

Designing and Evaluating the Tabletop Game Experience for Senior Citizens

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ABSTRACT

In this paper, we report on the design and evaluation of a tabletop game especially created for senior citizens. The game is intended to provide leisure and fun and is played with four players on an augmented tabletop. It evolved from existing games and rules that are popular and familiar amongst senior citizens. Several aspects that are part of the gaming experience, such as immersion, flow, affect and, challenge, were assessed experimentally. The gaming experience was measured relatively by subjectively comparing user reactions across two sessions, one using a conventional board game and another using a digital tabletop version of the same game. Our results indicate that senior citizens found the tabletop version of the game to be more immersive and absorbing. We also discuss some implications to tabletop game design that can be deduced from the qualitative feedback provided by our participants.

Categories and Subject Descriptors

H.5.2 [Information Interfaces and Presentation]: User Interfaces – *user centered design, prototyping, evaluation/methodology*

General Terms

Design, Experimentation, Human Factors

Keywords

Ethnography, focus group, fun, game, elderly, user-centered design, tabletop, board-games

1. INTRODUCTION

Gaming is widely experienced as a means for social interaction and enjoyment, and playing games can help to improve the quality of life, especially for the elderly who have ample leisure time. Elderly people today mostly play low-tech games such as card

games. They seem to be less inclined towards computer games than younger people are. Some contributing factors to this difference are obviously that they are less familiar with the games being offered and more afraid of the complexity involved in installing and playing the games. Another factor may however be that existing computer games simply deviate too much from the games that are familiar to the elderly, and that current games insufficiently take into account their real needs (or wishes). Therefore, in this paper, rather than designing a completely new game, we concentrate on augmenting a familiar game. This seems like the most straightforward way of establishing whether or not elderly people could be interested in computer games.

Increasingly, researchers are now focusing on designing social games, for example in [8], where several players can be involved in a co-located and collaborative way. Augmented tabletop gaming is one possible approach to allowing more players to participate and enjoy the flavor of traditional board games in a new setting. Combining board games with the rich media that are typically used within computer games, such as audio and computer graphics, allows to create new experiences. The game environment can also be made more challenging and more engaging by adapting dynamically to the game situation. Tangible interaction is a strong point of traditional board games and it helps to provide an enjoyable user experience for players. It can be incorporated in tabletop games by augmenting physical game elements with digital functionality. There are few examples of computer games that were especially developed for the elderly. One exception is a video game used for therapy, i.e., to help improve social and educational skills (see [7] for a detailed treatment). Although such games have obvious (functional) merits, they also have (social and usability) deficits that may influence end-user acceptance. For instance, PC games do not allow for personal face to face contact, an aspect that is crucial in traditional games. The complexity of the interfaces to many existing computer games may also create a threshold for their widespread acceptance. Elderly people are likely to be more sensitive than most to such aspects, so that they might also profit more from alternative approaches such as tangible interaction, on augmented tabletop surfaces.

Though there are a lot of games available today for children and adults, not much attention has been devoted up to now to games for senior citizens, especially not in the area of augmented tabletop gaming. One notable exception is ‘SharePic’, an

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application aimed at elderly for sharing digital photographs [3]. Examples of tangible tabletop games not aimed at elderly users are Weathergods [4] and Tankwar [9]. The aim of the project that we report here is to unveil some of the potential in designing senior-friendly tabletop games, where seniors are in the age range of 65-75 years.

2. GAME DESIGN PROCESS

2.1 Field study

In order to understand the target user group and the different kinds of games they play we visited a local community center for the elderly. A community center is a club-like gathering where people visit to socialize. We conducted two observation sessions, lasting one hour each. We observed which games the elderly played and how they behaved during game play. We noticed that all of them were playing card games (e.g., bank, poker), guessing games and memory games. The men also played billiards. The majority of the games played by the elderly had simple and uncomplicated rules. Most people also moved between groups of different people as they played different games. Another significant observation was that most of the activities of the elderly, game playing and otherwise, revolved around tables.

To develop a deeper understanding of our target users, we conducted short individual interview sessions with three senior citizens (2 Male and 1 Female, above 65 years old). One of the interview sessions was carried out at our laboratory and the other two at the home of the participants. From the interviews, we concluded that card games such as Black Jack are the most popular. Co-players in such games would usually be their cohorts, friends, peers, family members or sometimes even their grandchildren. They informed us that their game playing activity was most of the time social in nature. The elderly expressed that they did not like playing card games for money and tended to avoid gambling. This led us to ascertain that the primary motivation of the elderly for playing games was to attain leisure and fun, and to widen and maintain their social network.

2.2 Game Design and Rules

The game rules were purposely designed to be simple, intuitive and exciting for the senior citizens. From our earlier field studies, it was concluded that cards were a popular and frequently used game element. Moreover senior citizens would often play guessing games. Combining both elements we formulated the rules for our new board game, where guessing cards was one of the main characteristics.

We first constructed a (static) paper prototype of our game. Starting from this paper-based version of the game we also implemented a digital and dynamic version on a tabletop. This latter game was implemented on the Visual Interaction Platform (VIP) [1], a tabletop augmented reality platform (see Figure 1). The VIP framework was developed in house. VIP supports interaction through tangible checkers that are tracked in 2D by an infrared vision based system. Visual feedback is provided through a projected display. The differences between both versions of the game will be described after we have explained the game rules.

At the start of the game, each player occupies a corner of the board on which a city map with a rectangular grid is projected (in our case: the city of Amsterdam). The main objective of the game



Figure 1. The VIP gaming platform.

is to move individual checkers around on the game board, using the numeric value on a drawn card to decide how many squares on the grid to advance. This means that a player cannot move forward if a King, Queen or Jack is drawn. The purpose of the game is that players find their way across the city map. Players are instructed to cross three famous monuments in a specific order that is specified beforehand. The first monument is different for each individual player, the second monument is the same for the two players within a team and the third and final destination is identical for all players. Players sitting on opposite corners of the board are part of a team, while players sitting next to each other belong to different teams. Each player is provided with one quarter of a deck of playing cards. A turn constitutes a player picking a card from his individual deck, and the next player (from the opposite team) guessing the suit of the card. Player 1 is the first to draw a card. After his opponent has made his guess, the card is revealed to all. Depending on whether or not the opponent guesses correctly, he or the player whose turn it is can move his individual checker according to the numerical value on the card. A player can successfully cross the second and third monument only after his/her team member has reached the same monument. In such case, a player must wait for his/her partner, but the partner who is behind can use the numerical value on the card of his teammate to speed up his advance. The team for which both players reach the final monument first is declared the winning team.

The tracking technology in the digital tabletop version of the game allows for modifying the game in a number of ways. First, subsequent monuments can be rendered visible only after prior ones have been crossed. Each player has a set of menu buttons projected in his corner, and the game engine is informed of the successful crossing by a specific player of a monument by activating one of the menu buttons. This can be done by means of a tangible tile. Second, there are some hidden monuments in the digital game board which only pop up when a checker is on top of them. If this occurs, the player in question needs to go back to his/her location prior to the current turn, i.e., he loses his turn.

3. GAME EXPERIENCE EVALUATION

The game was evaluated with eight voluntary participants, five males and 3 females, aged 65 to 73. The two separate sessions were videotaped. The evaluation was conducted in our laboratory,



Figure 2. First Session, Second Phase (Tabletop game).

since the augmented tabletop system could not easily be moved. Prior to participating, each player signed a consent form. The goal of the evaluation was to measure the game experience of the elderly players. The validated Game Experience Questionnaire (GEQ) [6] was used for this purpose. The questionnaire comprises 34 items that need to be rated on a 5-point Likert scale. The items are categorized and averaged into seven subjective attributes, which are: Competence, Immersion, Flow, Annoyance, Challenge, Negative Affect and Positive Affect.

The evaluation was carried out in two phases (see Figure 2 and Figure 3). The participants first played either the paper or the tabletop version of the game. The order of playing either version of the game was balanced across the two sessions. The first phase ended when one of the teams won the game, after which all participants were asked to individually fill in the Game Experience Questionnaire (GEQ). After filling in the questionnaire they were interviewed by the researchers. The participants subsequently played the alternative version of the game, followed by filling in the GEQ questionnaire and being interviewed for the second time. The session was concluded by a short qualitative interview session.



Figure 3. Second Session, Second Phase (Paper game)

4. RESULTS AND DISCUSSION

Observation notes, video recordings and data extracted from the GEQ questionnaire was analyzed at the end of the experiment. With respect to the seven components of the GEQ mentioned

earlier, differences were observed in the ratings of Immersion and Flow. However caution must be exercised while interpreting our results as the subject pool was rather small.

All but one participant rated the tabletop version of our game as being more immersive than the paper version (see Figure 4). Immersion can be defined as the extent of involvement in a game [5]. One player phrased this as follows in the qualitative interview: "This game (tabletop version of the game) connects me more with itself and I feel I am more into the game".

Flow was unanimously rated as being higher in the tabletop version of our game (see Figure 4). Flow can be informally defined as an optimal state of enjoyment where players are completely absorbed in the game playing activity, as a balance is achieved between challenge and skill [10]. Similar results were mirrored in our observations and in the qualitative remarks of the players. A participant stated: "The colorful light and music adds a lot to the game (tabletop version) and I enjoy playing it more" and "In this game, things seem to be moving and changing, which is exciting". Considering that the tabletop version of the game was dynamic and animated in nature, the fact that it was rated as having more flow than the paper board game should come as no surprise. For instance the digital tabletop game afforded music, sounds, tangible interaction, hidden monuments, uncertainty etc; all aspects which led to the game being perceived as more dynamic. A participant was quick to point out: "It (tabletop version) was more challenging because there were more targets (hidden monuments) hence my paths became longer and tricky".

The quantitative data also indicated that the board game was found more challenging than the augmented game, although the difference just failed to reach statistical significance. This somewhat enigmatic result would require looking closer into how exactly participants interpreted challenge.

Overall the game was well received and appreciated, and the game rules were easily understood. Social interaction was clearly stimulated, as players not only interacted with their team members but also with their opponents. They assisted their team members in counting and moving their checkers and would keep a watchful eye on their opponents' every move. Similar results have been attained in the context of game playing with children [2].

From the evaluation, guessing was ascertained to be a key element of any engaging game for the elderly (the same holds for children [2]). During the interview session one participant mentioned: "Guessing was good, it seems we are playing two games at the same time: guessing and moving around and finding things on the map". Guessing featured regularly as one of the most popular elements of the game when participants were asked to rank game elements.

In compliance with the results from our initial field inquiry, the use of cards was widely appreciated by all players. Therefore to design a more engaging game for the elderly, it is advisable to incorporate cards as part of the game playing process. This renders the rules easier to follow. One quote from a participant substantiates this finding: "There are more choices in cards. We can see cards, shuffle them, rearrange them and then ask the opponent to guess".

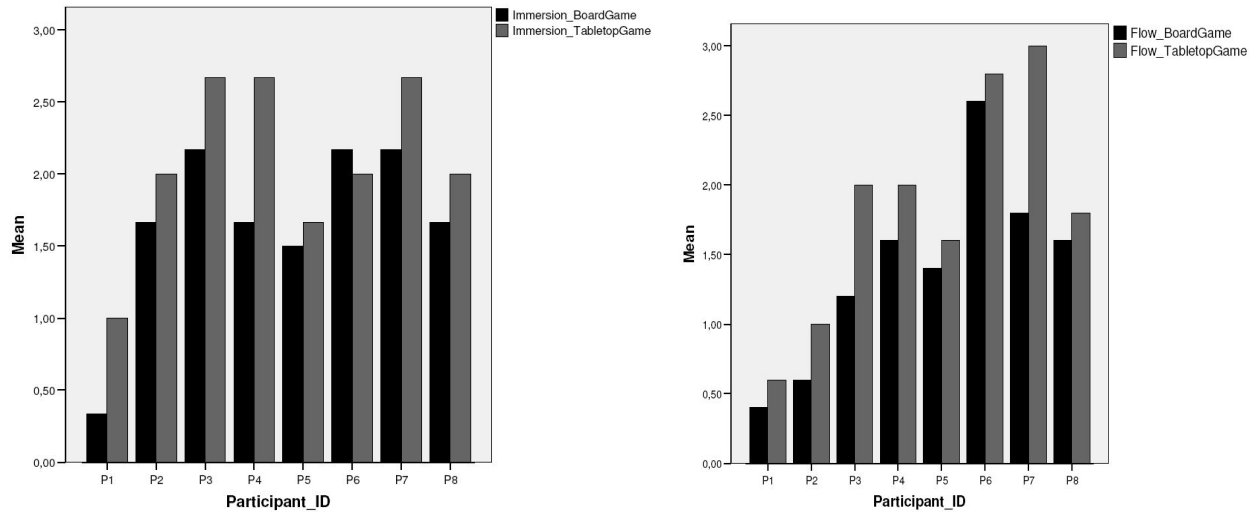


Figure 4. Ratings for Immersion and Flow per participant and per game version

In terms of game customization, the elderly remarked that flexibility of any game and its rules is very important. For example, if there are not enough players to complete the game, the game should still be playable. Similarly, the elderly wanted to modify the rule that Player 1 would always start the game. They suggested having an extra card guessing round before the game would commence in order to determine who will have the first turn.

Generally all players expressed a strong liking for tabletop games. From the two sessions it was concluded that multimedia is an integral component of tabletop games, as participants highlighted the absence of music, feedback sound and movement in the paper based version of our game. The participants did not report any interaction problems. However, an important issue for them was regarding the portability of a tabletop game as they stated that the research prototype was probably too big for their home. They wished to have a much more portable version of the same game.

5. CONCLUSION

In our research, we have compared both digital and static version of a tabletop game with the elderly. The former was generally rated to be as more immersive and engaging by the participants. In addition, our study reveals two important findings. Firstly, the game playing experience of the elderly can be enhanced by digital tabletop games, as technology is latent in them and hence dynamic game behavior can be incorporated, leading to easy interaction. Secondly, adaptive multimedia plays an important role when designing an engaging and enjoyable tabletop game for the elderly. As a direct and logical extension of our current research we will carry out further game evaluations with more participants in a longitudinal manner. It may well be the case that the results related to immersion and flow would be different when the elderly play the same game multiple times for a longer period.

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