. Presence refers to a sense of being there (game environment) [11]. Immersion, in turn, is often used to describe an immersive experience that occurs during using technology and sometimes it is even used as a synonym for presence [3]. Both presence and immersion, however, can be claimed to be closely associated to focused attention, when using psychological language.

The third of the concepts, flow, is a highly enjoyable experience that often occurs when an action is worth doing for its own sake and skills and the challenges are evaluated as being high and in balance [8]. Flow is a good example of experiential complexity; despite it includes separable components (cognitional, emotional and motivational) it is harmonious and integral as an individual’s experience. In previous studies all the three concepts have been integrated for describing many sides of UX in games. For example, they have been utilized in measuring the difference in UX that is caused by playing 3D vs. 2D driving games [16].

There have been also some attempts to explore UX in games by using qualitative methods. Despite interesting results these studies haven’t explicitly reported the methodologies used. As a whole research on UX in games has been quite fragmented and many studies have loosely been integrated to psychological aspects of experiences.

1.3 Aims of the study
The main purpose of this study is to explore what are the most common gaming experiences like and how they fit to psychological frame of experiencing. Instead of limiting the expressions of experience, all kinds of experiences are accepted to the data. Our first hypothesis is that cognition, motivation and emotion are basic building blocks of gaming experience as they are in experiences in general [10]. We also hypothesize that emotion is mainly composed of valence and arousal [1]. To further clarify the reasons for different experiences men and female are compared along the way as their habits as gamers are rather different [2].

2. METHODS

2.1 Participants
The questionnaire in Internet was filled in by 267 participants (132 male, 135 female). They were all Finnish and the mean age of them was 24.3 years (SD = 4.4). The youngest participant was 18 and the oldest 52 years old. Participants were invited to the study via university students’ mailing lists. Consequently the majority of them were students in university. 154 (57,1 %) of the participants played digital games at least once a month. Of them 50 (32,3 %) were women. Only 13 of all (4,5%) did not play at all, which meant that they had probably played in the past and thus felt capable to participate in the study. These 13 were all women.

2.2 Data collecting
The questionnaire contained items exploring demographic information such as gender, age and education. In addition, participants’ habits of playing digital games were measured (i.e. gaming frequency and favorite game type).

Finally after background questions participants were asked to write down the most common experiences they receive from playing games. For that purpose, there were five distinct open fields. Participants were free to describe their experiences in any way they felt the best. However, they were instructed to fill in the fields in order of prevalence (most common experience to the first open field, the second common experience to the second field etc.). Overall, qualitative data collecting technique had resemblance to IBQ-method (used in image quality studies) [12].

2.3 Data categorization and analysis
Qualitative data was categorized in two phases. In the first phase the descriptions of the gaming experiences were categorized according to the principles of grounded theory [15]. In practice, attributes that had meanings close to each other were put into the same category (for instance joy and enjoyment). To ensure the reliability of categories the coding was re-established by a naïve inter-rater. The measure of inter-rater reliability was Cohen’s Kappa coefficient [4]. Atlas.ti 5.0 software was utilized in the coding process.

24 most common codes in phase one were brought to the second phase of categorization. The aim in this phase was to structure the basic building blocks of gaming experience. Part of the categorization was done according to theories [1, 10]. Rest of the categories were formulated according to the data (i.e. grounded theory) since there was no theoretical basis for categorization. After categorization process the most common experiences of men and women were compared by using chi-square test.

3. RESULTS

3.1 Categories and structure of UX in games
The total number of descriptions was 1146. These formed 154 distinct experience categories. The 24 most common codes, their frequencies and Cohen’s kappa coefficients are represented in table 1.

In the second phase of categorization the aim was to go further in analyzing and structuring UX in games. As it was hypothesized the attributes fitted well into three basic building blocks of experience: cognition, emotion and motivation (structure of UX in games in figure ). In addition, a new category that stemmed
Table 1. The most common experiences, their frequencies and reliabilities

<table>
<thead>
<tr>
<th>Experience category</th>
<th>Frequency</th>
<th>Reliability*</th>
</tr>
</thead>
<tbody>
<tr>
<td>enjoyment</td>
<td>122</td>
<td>0.91</td>
</tr>
<tr>
<td>excitement</td>
<td>92</td>
<td>1.00</td>
</tr>
<tr>
<td>relaxation</td>
<td>89</td>
<td>0.98</td>
</tr>
<tr>
<td>entertainment</td>
<td>77</td>
<td>1.00</td>
</tr>
<tr>
<td>success</td>
<td>62</td>
<td>0.99</td>
</tr>
<tr>
<td>challenge</td>
<td>55</td>
<td>0.97</td>
</tr>
<tr>
<td>pass time</td>
<td>53</td>
<td>0.95</td>
</tr>
<tr>
<td>winning</td>
<td>42</td>
<td>0.92</td>
</tr>
<tr>
<td>social interaction</td>
<td>38</td>
<td>1.00</td>
</tr>
<tr>
<td>frustration</td>
<td>28</td>
<td>1.00</td>
</tr>
<tr>
<td>problem solving</td>
<td>28</td>
<td>0.91</td>
</tr>
<tr>
<td>escapism</td>
<td>26</td>
<td>0.94</td>
</tr>
<tr>
<td>immersion</td>
<td>24</td>
<td>0.75</td>
</tr>
<tr>
<td>learning</td>
<td>23</td>
<td>0.91</td>
</tr>
<tr>
<td>progression</td>
<td>22</td>
<td>0.98</td>
</tr>
<tr>
<td>competition</td>
<td>20</td>
<td>0.90</td>
</tr>
<tr>
<td>fascination</td>
<td>19</td>
<td>0.90</td>
</tr>
<tr>
<td>boring</td>
<td>17</td>
<td>0.90</td>
</tr>
<tr>
<td>annoyingness</td>
<td>17</td>
<td>0.88</td>
</tr>
<tr>
<td>inspiring</td>
<td>14</td>
<td>0.87</td>
</tr>
<tr>
<td>role engagement</td>
<td>14</td>
<td>0.70</td>
</tr>
<tr>
<td>pointlessness</td>
<td>14</td>
<td>1.00</td>
</tr>
<tr>
<td>addictive</td>
<td>14</td>
<td>1.00</td>
</tr>
<tr>
<td>discovery</td>
<td>14</td>
<td>0.86</td>
</tr>
</tbody>
</table>

* Cohen’s kappa coefficient

from the data was created. It consisted of two attributes that described perceptual intensiveness of gaming and was called focused attention.

Cognition consisted of attributes that described a gaming event on factual and non-emotional level. These attributes formed a process-like description of gaming and was consequently called a conception of gaming process instead of mere cognition. All the attributes were closely tied to challenges. First of all players encounter several types of challenges, which in turn have to be overcome somehow (ways to overcome challenges). This was followed by consequences of overcoming challenges, which may be progression and learning either in game world or real world. In addition, gaming was seen as a social activity.

Emotion was hypothesized to consist of at least of two dimensions which were both found in the data. Valence described the pleasantness of gaming and both ends of the dimension appeared in the data. Similarly arousal could be either high or low. There were no other attributes placed into the category of emotions.

Motivations were attributes related to the causes of gaming. There were two points of view to consider these causes that stemmed from the data. Level of motivation consisted of valence-related attributes. Both low and high level attributes appeared in the data. Functions of gaming were sort of answers to the imagined question: “Why do you play games?”

3.2 Gender and experiences
Generally men and women described their gaming experiences differently ($\chi^2(23) = 51.12, p < .01$). Of the 24 most common attributes, there were 6 which were related to gender. Women described more often that enjoyment was part of their UX ($\chi^2(1) = 5.21, p < .05$). Nevertheless, they also mentioned more often that gaming is boring ($\chi^2(1) = 7.65, p < .01$) and pointless ($\chi^2(1) = 10.99, p < .01$). Men were more prone to mention challenges ($\chi^2(1) = 6.99, p < .01$), learning ($\chi^2(1) = 4.71, p < .05$) and role engagement ($\chi^2(1) = 4.13, p < .05$).

4. CONCLUSIONS
In this study we examined what the UX in games is commonly like and how it can be combined to psychological way of conceptualizing experience. In addition, we explored user experiences that are related to gender.

According to Hilgard [10] mental activities are composed of cognition, motivation and emotion. These were all found in the data. In addition to the previous, a new category was created to depict perceptual-attentional elements of UX. This new category is well in line with previous findings which underline that feeling of being there (i.e. presence) is essential for pleasant UX in virtual environments [11, 16]. Results also elicited many concepts such as challenge and enjoyment that are integral in theory of flow [5].

Altogether results imply that previous research on gaming experiences has used concepts with valid content. Nevertheless, using basic psychological concepts, which have previously been in the background when the overview of UX in games has been formulated, would make studies more comparable and the field of research more meaningful from the psychological point of view. As seen in this study, psychological concepts have an excellent explanatory power for UX in games. In addition, the results indicated that UX in games can be either negative or positive. This supports that both kinds of experiences should be studied when the human-computer interaction is wanted to be fully understood in context of games.

Male and female turned out to be quite different in how they experience gaming. One of the most interesting differences was that male associated challenges to gaming more often than women. However, on the basis of this study it is not possible to say why challenges are experienced differently, but evidently they are a central part of gaming and probably contribute to positive UX in games as suggested before [16].
Figure 1. Main and subcategories of UX in games. Italics refer to categories have been found in the data by using grounded theory. Other categories have been developed or used to further structure dimensions of UX (2nd phase of categorization).

The main limitation of the study is that the participants were mainly young adults whereas gamers in general come from all age-groups. Another thing that should be kept in mind is that dividing experiences into parts is always artificial to some extent. However, we believe that the study is valuable in anchoring research on UX in games to psychological concepts and way of thinking. In addition, together with earlier studies [16, 17] this study helps to build a more coherent model of UX in future, which can be used in various contexts such as developing new games and game environments.

5. REFERENCES