The Animation Effect of Graphic Symbols on Target Detection

Ki-bum Song, M.A., Ji-yun Lee, M.A., & Yang-gyu Choi Ph.D.

Department of Speech Pathology, Daegu University, South Korea

Review of Literature

- Using AAC systems, these systems require high speed and accuracy in communication.
- Therefore, in design of AAC system, strategies for speedup serve as an important element.
- What is the way that can recognize the symbols which are presented on the display most quickly and accurately?
- Symbols based on movement are more efficient than static symbols in AAC users include the change in size, contrast and relative emphasis (Vinoth, & Krista, 2008).
- People prefer animation to static image.
- Animation is much more effective than static image in representing information (Chan Lin, 2000).
- However, Animation which disappears after momentary appearance can interfere with transfer of meaning (Hegarty, 2004).
- In most AAC systems, graphic symbol is used and research on animation is insignificant.
- Considering the situation which information should be exchanged quickly and accurately in communication, the comparison of graphic symbol and animation effect of graphic symbol has major significance.

Research Question

- Is there difference in reaction time between graphic symbols and animation symbols?
- Is there difference in error rate between graphic symbols and animation symbols?

Methods
Participants

- 64 participants divided into age groups: 34 College students (Mean age: 21.3) and 30 Preschool children and younger elementary school students (Mean age: 8.3).

- Screening: In the case of preschool students and younger elementary school students, only the children who are included in normal development age through Peabody Picture Vocabulary Test-Revised (PPVT-R, Dunn, 1981).

Instrument

1) Test of response rates

- Graphic symbol

- 16 graphic symbols: 14 Picture Communication symbols (PCS) (Johnson, 1981), PICSYMS (Carlson, 1985), and Makaton (Grove & Walker, 1990) symbols represent four emotions (happy, sad, afraid, angry).

- Production of animation symbol

- Professional illustrator produced animation symbols.

- Illustrator considered the characteristics of four emotional symbols

- In the case of ‘sad’, the image with tears in eyes is emphasized and in the case of ‘happy’, shape of lips becomes larger, in the case of ‘afraid’, lips quiver and in the case of ‘angry’ smoke arises from ears.

- Test trial program

- In order to grasp reaction time (ms) and accuracy to graphic symbols and animation symbols accurately, Director 8.0 program which was made with Adobe and Visual C++ were used for this study.

- Information about reaction time and forward reaction and personal information about subjects were stored automatically.

Procedures and methods of test

- This study was conducted with touchscreen and desktop computer in the quiet room.

- After seating subjects comfortably in front of touchscreen, monitor was adjusted properly.

- Press ‘start’ button after inputting personal information of subjects on first screen.

- 4 cut symbols of 5x4cm cell were presented on touch screen in horizontal direction randomly.
When 4 cut emotional symbols that were picked at random were presented with words on a screen.

Participants touched the picture that corresponded to the word presented with finger.

Prior to this experiment, the subjects learned how to use experimental methods and touch method by conducting preliminary test.

The message showing 'If you store, click the button for the picture. Thank you' and at this moment, if the button is clicked, data will be stored automatically and experiment will be finished.

Data analysis

The data that were stored in text file were measured repeatedly by using SPSS statistical package.

Average reaction velocity to graphic symbol and animation symbol was presented by using descriptive statistics.

Result

Reaction time

Adults

Animation symbols had statistically significant faster reaction time compared to graphic symbols for adults, F(1, 33)= 17.919, p<.001

Reaction time of emotion was analyzed by T-test. Animation afraid, angry, and sad symbols had statistically significant faster reaction time compared to graphic afraid, angry, and sad symbols for adults, t(33)=2.616, p<.05, t(33)=2.041, p<.05, t(33)=2.930, p<.01, individually.

Children

Animation symbols had statistically significant faster reaction time compared to graphic symbols children, F(1, 29)= 12.944, p<.001

Reaction time of emotion was analyzed by T-test. Animation afraid and sad symbols had statistically significant faster reaction time compared to graphic afraid and sad symbols for children, t(29)=3.231, p<.01, t(29)=2.443, p<.05, individually.

Error rates
With respect to overall error rates in graphic symbols and animation symbols, there was no significant difference between two symbols. However, with respect to error rates depending on emotion, 'afraid' was the highest and in 'sad', 'angry', 'happy' order.

Summary of findings

- Animation symbols had statistically significant faster reaction time compared to graphic symbols for adults and children.
- In reaction time of emotion, animation afraid, angry, and sad symbols had statistically significant faster reaction time compared to graphic afraid, angry, and sad symbols for adults.
- And animation afraid and sad symbols had statistically significant faster reaction time compared to graphic afraid and sad symbols for children.

Discussion

- Reaction time between graphic symbol and animation symbol showed discernible difference.
- Reaction time of animation symbol was faster than that of graphic symbol.
- Animation has a positive effect on reaction time in selecting symbol.
- Movement based symbols such as change of size, contrast, and relative emphasis are more effective than static symbols for AAC users (Vinoth, & Krista, 2008; Chan Lin, 2000)

Future Research Needs

- Much larger samples should be obtained.
- Another verb symbols should be tested.
- New animation way that can enhance forward reaction rates more should be sought continuously.

References


