

When Gaming is not Suitable for Everyone: Playtesting Wii Games with Frail Elderly

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ABSTRACT

This paper discusses the accessibility of commercially available video games for frail elderly players by providing an exemplary focus group analysis of Wii Sports and Wii Fit mini games. Although recent research results show that engaging with games may have positive effects of the overall well-being of senior citizens, the results of playtesting sessions presented within this paper suggest that not all games are fully accessible to elderly players. While the average perceived playing experience reported in focus group discussions is very positive, observations during the playing sessions suggest a variety of problems ranging from low-level controller issues and the inability to proceed through menu structures to complex effects of demanding in-game challenges and inadequate player feedback. Concluding, we argue that commercial games are not suitable for frail elderly and designing for accessibility needs to go beyond providing simplistic interfaces: To address institutionalized elderly, specifically designed games are necessary to provide a positive gaming experience.

Categories and Subject Descriptors

H.5.m [Information Interfaces and Presentation (e.g., HCI)]: Miscellaneous; K.4.2 [Computers and Society]: Social Issues – *Assistive technologies for people with disabilities, Handicapped persons/special needs*; K.8.0 [Personal Computing]: General - Games.

General Terms

Measurement, Design, Experimentation, Human Factors.

Keywords

Focus Groups, Frail Elderly, Game Usability, Accessibility, Player Experience, Silver Gaming

1. INTRODUCTION

Recent case studies report various positive effects of playing

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games on frail elderly persons, and the installment of Nintendo Wii consoles in nursing homes is repeatedly mentioned as a means of encouraging senior citizens to engage in games, interact with peers and remain physically active [8], [15]. However, the issue of game accessibility is only mentioned by few studies [10], [12], or research addresses active elderly players [4], [6], [10], [11]. Hence, psychological effects are examined extensively, but little information is provided regarding elderly users' interaction with such games. Additional research results examining the needs of elderly audiences highlight the importance of accounting for the player's abilities when designing digital games [3]. Visual and hearing impairments, sensomotor deficits including decrements in fine motor skills as well as posture and gait are mentioned as prevalent age-related changes among senior citizens [2], [7]. Furthermore, age-related diseases are prominent among frail elderly and may cause severe cognitive and physical impairments [2]. However, commercially available games are seldom designed for accessibility, and it is assumed that despite their casual nature, many Wii games are not suitable for elderly players.

Therefore, this paper aims to examine the suitability of the two Wii games Wii Fit and Wii Sports with a focus on the accessibility of input devices and the resulting player experience. Furthermore, the feasibility of casual game concepts is analyzed as a basis for further considerations regarding the development of usable games for elderly players. The following section describes how playtesting sessions featuring different games for Nintendo's Wii console were introduced to frail elderly players living at a full-care nursing home and summarizes the most important observations. Furthermore, the results of complementary focus group discussions are discussed with a focus on game development for frail elderly.

2. PLAYTESTING SESSIONS

Previous research reports that focus groups have successfully been installed to discuss digital games with elderly persons [1], [10], [13]. Furthermore, case studies have shown that playtesting games with senior citizens may provide valuable information about their interactions with the game as well as their gaming experience [9]. In this paper, both methodologies were combined in order to introduce games to elderly living at full-care nursing homes.

2.1 Description of the Group

A group of ten senior citizens living in a full-care nursing home in Duisburg, Germany was involved in playtesting Wii games and the focus group interview. The average age was 82 ranging from 67 to 91 with a large majority of people in their mid-eighties. All

participants suffered from severe age-related impairments, especially decrements in mobility and sensomotor skills and were dependent on assistive devices when walking. Furthermore, three participants suffered from severe cognitive decline (e.g. Alzheimer's disease) and its impact on their interaction with the environment. Although most of the members of the focus group enjoyed playing bingo, card games or simple board games such as ludo, none of the participants had prior experience playing games.

2.2 Procedure and Setup

Because none of the members of the focus group had previous experience playing video games, four gaming sessions were held over the period of one month prior to the focus group discussions at the respective nursing home. Each session lasted about two hours with two groups of five persons engaging in play for an hour. Through these sessions, participants had the opportunity of testing different video games and gaining personal experience regarding the use of entertainment systems. Furthermore, the sessions provided information on the use of off-the-shelf gaming systems by frail elderly users.

Games featured in the introductory sessions included Nintendo Wii Sports and Sports and Wii Fit. As for Wii Sports, tennis and bowling were selected as they seemed to be the most accessible games with a certain degree of realism and possible connections to participants' past experiences. Both of the games are played with the Wii Remote only, the movements necessary to play are similar to real-world actions such as lifting the bat to hit the ball or throwing a bowl. Additionally, three Wii Fit balance games which are controlled using the Nintendo Wii Balance Board were included: Soccer heading, ski slalom and penguin slide. In soccer heading, the player has to return balls by shifting his weight left or right on the Balance Board. Ski slalom features a downhill track and the player is required to pass different checkpoints by weight shifts to the front, left or right. Finally, penguin slide is a mini game in which a flow has to be moved up or down which is also realized through left or right weight shifts on the board.

2.3 General Observations

Although all of the focus group members claimed that they equally enjoyed playing both Wii Sports and Wii Fit, a number of problems occurred during the gaming sessions which can generally be attributed to a lack of gaming experience and age-related impairments. The following section presents a detailed analysis of the most important issues which include valuable information for the design of a senior-friendly digital game using Nintendo's haptic input devices. On a general level, none of the participants of the introductory gaming sessions was able to independently navigate through the menu structures provided by both games. Although Nintendo follows a simplistic approach towards interface design menus appeared to be too colorful and thus distracting. Additionally, small fonts frequently resulted in reading difficulties although the games were presented on a relatively large projector image. Finally, participants were unable to cope with the complexity of menu structures as each menu screen confronts the player with a variety of alternative options.

2.3.1 Controller Issues

On a general level, all participants were well able to use the Nintendo Wii Remote and Balance Board as game controllers based on the general layout and robustness of the devices. However, certain details of the implementation seemed to cause difficulties among the focus group.

First, playing Wii Fit using the Balance Board was problematic for most of the participants because their physical condition did not allow them to stand independently for a longer period or they were dependent on assistive devices. Therefore, using the board while sitting on a chair presented a valuable alternative for many senior users (cf. Figure 1). However, it was not possible to properly run calibration routines which are necessary to use the board prior to game start, and due to movement restrictions caused by the sitting position not all of the games were fully accessible to the players. Second, while starting and playing Wii Sports games using the Wii Remote, players frequently pressed buttons (e.g. plus or minus buttons) by accident, and responding to resulting popup windows or messages was difficult for persons suffering from decrements in fine motor skills. Nevertheless, these issues can easily be addressed by implementing a senior-friendly controller layout which blocks unnecessary buttons of the Wii Remote during game play and accounts for calibration requirements and weight differences if players decide to participate in play using the Balance Board while sitting. These issues are especially important as they hinder the player's easy entry to play and may hence result in elderly quickly losing interest in digital games due to these interface-related problems.

Furthermore, while playing Wii Sports users were often confronted with complex input sequences which have to be performed in order to trigger important procedures. Although the Wii Remote offers the possibility of implementing natural input gestures which could easily be performed by most group members, the combination of haptic and button input was especially challenging for senior citizens. This issue was very prominent while the group engaged in a match of Wii Sports bowling: While all of the players had gained a solid understanding of the rules of the game throughout the playing sessions and were well able to perform the necessary throwing gesture while holding the remote, the game requires players to press the B button in order to let go of the ball. Because this final step of the input sequence is time sensitive, many users failed to coordinate their movements appropriately and required extensive assistance to be able to engage in play.



Figure 1. Elderly players engaged in digital games.

2.3.1.1 Gameplay Issues

During game play, several situations were observed which appeared to cause difficulties for frail elderly players. The most prominent issue with both Wii Fit and Wii Sports was caused by

the necessity of immediate player reactions on the one hand and the complexity of input options available to users in order to participate in play on the other hand. Because many in-game situations required the players to react quickly to master the challenges of the game, age-related cognitive and sensorimotor impairments had a large impact on individual player performance. Elderly users showed generally slow and few precise attempts at responding to critical in-game situations, e.g. while participating in Wii Sports tennis, a game which requires the player to shake the Wii Remote in order to play the ball during a limited time frame. Similar problems were observed while the focus group tested Wii Fit balance games such as ski slalom or penguin slide, which require the player to quickly shift his weight on the Balance Board to succeed in the game.

Because all members of the focus group scored lower results than the average player, scoring info regarding the player's personal performance presented at the end of the game also caused problems. Results were often declared to be insufficient although some of the players performed extraordinary well considering their cognitive and physical abilities and comparing their results to average scores of other group members. Unfortunately, none of the games offered the possibility of adjusting threshold values for player feedback which caused some of the focus group members to express a feeling of personal failure.

Another issue for senior players which was prominent among many games was their length. Although the total duration of games such as Wii Fit soccer heading or Wii Sports tennis rarely lasts more than a few minutes, these and similar games constantly confront the player with new challenges (e.g. soccer balls which have to be headed back) while completely avoiding recoveries which would allow the player to readjust the controller and regain focus on the game. Consequently, individual performances of many members of the focus group dropped towards the end of the respective game as a result of cognitive and physical exhaustion while it was obvious that players would have benefited from a generally slower pacing of the game.

2.4 Focus Group Discussions

Focus group discussions were conducted among two groups consisting of five participants of the gaming sessions each and were accompanied by nursing staff. Questions discussed among the group included the players' personal gaming experiences, their ideas for a game concept aimed at an elderly audience as well as feedback regarding specific game features and the users' preferences and abilities.

2.4.1 Player Feedback

Although observations revealed that most participants of the focus group had substantial problems regarding interaction paradigms and complex game mechanics, statements within both groups suggest that playing digital games was an enjoyable pastime and presented a valuable alternative to watching TV or playing board games: *"I liked that I could be active again, to be able to do something all by myself."* – *"This was fun, although I never thought I would play computer games."*

During the discussion, all players reported a very positive gaming experience and only reported difficulties when specifically asked about negative experiences or difficult situations. Basically, the results support the observations made during the gaming sessions. Participants claimed that they had difficulties navigating through the menu structures due to complexity and the rich graphical design which created problems for elderly users because they

were often unable to distinguish between relevant and obsolete information: *"There were so many different things on the screen. I have never used anything like those games and therefore it was difficult for me to make decisions."*

Furthermore, both groups agreed that the extensive use of gaming language and largely accepted conventions (e.g. referring to a button by listing its name instead of the position) created additional difficulties because none of the participants had prior experience with similar systems: *"All of this is new to us, so we need more explanations, for instance on how to use the remote."*

Additionally, the focus group stated that the necessity of complex input sequences to participate in Wii Sports games was perceived as one of the major disadvantages of Wii Sports games. The participants suggested relying on one type of input only while featuring a higher level of automation, e.g. offering a possibility of bowling without explicitly having to let go of the bowl. One participant stated: *"I never knew when the ball would drop, it would have been easier without pressing that button."*

Finally, the visual style of the game was criticized for being too distracting and colorful and thus keeping the player's attention from the core mechanics and main action of the game. All of the seniors agreed that fewer visual effects and a less colorful approach would have facilitated their entry into play and would have eased the impact of visual impairments: *"I had difficulties following the [tennis] ball because there were so many other things going on in the game."* – *"It wasn't easy to focus on playing, something more simplistic would be better for me."*

When questioned about activities that the participants of the focus group used to enjoy but were no longer able to participate in due to cognitive or physical restrictions, exploring the outside world - especially going for walks - was frequently named. Furthermore, many members of the group reported that they used to enjoy sports (e.g. tennis or soccer) but were no longer able to engage in physically challenging activities. Therefore, including one or more of these aspects in a game concept might offer the possibility of bringing up positive memories and the chance of virtually engaging in former hobbies [10].

All members of the focus group agreed that they especially enjoyed participating in games which allowed for the competition or cooperation between multiple players: *"I liked that we could all play together."* – *"Next time, I am going to beat [...] for sure."* Several participants underlined the importance of social interaction between the users and reported that results of their gaming sessions had been discussed outside the gaming sessions. On a side note, one woman playfully complained that after losing to a friend, she had been mocked by her during breakfast the next morning, which however got other inhabitants interested in the gaming sessions. Therefore, it seems appropriate to include both cooperative and competitive play in the game concepts aimed at elderly players.

2.4.2 Feedback of Nursing Staff

Members of the nursing staff who accompanied the gaming sessions highlighted the importance of easier interaction paradigms and a simplistic approach towards game design to facilitate play for healthy seniors on the one hand, and in order to be able to open gaming sessions to players with mild cognitive impairments on the other hand. On a general level, they underlined the importance of cognitive and physical stimulation for frail elderly persons and claimed that video games including mildly exertive elements might have a positive impact on seniors.

3. CONCLUSION AND FUTURE WORK

In this paper, the results of four focus group gaming sessions as well as the follow-up interviews were discussed. The most important takeaway is that frail elderly persons do enjoy engaging in digital games regardless of their lack of prior gaming experience and age-related impairments. Yet, observations made during the playing sessions and information gained during the focus group discussions show that neither Wii Fit nor Wii Sports are suitable for frail elderly players as they generally appear to be too complex and challenging for this target audience. Adjustments which are necessary to address these issues are manifold, and three major design opportunities were identified:

Provide a both visually adjustable and generally flexible user interface. The results of the playing sessions support the necessity of adjustments regarding the graphical user interface and the general visual style of games [7]. The sessions showed that both the Wii Remote and the Balance Board might represent suitable input devices when implemented with age-related impairments in mind: Even when seated in a wheelchair, participants were able to place their feet on the Balance Board. Likewise, using the Wii Remote as haptic input device was beneficial for players suffering from decrements in fine motor skills as the imitation of real-world gestures was practicable for a large majority of players.

Create adaptable game designs which scale according to the cognitive and physical abilities of your target audience. In many cases, it is not sufficient to provide an alternative input paradigm as the complexity of games also influences the player's overall ability of actively participating in play. Therefore, games specifically addressing frail elderly have to be developed to guarantee a certain degree of accessibility: This issue is not limited to the design of usable interfaces, but includes considerations regarding game mechanics and the overall game complexity, speed and pacing and the accuracy of player input. Also, it is important to keep in mind that in-game actions which are easy for the average player may overstrain frail elderly.

Do not try to design for all, address frail elderly players first. A user-centered design process is recommended to address specific requirements of senior audiences, and their heterogeneity requires adaptable games. It is important to highlight that these games are unlikely to appeal to a broader audience, instead of a "design for all"-approach, it seems appropriate to first design for the specific target group and then integrate additional audiences.

Apart from these recommendations, the aforementioned gap between personal experience and objective performance needs to be examined: Positive effects of games due to their novelty are likely to wear off, and interaction problems may become more prominent. Also, many participants of the playtesting sessions showed only small improvements over time, which suggests that the initial entry barrier was too high and that learning how to play is only possible within a limited scope. Another challenge which needs to be addressed by future work is testing games with persons suffering from cognitive impairments as they are often unable to voice feedback during group settings. In this context, observations may provide some information, yet additional means of obtaining subjective data have to be developed to further explore their gaming experience.

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