A Study on Interface Design of Serious Game for the Elderly

Ji-won Lee¹, Seong-jun Park²
¹² Dept of Game, Hoseo University,
20, Hoseo-ro 79 beon gil, Asan, Chungnam, South Korea
Ji-won Lee, gshark@nate.com
Seong-Jun Park, sjpark@hoseo.edu

Abstract. In this paper, screen layout importance suitable, the size of a text and an object, a way of configuring the color of sense of attention and time, psychology induction due to the color contrast for the elderly are proposed. The elderly are vulnerable to recognition and response for dynamic interface by physical aging. In addition, it's difficult for them to read, understand characters and recognize and apply a variety of objects. For this, effective graphic interface configuration is required. To this end, it suggested the configuration of the interface screen and a way of designing it from the perspective of design and color, clinical trials were conducted targeting 100 elderly people at Asan Medical Center in Seoul by implementing 'Rejuvenesce Village', serious game for the elderly using this. As a result, the compatibility of the interface design proposed and visual, auditory requirements were found.

Keywords: Serious Game, Elderly Game, IRB, GUI Design, Interface Design, Cognitive Training, Elderly Requirement

1 Introduction

A study on computer of serious game for the elderly was conducted focusing on physical medicine and rehabilitation. According to previous studies, computer games have advantages of having a positive impact on their physical, psychological treatment and motivation because of giving a variety of experience based on safety on the virtual space.[1,2]

A research on game design ways to induce users, especially elderly people's interest and concentration was conducted in many ways such as devices and graphics, system designs, etc.[3,4] Among game design ways to induce elderly people's interest and attention, graphic interface design can increase its functionality and effectiveness based on user's understanding and interest on the basis of cognitive approach and color psychological approach.

Therefore, in this study, we examined interface design to induce elder people's condition changes according to visual interface research and color use by physical aging and developed serious game 'Rejuvenesce Village' with the purpose of cognitive function activation. Clinical trials were conducted targeting 100 elderly
people at Asan Medical Center and the fit of the study on the proposed interface is investigated.

2 Related Research

2.1 Interface of serious game for the elderly

Interface includes acquisition and understanding, application of the information from the screen should be made in a short time. Especially, in the case of the elderly with degradation of vision and cognitive function, interface should be intuitive, simple, easy and fun. It should make the elder avoid confusion without inserting too much information, operate without prior learning or manual, immerse in the game and connect it easily, ultimately have fun in the process.

2.2 Graphical user interface accessibility

The information received from the eyes is perceived through sensory organs and the brain's mentation. Recognitive process contains all mental operations involved in acceptance and storage, process of information and sensation, perception, memory, thinking, learning, etc. are included. For example, in the process of recognizing the vision, if using appropriate images suitable for words to display icons and background images of the game interface, synergistic effects appear interacting with words and images.[5]

3 GUI design methods

3.1 Visual attention of the screen configuration

To examine visual attention of the screen configuration, screen configuration methods, contents and importance were analyzed targeting 25 kinds of computer games with a lot of dynamic interface. The screen was split to nine zones because many objects were inserted at the same time due to characteristics of serious game for the elderly.[Fig 1] As a result of analyzing the game screen configuration, its importance appeared in order of the middle, the bottom, the left. The bottom and the left except for the center of the screen has high concentration and these places are easy to acquire information. As the delivery of information is more or quick update is more required, the importance of information is higher, it's appropriate to take advantage of the left bottom and the center bottom. In addition, as the importance of information is higher like the left bottom, graphic is used, the upper right part is suitable for expressing
texts or quantifying.

Fig. 1. A study on screen configuration by game genre

3.2 Graphic User Interface

In order to look at the suitability of the physical expression of information provided to the elderly through a display monitor, it was studied due to interface design factors of Gestalt psychology mentioned earlier. To investigate text size suitable for the elderly, the suitability from 15 to 5 pt unit was examined. Considering presbyopia as a hypothesis, the font size more than 35 pt was expected to be appropriate, as a result, readability fell on characters less than 30 pt if the number of the sentence was more, it was difficult to understand the contents. In spatial aesthetics, it's good the space objects occupy is about 20% of the total space. So, the area of the object suitable for a 26-inch display is as follows:

4 Experiment and Analysis

Fig. 3. Clinical trials in Seoul Asan medical center

In this paper, clinical trials were conducted for 100 elderly people in Seoul Asan
medical center from July 2012 for about 5 months to investigate the interest and effectiveness which actual users felt about proposed game design methods. [Fig 3]

Table 1. Satisfaction on interface (unit: person, %)

<table>
<thead>
<tr>
<th>Div.</th>
<th>Item</th>
<th>Frequency</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Text Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suitable</td>
<td>99</td>
<td>99.0</td>
</tr>
<tr>
<td></td>
<td>Not Suitable</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Text Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Requirement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30pt</td>
<td>34</td>
<td>34.0</td>
</tr>
<tr>
<td></td>
<td>35pt</td>
<td>27</td>
<td>27.0</td>
</tr>
<tr>
<td></td>
<td>40pt</td>
<td>21</td>
<td>21.0</td>
</tr>
<tr>
<td></td>
<td>45pt</td>
<td>12</td>
<td>12.0</td>
</tr>
<tr>
<td></td>
<td>50pt</td>
<td>6</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>Voice Speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Requirement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>More slow</td>
<td>7</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td>Suitable</td>
<td>70</td>
<td>70.0</td>
</tr>
<tr>
<td></td>
<td>More fast</td>
<td>23</td>
<td>23.0</td>
</tr>
</tbody>
</table>

The 99% of the subjects responded font size was suitable now. Regarding font size to ask question by showing actual font size by point, it appeared in order of 30pt 34%, 35pt 27%, 40pt 21%, 45pt 12%, 50pt 6%. The 70% of the subjects said pace of speech in the game was now reasonable, but the 22% of them wanted to be faster. On the other hand, the 7% of them requested to be slower. [Table 1]

5 Conclusion

In this paper, methods for interface design of serious game for the elderly were suggested. The elderly need the interface configuration different from general computer games due to their physical and psychological characteristics. Therefore, in this paper, the interface screen configuration and design methods from the perspective of design, color are suggested, clinical trials were carried out targeting 100 elderly people in Seoul Asan medical center by implementing serious game for the elder, 'Rejuvenesce Village' to apply them. As the experimental results, a positive response of the compatibility for the proposed interface design methods and complementary part were found. As future research, a study on design methods for hearing and effective game application will be done.

References

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