

The Gods Play Dice Together: The Influence of Social Elements of Gamification on Seniors' User Experience

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Abstract. Due to increasing technologization and demographic changes, more and more elderly people are facing the challenge to use internet-based services for information and communication (ICT). In order to reduce frustrating experiences with ICT, such as feelings of helplessness and fear as well as motivational barriers, gamification and serious games are a promising approach. However, we assume that, when designing gamified applications for senior citizens, social aspects play an important role. Our research question aimed at comparing subjective enjoyment and motivational effects by providing different sociable gameplay conditions.

In a laboratory experiment 18 pairs of seniors from 58–85 years of age played an online version of the dice game “Yahtzee”. Each participant worked in a separate room. The pairs were assigned to one of the following social modalities: (1) isolated condition with no interaction at all, (2) shared screen-condition and playing the game against each other knowingly, or (3) shared screen-condition plus video and audio feedback between both participants. By using a set of questionnaires we measured perceived attractiveness, emotional enjoyment, and motivation during the game as well as after the experiment.

Repeated measures during the experiment show that social aspects significantly enhance positive feelings and the willingness to maintain the gaming task.

Keywords: Gamification · Serious games · Elderly people · Social interaction · Motivation · Emotion

1 Introduction

Previous research has shown that the use of game elements, such as rewards, instant feedback, progress bars, and badges in non-gaming contexts is supposed to improve learning processes, to facilitate positive experiences, and to motivate seniors' ICT usage (Bürglen et al. 2014). However, these effects strongly depend on prior experiences and individual preferences, such as knowledge about ICT and openness towards games in general. Therefore, the design of gamified applications and serious games should follow a human-centered design approach and consider needs and requirements of the specific target group (Minge et al. 2014). One goal of our research is to analyse

such elements in real games and their influence on enjoyment and motivation of senior citizens. In order to increase user enjoyment with technology, those elements could further be employed in the design process of interactive systems.

An important source for enjoyment and intrinsic motivation is social interaction – or “socio-pleasure” (Jordan 2000). Socializing is the crucial ingredient for Online Social Networking sites such as Twitter, Youtube, and Facebook, allowing users to interact with each other in an alternate online world in real time (Pérez and Gómez 2011). The importance of social interaction is in line with the self-determination theory (SDT) by Deci and Ryan (2000), which is based on the premise that humans are active organisms, focused on growth and innately motivated to integrate psychic elements into a connected sense of self, both individually and in terms of relatedness to larger social structures. Among competence and autonomy, relatedness is one of the central human needs in SDT.

With a closer look at games, socializing is also one of the four basic motivators for playing (Bartle 1996). Zichermann and Cunningham (2011) even assume that this is the most important motivator because “the average person is looking to socialize - not win” (Zichermann and Cunningham 2011, p. 24). Weibel et al. (2008) showed that game players generally opted for direct competition with human players, rather than with computer opponents. Playing together, either with unknown people or with close friends, has not only immediate effects on gameplay, but positively influences motivation in the long run (Seay et al. 2004). Player behaviour can be regulated by game instrumentality; but much more important are shared social practices (Chen 2009), which usually revolved around communication (Ducheneaut et al. 2007). As such, the option to play as a single player belonging to a team or collective, in order to work together either in “cooperative quests” or in “team-play” with and against other opponents, is an important driver for motivation and positive experiences with games.

However, when it comes to senior citizens, there have been only a few studies focusing on the influence of social elements of gaming for elderly game players. Although most people, especially younger generations have an online social network account and maintain positive opinions about their use (Pérez and Gómez 2011), generational differences begin to emerge however, with the elderly being more cautious about privacy issues and data safety (Zukowski and Brown 2007). Little is known about the motivational and emotional experiences of seniors when they play (computer) games. This was the starting point for our research question.

2 Research Question

Our study aimed at identifying the potential of sociable game elements for senior citizens: If an interactive application included sociable elements as part of the gamification (e.g. shared screens and/or live video and audio feeds), would the application be more enjoyable and rated more positively by seniors? If effects could be obtained, those elements could be employed as gamification elements and tested in non-gamified contexts. This could provide an effective and more enjoyable way to familiarize seniors independently with (web-based) computer systems.

3 Method

3.1 Participants

Thirty-six seniors (half of them women) from age 58 to 85 ($M = 69.9$) participated in the study. All of them were invited in pairs, but tested in separate rooms respectively. Most frequent relations were friends ($n = 14$) and married couples ($n = 10$). They knew each other for 21.7 years on average. 20 Participants were experienced with computer games and most of them ($n = 30$) with the rules of the dice game “Yahtzee”, which we used as stimulus for our laboratory experiment.

3.2 Stimulus and Experimental Design

“Yahtzee” is a very popular strategy game with a clear procedure and easy rules. For our study we used an online version of “Yahtzee”, which is highly usable and provides single and multiplayer game modes. The experimental manipulation consisted of three between-subjects conditions: (1) Playing the game alone in an isolated condition with no interaction at all, (2) playing the game against each other knowingly on a shared screen, and (3) playing the game on a shared screen plus video and audio feedback between both participants. The eighteen pairs were assigned randomly to one of these conditions. In each session two rounds were played. It was assumed that the perception of hedonic qualities, positive emotions, and intrinsic motivation to keep playing the game would be higher for the sociable conditions.

3.3 Dependent Variables

In order to measure immediate effects on emotions, participants filled in the 9-point valence scale of the Self-Assessment Manikin (SAM) by Lang (1980) after completing the first and the second “Yahtzee” game. Additionally, they answered the 7-point Likert-scaled single-item: “How motivated are you for a second (a third) game?” At the end of the experiment, the following questionnaires were employed to measure summary assessments: The perception of pragmatic and hedonic product qualities was captured by the AttrakDiff (Hassenzahl et al. 2008), positive and negative emotions by the use of the meCUE questionnaire (Minge and Riedel 2013), and motivation by a German version of the Intrinsic Motivation Inventory (IMI) by McAuley et al. (1989). As covariates, demographic data (i.e. age), openness towards games, and prior knowledge of “Yahtzee” were assessed.

3.4 Procedure

At the beginning, the pairs were split and each participant was led to a separate room. Each room had a PC, two monitors (one for the “Yahtzee” interface and one for the potential video and audio feedback), connection to the online game, keyboard, mouse and speakers. In case of the video and audio feedback condition, a webcam including a

microphone was used. Initially, participants received a brief training for “Yahtzee”, including rules and controls, so they would be able to play the game successfully. For the shared screen condition, subjects were told that they were playing against each other. For the video and audio feedback condition, the system was shown and briefly explained. If the second monitor was not used for video feedback, a static picture was presented (see Fig. 1).

Then participants were instructed to fill in the valence scale of SAM (which served as a baseline for the emotion’s assessment) and to play the first round of “Yahtzee”. After completing this game, participants assessed their emotional state with the SAM scale and their motivation to play a second round right away. After the second game, participants again rated their emotion and motivation for a third round. However, a third game did not take place for any participant. Finally, standardized questionnaires were completed, namely AttrakDiff, meCUE, and a German version of the IMI. Demographic data was collected at the end. An experimental session took 90 min on average. Participants were paid 10 Euro.



Fig. 1. The experimental setup with two separate rooms and equipment

4 Results

4.1 Repeated Measurements

Ratings of valence (SAM) and motivation (single-item) were analyzed by a MANCOVA with repeated measurements. Age, openness towards games, and prior knowledge of “Yahtzee” served as covariates. The analysis revealed a significant main effect of the different sociable conditions on motivation ($F(2, 25) = 5.381, p < .05, \eta_{part.}^2 = 0.301$): The higher the degree of sociable elements, the higher is the willingness to keep playing the game. A substantial post hoc difference ($p = .03$) was found between the isolated and the shared screen condition (see Fig. 2). For valence the main effect of our experimental manipulation failed the significant level ($F(2, 25) = 0.557, p = .580, \eta_{part.}^2 = 0.043$). However, mean ratings after the first round show that compared to the baseline, emotions became more positive in case of the two sociable conditions. Between the isolated and the shared screen condition this difference is significant ($p = .02$). After the second game,

it is only the video and audio feedback condition, which is experienced with more positive emotions.

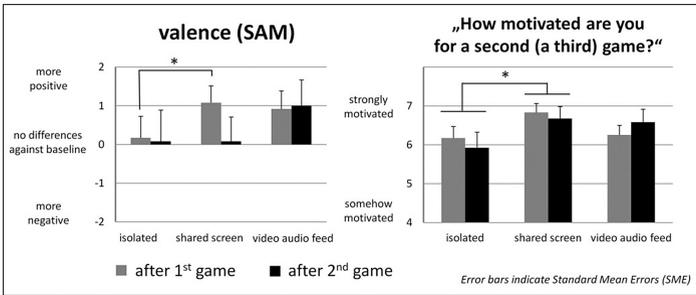


Fig. 2. Mean ratings for valence (SAM) and motivation (single-item) after the first and second game by the three sociable conditions.

4.2 Summary Assessment

The questionnaires were analyzed by a one-factorial MANCOVA with the same covariates as in Sect. 2. Descriptively we found higher ratings on the dimensions identification (AttrakDiff) and perceived competence (IMI) for both sociable conditions, whereas stimulation (AttrakDiff) and pressure (IMI) were highest for the isolated condition. McCUE's negative emotions were highest when playing "Yahtzee" alone and lowest for the video and audio feedback condition. Due to high standard deviations the analysis did not reveal any significant main effects.

5 Discussion

The results of our experiment indicate that social game elements, such as acting together, comparing scores, and communicating with other people when playing an online game, immediately affects measures of emotions and motivation of elderly users. Interestingly the highest effect was observed for the shared screen condition which did not include a video and audio feedback. However there is evidence that direct communication could be important for a positive user experience in the long run. Reflective experiences which were measured by post experimental questionnaires were highly influenced by intra-individual differences, such as prior knowledge and openness towards games. We suppose that processes of attribution and response biases have minimized existing differences caused by the three experimental conditions. The objective of our study was not only to investigate the influences of social elements on seniors' game experiences. We also aimed at identifying the potential to motivate elder people's use of technology through social gamification elements. Our results support the assumption that socializing is an important factor for seniors' experience of interaction with technology. Therefore we will conduct further studies which aim at investigating social elements in non-gamified applications.

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