Intergenerational Play: Exploring the Needs of Children and Elderly

Julia Othlinghaus, Kathrin Gerling, Maic Masuch

Entertainment Computing Group, University of Duisburg-Essen

Abstract

Designers of intergenerational video games face distinctive challenges due to particularly diverse target audiences - many design principles and guidelines used for one target group cannot be applied to the other, and vice versa, because needs and cognitive or physical abilities of children, adults and senior citizens differ substantially. In this paper, we analyze characteristics of children and senior citizens to summarize similarities, and examine existing approaches towards intergenerational play to provide an overview of design opportunities to suit the needs of children and older adults.

1   Introduction

Different studies provide evidence that games can be a good platform for intergenerational interaction (Chiong, 2009). Play is common between grandparents and children and is crucial to the building of relationships (Vetere et al, 2009). Regardless of age and other characteristics, play is a way to learn about oneself as well as other people, and provides a joyful experience. Intergenerational games enhance the social bonding between children and older adults and provide a gateway to overcome social distances (Al Mahmud et al, 2010). It offers opportunities and benefits for both children and elderly people: Apart from the enjoyment of gathering and interacting, they learn from each other and gain cognitive, social, physical and emotional profits (Davis et al, 2002).

However, intergenerational play has rarely been addressed in terms of game design and game accessibility. In this paper, we provide an analysis of the special needs of children and senior citizens regarding digital games, as well as an overview of possible design opportunities.

2   Related Work

Voida & Greenberg (2009) conducted a multi-generational study of co-located group console gaming in which they examined the intergenerational gaming practices of four generations and the roles that gamers of different generations take on when playing together in groups. The observations suggest that intergenerational interactions surrounding console gaming can provide developmental benefits crucial to individual well-being. Younger gamers rather took on leadership roles in gameplay while all generations adapted player roles more flexibly than in traditional play settings. Based on their findings, Voida and Greenberg developed design recommendations for intergenerational interactions:

- Designing to support a breadth of generational involvement in gameplay
- Designing to include intermediary generations
- Designing to support transitions between roles

Chiong (2009) summarizes additional guidelines for creating intergenerational video games:

- Mobility and casualness
- Build on natural learning opportunities
- Teach or model the practice of scaffolding
- Stay domain-free
- Allow asymmetrical/asynchronous play
- Create a socially desirable reward system

Furthermore, different case studies have been implemented to foster intergenerational play. *Age Invaders* (Khoo et al, 2005) is an interactive mixed-reality game based on the traditional arcade game "Space Invaders", that allows elderly people to play together in a physical media space with grandchildren, while parents can participate through the web as virtual players. The game balances physical ability across generations in the way that older players have more time to react to slow rockets fired by the younger players while these younger players have to react to much faster rockets launched by their older opponents. *Curball* (Kern et al, 2006) is a collaborative game based on a combination of Curling and Bowling which makes use of tangible devices to foster intergenerational play. In this game, the senior player plays with a physical ball while the child's task is to move obstacles with the help of the senior's commands. Vetere et al. (2006) developed a technological, distributed approach based on the traditional game of *hide-and-seek* that tries to re-connect intergenerational relatives and allows them to play together although they are not co-located. The game makes use of several bluetooth markers at the homes of the grandparent and the grandchild. One player takes on the role of the hider, while the other one takes on the role of the seeker. Thereby, the game supports intergenerational play at a distance. *Collage* (Vetere et al, 2009) is a medium for the exchange of everyday experiences (e.g. photographs, messages) and playful interaction between grandparents and their grandchildren. It consists of shared displays and uses mobile camera-phones as input devices, and a touch screen for synchronous interaction between the distributed parties.

3 Games for All: Needs of Children and Seniors

To create an enjoyable intergenerational gaming experience for children and grandparents, different cognitive and physical abilities as well as differences in gaming preferences have to be considered.

3.1 Cognitive and Physical Abilities

Cognitive and Physical Abilities of Elderly Persons

Previous work has addressed the impact of cognitive and physical abilities among elderly persons on the use of information technology from the perspective of HCI (Czaja & Lee, 2008) as well as digital game design (Ijsselsteijn et al, 2007). Czaja and Lee (2008) summarize the impact of aging on *cognitive processes*. Aging influences memory performance in certain situations, particularly the working memory seems to be affected by increasing age. Furthermore, an impact of attentional processes has been observed among senior citizens. Age influences *physical abilities* and is often associated with decrements in posture and gait, leading to a lack of balance and a higher risk of falls. Also, fine motor skills decrease during late life, which is particularly important when designing game interfaces for elderly players (Gerling & Masuch, 2011). Additionally, age-related diseases may further influence cognitive and physical abilities of older adults, ultimately affecting the ability of senior citizens to engage with digital games.

Cognitive and Physical Abilities of Children

Chiasson and Gutwin (2005) developed a catalogue of design principles for children based on an analysis of a wide range of research in the field of children's technology. Adams summarizes recommendations for game design with respect to children's development (Adams, 2010). Regarding their *cognitive development*, children might have problems to comprehend and remember instructions or might forget how to accomplish a certain task or specific actions; furthermore, they have difficulties with abstract concepts. Due to this fact, games should provide scaffolding and guidance. In addition, children are often impatient; therefore interface and gameplay should be as intuitive as possible, easy to learn and provide immediate feedback as well as frequent rewards. Children have the ability to solve riddles and perform difficult tasks, however these should not be too complex to reduce cognitive load. Children might have difficulties adapting to the rules and mechanics of the game but are good at playing make-believe and can directly immerge into a virtual situation. *Physical development* addresses the development of motor skills and coordination. Children's motor skills are not fully developed (especially hand-eye-coordination), which has to be taken into account when designing games for them. Young children may have difficulties using specific input controls or performing specific actions. Interactions provided by the game should thus be as simple as possible. Especially tangible devices encourage children to physically interact with their environment and become more involved in the interaction.

3.2   Gaming Preferences

Gaming Preferences of Elderly Persons

Since only few elderly people actively play digital games, only little research regarding their gaming preferences is available. Nap et al. (2009) examined gaming preferences of senior citizens and found that the elderly enjoy playing casual games, which offer an easy entry into play. Furthermore, results of participatory design sessions (De Schutter and Vanden Abeele, 2008) suggest that older adults prefer games that allow them to educate themselves, contribute to society and connect with others. Sports, gardening and music are frequent topics included in their game concepts. Sales statistics support the importance of meaningful games, suggesting that a large percentage of 'wellness games' designed to train body and mind are purchased and played by older adults (ESAC 2009).

Gaming Preferences of Children

The southwest media education research association (mpfs) regularly publishes KIM-studies, documenting the media habits of children aged six to thirteen in Germany. The most recent study conducted in 2010 also included information on children's gaming preferences. Findings show that the range of games played is wide. Children primarily like puzzle and dexterity games, racing and soccer games, complex simulations as well as action and strategy games. The most played games are FIFA, Super Mario, The Sims, Singstar, Mariokart, Pokémon, Harry Potter and Wii Sports.

3.3   Design Opportunities for Both Audiences

The comparison of the abilities and needs of children and elderly persons reveals several similarities. Children's skills are still developing, while those of elderly are beginning to decline; thus both target groups are characterized by changes occurring within relatively short time intervals. Both generations must contend with limited memory capacity and have problems focussing their attention. Therefore they have neither the ability nor the patience to deal with long instructions and need scaffolding and guidance in some way. The need for a simplistic interface is also true for both, as well as easy access and gameplay. Despite the number of similarities, there are also differences between the generations.s. Children are often more agile, have more experience with games and a more uninhibited approach towards dealing with technical devices. Elderly people might not be versed in playing digital games and not be familiar with controls, terms and rules. Research results suggest that many commercial games are not suitable for seniors (Gerling et al, 2010).

Regarding the gaming preferences of both generations, sports, music and meaningful play emerge as means of uniting children and elderly people. Chiong found that especially physical games engage both adults and children (Chiong, 2009). Generally, both generations prefer games that offer meaningful and appropriate content referring to everyday situations and age-related interests. Both audiences enjoy collaborative gaming and particularly like the social aspects of games. On the whole, both target groups are not homogenous in themselves: Individual characteristics and abilities differ dramatically amongst elderly people and large

differences can also be asserted amongst children of only one to two years in age difference. Nevertheless, both generations have special preconditions and dispositions that have to be taken into account when designing intergenerational games. Wherever relevant differences occur, needs-based measures and adjustments must be developed. These findings provide a foundation for further developments in different research fields: Beside the knowledge we gained in terms of the similarities and differences between the abilities and needs of children and elderly persons, we got an idea how to foster intergenerational play and also laid the basis for developing general guidelines for designing intergenerational games as well as genre creation and improvement to meet the interests of both audiences. A further goal could be to achieve general usability improvements in terms of developing gaming interfaces for multi focus groups.

4   Conclusion and Future Work

In this paper, characteristic features of children and elderly persons were examined in order to provide a theoretical foundation for the further exploration of intergenerational play addressing grandchildren and grandparents. The analysis shows that while both audiences are fairly heterogeneous, some similarities exist that might create a basis for intergenerational game design. Based on these results, design opportunities for intergenerational play were highlighted. Generally speaking, intergenerational play offers an interactive and joyful way to encourage the exchange of generations and to influence the health condition of all parties in a positive way. Based on the considerations presented within this paper, we plan to implement and to evaluate movement-based mini-games for children and elderly people. With the use of the Wii Balance Board and elements of dancing and music, we hope to provide a diversified and joyful experience for people of all ages to strengthen social bonding between different generations. The mini-games are planned to support cooperative and competitive gaming, while providing adjustable levels of difficulty and complexity to accommodate different target groups with diverse cognitive and physical abilities.

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Contact Information

Kathrin Gerling, M.Sc.
Entertainment Computing Group
University of Duisburg-Essen
Forsthausweg 2
D-47057 Duisburg

E-Mail: {kathrin.gerling, maic.masuch}@uni-due.de
WWW http://medieninformatik.uni-due.de