Investigating Gamification for Seniors Aged 75+

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ABSTRACT

Gamification, the use of game elements in non-game contexts, has been successfully used to motivate people to reach their goals more efficiently or turn unpleasant tasks into fun ones. However, most gamified systems are conceptualized for a younger audience and do not account for age-specific changes in the motivation to play or the perception of game elements. To inform the design of gamified applications targeting elderly people (aged 75+), we investigated their gaming experiences, what affects them positively while playing and their attitudes towards the most commonly used game elements. We report findings from semi-structured interviews and a storyboard-based game element assessment (N=18, mean age=84.61), indicating that the main motivation to play is socializing, that participants avoid competition and prefer collaboration and care-taking as well as that badges and points are considered meaningless and provide a level of visibility that puts participants under pressure.

ACM Classification Keywords

H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous

Author Keywords

Older adults; game elements; interviews

INTRODUCTION

Gamification, the use of game elements in non-game contexts [7], has been frequently used as a motivator, e.g. to help people to reach their goals [28], to make unpleasant tasks fun [1] or to engage users in sustainability projects [19]. However, most of those systems do not account for age-related changes [17] and are designed for a young audience [28], even though there might be a huge potential in designing gamified systems supporting seniors: besides the fact that playing digital games was shown to be associated with successful aging [21], gamified systems may help seniors to remain physically, cognitively and socially active [9], which has positive effects on health and well-being [18]. This is further enhanced by the demographic transition leading to a drastic increase
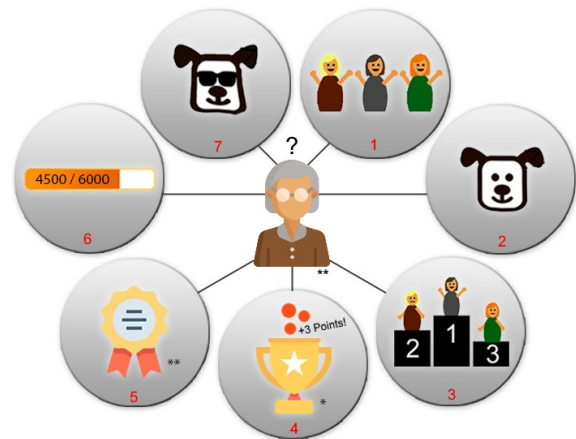
* Icon made by Vectors Market from www.flaticon.com
** Icon made by Freepik from www.flaticon.com

Figure 1. Stylized, frequently used, game elements in gamified systems (collaboration, virtual characters, leaderboards, points, badges, progress bars, customization (from 1-7))

of the group of seniors in the near future [8], implying that a rapidly growing number of people can benefit from research in this domain.

Elderly people are most often not used to game mechanics applied in digital games and might have different assumptions [10], which makes it essential to account for their experience with games, their sources of fun as well as any physical or mental limitations in order to conceptualize a successful and suitable gamified intervention. Moreover, goals and priorities differ between younger and older people [13] which might have an impact on what motivates or affects seniors and what is considered to be fun while playing. Past research explored the motivations of older adults to play [2, 6, 27], the design space of exergames targeting seniors [3, 10], issues related to the accessibility of games [10, 15] and exercise motivations of older adults to inform the design of technologies supporting physical activity [16, 26] revealing that older adults have specific needs regarding all these aspects. However, there is a lack of research targeting motivations of seniors (aged 75+) to play games, their perception of single game elements and the role of social factors for them while playing games.

In this paper, we contribute to the aforementioned points by investigating game experiences of seniors, what motivates and affects them positively when playing, social aspects and how certain game elements are perceived in order to inform the design of gamified interventions for seniors.

RELATED WORK

The perception of digital games for older adults as well as their motivations to play have been researched in different domains. We summarize core findings from related work and discuss their implications for and differences to our work.

Older Adults' Motivations to Play

De Schutter et al. [6] conclude that a playful activity is considered meaningful if it fosters connectedness, cultivation and contribution. Interestingly, playing multiplayer games was rare among the participants, even though connectedness was one core factor for meaning. Similarly, Nap et al. [23] found that staying in touch with society and escapism are strong motivations to play. In line with [6], there was a strong indication that participants prefer solitary over multiplayer play, even though they appreciate socialization in general. As potential reasons, the authors mention the increased fear of failure seniors have and the unwillingness to be dependent on other players and their availability. Furthermore, Birk et al. [2] showed that motivations to play change with increasing age from focusing on performance towards focusing on completion, choice, and enjoyment (which is, for example, manifested by preferring casual over performance-related games). This is explainable by older adults focusing on goals supporting emotional stability and social relationships rather than striving to learn new skills.

Encouraging Older Adults Through Technology

Kappen et al. [16] emphasize the need to consider the life stage of older adults without exploiting fears, to explore ways to provide meaningful and engaging feedback to the users as well as to support socialization around physical activity. The authors note that social sharing needs to be used carefully as some participants reported feelings of self-consciousness when confronted with persons who are more active than themselves. Results from Romero et al. [26] show the fear of elderly people for being stigmatized when using technologies that emphasize their need for help. However, using new ways of interaction may raise acceptance issues and lead to seniors rejecting the technology. Therefore, technologies should support familiarity and promote participation. Another important aspect to design playful systems encouraging physical and social activity is mutually using social (sharing of activities) and physical (monitoring one's own activities) motivators.

Implications and Differences

Older gamers play games to relax and have fun [23] and value choice, enjoyment [2] and meaningful play, i.e. they appreciate social interaction, teaching or learning and contributing to society [6]. We elaborate further on this (**RQ1**) and aim to elicit game elements to satisfy the need for purpose and meaning as this link is currently missing. Interestingly, even though social interaction was shown to be a core motivation to play in most of the presented papers [6, 16, 23, 26], older gamers strongly indicated a dislike of multiplayer games [6, 23]. To get more insights about this, we investigate fears and motivations related to social game elements (**RQ2**). Related to this, we want to explore the perception of most commonly used game elements [28] (**RQ3**). Worthwile to mention is also that the age at which participants were considered to be "elderly" is reasonably lower than in our sample: 45 years in [6], 50 years in [16], 55 years in [2] and 65 years in [23, 26]. For the other presented papers the minimum age was either not reported or there was no user study conducted.

STUDY

We investigate the following research questions ("RQ"), which are based on the findings from related work:

RQ1: *Reasons for playing games:* What are underlying factors that motivate seniors to play games?

RQ2: *Social play:* What social game elements are suitable for seniors? What do they fear or appreciate in competitive/cooperative settings?

RQ3: *Perception of game elements:* How are frequently used game elements perceived by seniors?

Procedure and Method

We recruited participants from nursing homes and participants living on their own. To ensure that they do not suffer from mental diseases, we consulted the nursing management. The study started with a short questionnaire covering demographical data. A semi-structured interview followed to learn more about their gaming experience and their motivation for playing games. The semi-structured interviews were directly transcribed and were conducted in face-to-face conversations with the participants in separate rooms (in the nursing homes) or in participants' apartments (for those living on their own). We followed a directed content analysis approach [14], i.e. we went through the transcripts to find themes related to each of the RQs (e.g. themes for **RQ1** included "socializing", "watch others play", and "cognitive benefits"). We then counted for each theme how many participants mentioned it and exemplary reported statements of participants related to the theme [5]. All questions can be found in the supplementary materials.

Afterwards, we adapted the procedure of Orji et al. [24]: participants were shown seven storyboards, each explaining one game element in the scenario *"Motivate yourself to go for a walk"*. We decided to use a concrete scenario since context is crucial for a proper imagination of game concepts among older adults [26]. The scenario was chosen based on a literature review of persuasive systems [12] showing that a huge majority are conceptualized in the exercise domain. For the scenario to be relevant, we ensured that all participants were able to walk on their own. We also limited the amount of storyboards so as not to overwhelm them (cf. [29]) and chose the game elements points, badges, virtual characters, unlockables, competition, collaboration and progress bars, as they are frequently used [28]. For every storyboard, we asked questions like *"What is awarded to the person on the storyboard?"*, *"What does the person on the storyboard need to do to get the reward?"* to make sure that the participants understood the underlying game elements. We then assessed for each game element whether it is considered to be motivational using 5-point Likert scales. To improve older participants' abilities to respond adequately [29] and to get insights about reasons why participants like or dislike different elements, we discussed
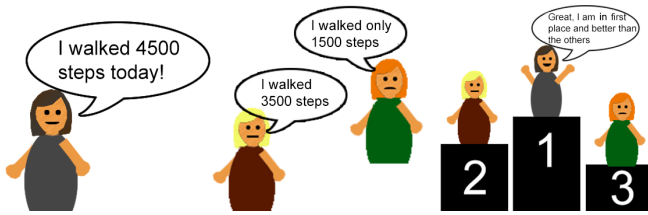
Figure 2. The translated storyboard showing the concept of competition

their decisions in a semi-structured way. Exemplary, the storyboard for "competition" is shown in Figure 2. All other storyboards can be found in the supplementary materials. The study was approved by our Ethical Review Board[1].

Results and interpretation

18 German participants took part in the study (10 female, 8 male – 13 living in nursing homes and 5 living on their own) aged 84.61 years on average (Mdn=86, Min=75, Max=93). They reported not to be familiar with technology (M=1.5, SD=1.01, Mdn=1) but agreed to being interested in accumulating more experience with technology (M=3.83, SD=1.12, Mdn=4). In addition, participants reported playing parlor games multiple times a week (M=3.72, SD=0.80, Mdn=4) but never play video games (M=1.39, SD=0.83, Mdn=1).

RQ1: *Reasons for playing games*

All participants emphasized to value the time spent playing: *"After playing games I have the feeling of accomplishment, that time was not wasted"*[2] **(P3)**. Even those that do not play regularly stated that this is mostly because they do not have people to play with: *"When my children were younger we used to have a whole cupboard full of games and played really a lot. Today I don't have people to play with. [...] I would definitely like to play more games again"* **(P16)**.

The main reason to play (mentioned by all), is socializing with others (*"In first place we meet to communicate. Playing games supports this by inducing a good mood"* **(P14)**). They also reported seeing games as a starter for conversations (*"The Bingo evenings here helped me to get in touch with other seniors living here"* **(P2)**). We furthermore found evidence that elderly people have fun watching others play and use the occasion to get in touch with them (reported by 5): *"Sometimes I just sit there and watch others playing. It is fun to see their reactions and it offers me the opportunity to talk to them"* **(P9)**. Despite socializing, 12 participants stated to value the perceived cognitive benefits that arise from playing games (*"A nice side effect of playing games is that I keep mentally fit"* **(P10)**).

RQ2: *Social play*

Most participants (16) reported not to be driven by winning the game in first place but instead enjoy spending time with others: *"It is not about winning at all, it's about spending time together"* **(P3)**. While for 6 participants winning does not matter at all, 10 participants stated that they also like to win, but that is not most important: *"The main reason [to play] for me is*

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to avoid being alone and enjoy time with others. However, winning a game is also nice sometimes" **(P10)**. We also found that nearly all participants (17) prefer collaborating: *"We sometimes do teamwork when playing Skip-Bo. [...] Winning as a team makes me much happier than winning on my own"* **(P6)**. Since Skip-Bo is a competitive game, this statement underlines the strive for collaboration even more. In addition, the aspect of taking care of others was mentioned by almost all (17). They indicated to have a better experience when all players are satisfied: *"It is not too much about winning, it is more about ensuring everybody has a good time"* **(P9)**.

15 participants reported that they were more inclined to competition at younger ages: *"When I was young I was a swimmer and very ambitious [...]. Today I don't want to compete against others, those times are over"* **(P5)**. In addition, there is less pressure to win a game and a more relaxed atmosphere during play: *"I think what has changed is that we don't take things too seriously when playing"* **(P4)**. A majority (14) of participants stated that they value social contacts and communication with others much more than in their younger years: *"Once you are old and live alone you realize that having people around you is the most valuable thing you can have"* **(P18)**.

RQ3: *Perception of game elements*

Considering the storyboards representing different game elements, participants rated both collaboration, i.e. working as a team to reach a goal together, and caring for a virtual character (we showed them a virtual dog), i.e. reaching a goal to make a virtual character happy, to be most motivational (see Table 1). When discussing what participants like about collaboration, reasons were related to statements mentioned in the interview. In addition, most of the participants (10) reported that collaboration includes all players when winning a game, regardless of their abilities, which is especially important at older ages: *"When collaborating, those that are not as fit as others also participate in winning the game, which is important as age brings disabilities that you cannot control. Being confronted with others reaching scores you will never be able to reach because of your disabilities is very demotivating"* **(P5)**. 12 participants reported that the virtual character provides a meaningful incentive for them, since they felt responsible for it: *"I would definitely do my best to make it [the dog] feel good"* **(P1)**. **P15** has some reservations and remarks that the character should not try to imitate a real pet too much, but should *"look like in a cartoon for example"* to be more authentic.

Customizing the virtual character, i.e. collecting/unlocking gifts for it, was considered to be slightly motivational. 8 participants liked this idea as they perceived it as a way to care for it, but on the other side four of them reported that the motivational impact strongly depends on the gift itself (*"Of course I would like to collect gifts or things for it, but I really need to have the feeling that the gift makes it happy and that the gift is suitable for it"* **(P16)**) and that they like to be able to decide what kind of gift is given to their virtual character (*"I want to be able to decide what gift is given to my pet [...] just like in real life I don't want to give generic presents, they need to be personal"* **(P6)**). Seeing the current progress towards a goal was considered neutral regarding its motivational effect.

Game element	M	STD	Mdn
Collaboration	4.22	0.71	4
Virtual Characters	4.17	1.01	4
Unlockables/ Customization	3.39	0.89	3.5
Progress Bars	3.39	0.68	3
Badges	1.67	0.82	1.5
Points	1.56	0.83	1
Competition	1.44	0.60	1

Table 1. Perceived motivational effect of game elements, rated using 5-point Likert scales.

Asked for reasons, participants most of the time appreciated seeing their current progress towards a goal, but also reported that they are afraid not to be able to reach the goal, which would make them feel discouraged or sad.

Interestingly, points, badges and leaderboards were negatively perceived (see Table 1). Participants (14) stated that they do not see the benefit of earning points or emphasized that they miss the feeling of reaching something that is meaningful: *"I don't have the feeling of having reached something that has value. I don't see the benefit of collecting points"* **(P7)**. Concerning badges, they had similar concerns, with 8 participants that additionally disliked the visibility badges provide: *"I don't want to show these badges to anyone, I don't like putting myself in the foreground"* **(P3)**, *"Having those badges would put me under pressure. I would have the feeling that others expect me to perform even better"* **(P12)**.

The competitive aspect of leaderboards was criticized by all of our participants, stating that they prefer playing for fun and leisure and do not want to make other players feel sad. Digging deeper into that, we also found that a reason to avoid competition comes from a fear of failure: *"I am afraid that people will think I am not fit anymore"* **(P16)**. **P15** adds that reasons or explanations for failures changed compared to when he was younger: *"When I lost a competition at a younger age, there were various reasons [...] you just had a bad day or something. When I fail today, people often attribute this to my age which is quite frustrating."* Participants additionally often stated being tired of competition: *"I don't want to compete against others, I had enough competition in my life"* **(P1)**.

Discussion and Limitations
We found that besides leisure and fun, socializing is a core motivator for participants to play games. This may come from the demand to socialize that was found to be higher among seniors [4]. We also found that collaboration and care-taking are motivating factors to reach certain goals, which may be explainable through research done by Cornwell et al. [4] showing that age is positively related with socializing and volunteering. Another explanation for this might be related to the fact that a huge majority of participants were recruited from nursing homes, as this might affect participants' attitude towards collaboration and social aspects during play.

Points, badges and leaderboards, which are widely used in gamified interventions [28], are negatively perceived by the participants. Concerning points, the main reason for the low motivational influence on elderly people was found to be the lack of value, which is explainable by findings from [30]

and [22], showing that elderly people are more inclined to value meaningfulness. Besides that, badges were often reported to harm motivation as they provide a certain level of visibility, i.e. participants complained that badges put them in focus. A potential explanation for this might be lower self-esteem among elderly people: Robins et al. [25] investigated self-esteem during the life span and found that self-esteem sharply decreases in old age. Keeping in mind that elderly people like collaborating and care-taking, the low motivational effect of leaderboards is not very surprising. Reasons include the fear of failing, the fear of making other players feel sad and of compromising harmony or starting arguments.

Findings related to the game elements have two limitations: First, they were not based on interventions in which these game elements were applied but on subjective assessments of the participants. Second, we used only one specific context and did not investigate the game elements in other contexts as well. Addressing the first limitation, we decided to use storyboards over a software prototype due to similar reasons as mentioned in [24]: To avoid inducing confounding variables (visual attractiveness of the prototype, usability issues, issues related to the lack of experience with technology, concrete implementation details) as well as to provide a common visual language that is easier to understand and does not involve game- or technology-specific knowledge. Concerning the second limitation, we decided to use only one scenario so as not to overwhelm participants (which was shown to be especially important for seniors [29]) and because research exists indicating that the perception of single game elements does not significantly change between different scenarios [20]. Participants' little to no experience with digital games is another limitation which may have an impact on the transferability of our findings to digital games. However, low experience with digital games is very common in this age group [11]. Moreover, the design of the storyboards themselves may have also had an effect on the perception of the game elements, which is why we attached them as supplementary material.

CONCLUSION
Although seniors could benefit from gamified systems [9], these mostly are designed for a young audience [28]. To inform the design of such systems, we investigated game experience, reasons to play, social aspects and how popular game elements are perceived. We considered a notably older sample than previous work (aged 75+) and found that participants are experienced in playing analog games and that their main motivation to play is socializing. Moreover, we add to the body of knowledge that they avoid competition and strive for collaboration and care-taking to ensure all players enjoy the game equally and because they are afraid to fail. Badges and points are considered meaningless and provide a level of visibility that puts participants under pressure. On the other side, virtual characters are perceived as meaningful, as participants felt responsible for them.

Future work should validate findings from this paper in other contexts as well. Morever, concrete implementations of game elements (that were outlined in this paper) should be evaluated.

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