

The effect of Animated Character in Multimedia Presentation: Attention and Comprehension

Cholyeun Hongpaisanwivat
Computer Science Department
Thammasat University
Prathum Thani, Thailand
chhong@cs.tu.ac.th

Michael Lewis
Department of Information Science and
Telecommunications
University of Pittsburgh
Pittsburgh, PA, U.S.A.
ml@sis.pitt.edu

Abstract – *This present study examined the effects of animated characters and presenting voices on comprehension and attention performance in learning from a multimedia presentation. This study also investigated the effect of introversion/extroversion in learning performance and rating affected by animated character. Comprehension was affected by neither animated characters nor presenting voices. Results show that an animated character may retain learner's attention. The presence of animated character did not increase positive attitude of participants toward the multimedia presentation.*

Keywords: Animated character, Multimedia Presentation, Attentional, Extroversion/Introversion .

1 Motivation

There has been rapid growth of electronic learning opportunity. A multimedia presentation is one of electronic learning environments. Even though multimedia presentation provides an effective learning environment, which utilizes human memory of visual and verbal resources, learners may be cognitively overloaded when there is much information and/or complex display presented. This situation will have a greater impact to novice learners, who may have difficulty in which they should pay attention [6].

In classroom, effective instructors while lecturing draw student's attention to any important points in presented material, or to referential points. Therefore, an effective multimedia presentation system should also be able to provide an attentional guider in order to help students learn material being presented. A simple guider such as an arrow produced the effect of increasing performance in recalling objects pointed [5]. In addition to directing student's attention, human presenters act other behaviors such as movement and facial expressions.

Those behaviors are important as creating live learning environments. A simple arrow in multimedia presentation has limitation to display emotional expressions.

Research has shown that an animated character can capture students' attention, engage them in learning and motivate them to learn [3, 4] The animated presenter for Web material was evaluated as being helpful, entertaining, and able to make the technical material presented seem less difficult [1]. The simple emotional pedagogical agent named "Smiley," providing feedback to the students based on their progress on the training, was able to persuade students to go through the training twice [2]. Positive factors of animated characters, such as the ability to engage, motivate, and entertain, are a critical factor in aiding the learning process. Animated characters embedded in multimedia presentation are hypothesized to augment students' perception of the learning experience and their performance.

In multimedia learning systems, presenting voices affect learners' comprehension. Animated characters which present material with different voices are also hypothesized to produce level of comprehension. Additionally, individual differences are known to be a significant predictor in human computer interaction. Because animated characters rely on affective social responses to produce pedagogical benefits there are likely to be significant individual differences.

The aim of this study was to examine how animated characters affect students' comprehension and their attention while learning a multimedia lesson. This study was conducted using synthetic and natural voice types since both can be used for presenting a multimedia lesson. The study also explored how individuals regarding the degree of user's extroversion learn a multimedia lesson that featured animated characters. Finally, the present

study investigated user's attitude toward the learning environment.

2 Method

The study apparatus was the PowerPoint presentation used in an actual computer graphics course. Each slide was scripted with the instructor's explanation and a sequence of locations to which attention should be directed. A 2 (synthetic voice vs. human voice) X 3 (no character, pointing finger, animated character) between-subject experiment was conducted with 60 participants who had not taken computer graphics courses. A level of comprehension was measured by a set of paper-and-pencil tests. The attention score was determined by the number of accurate items of recall explicitly pointed to and the number of errors of recalls involving objects which attention was not explicitly directed.

3 Result

The results indicate that the animated character did not significantly increase comprehension. Presenting voice produced a marginal effect on comprehension, where human voice yielded better comprehension than synthetic voice. Neither animated character and presenting voice had significant effect on recall performance for attended objects; however, there was an interaction effect (see Figure 1). It indicates that the animated character with synthetic voice was helpful in recalling attended objects, but not animated character with human voice. There was no significant effect of animated character and voice type on recalling unattended objects and neither was interaction effect.

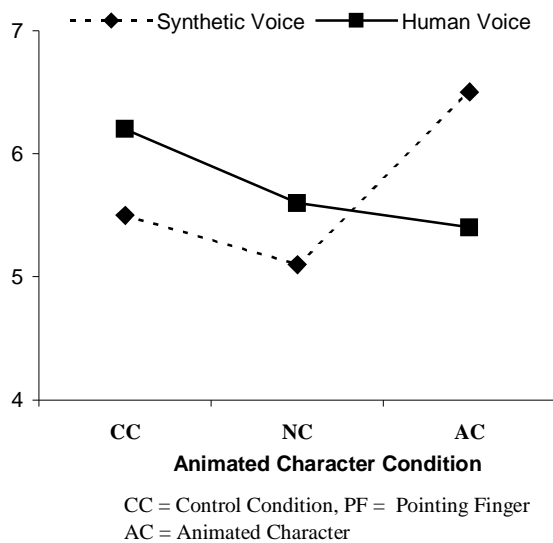


Figure 1: Recall performance for attended objects

Participants were divided into two groups based on the median of the Extroversion Inventory used. The results of a three-way analysis of variance indicate that there were no significant main effects of animated character, presenting voice, or extroversion scale on comprehension. There were neither two-way nor three-way interaction effects as well.

There were no main effects of those three variables on recall performance for attended objects, but two two-way interaction effects and three-way interaction effect were found. The three-interaction effect revealed that recall involving attended objects in the pointing finger and no-character conditions with human voice was higher than the performance which featured the synthetic voice. On the other than, the recall in the animated character with synthetic voice was higher than in animated character featured with human voice.

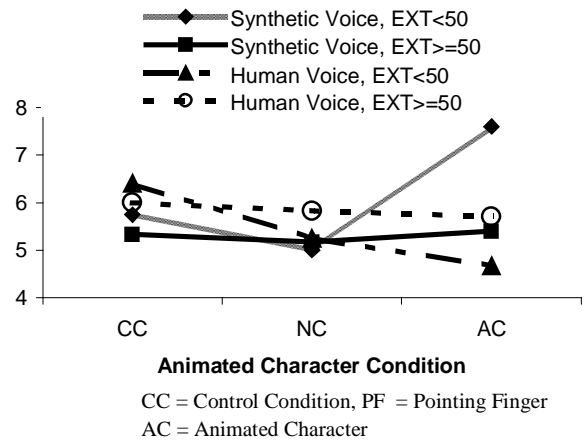


Figure 2: Recall performance for attended objects by extroversion scale

Significant main and interaction effects of those three variables on recall performance for unattended objects were not found.

There were no significant differences in ratings of the presentation. Participants rated the presentation equally in terms of its enjoyment, its learnability, its motivation, degree of interest, and satisfaction with regard to content material, speed, and clarity of presentation. However, participants in the synthetic voice condition were less likely to continue viewing the presentation than those in the human voice condition.

The animated character (AC) was rated significantly more anthropomorphic than the pointing finger (PF). AC was evaluated as being more useful for and contributing more to learning the material than PF, although AC was not considered as necessary. AC was also rated as being more likeable, and more enjoyable than PF. Participants indicated a greater willingness to view more slides

featuring AC than those featuring PF. Animated character's behaviors were judged as being more appropriate, natural, and engaging than were the pointing finger's behaviors. PF was marginally rated as being more distracting than AC. In addition, participants felt comfortable with AC and PF equally, but they did not feel comfortable with the synthetic voice.

Corresponding to the quality of anthropomorphism, AC was rated as having more of a personality than PF. AC was judged more cheerful, friendlier, more enthusiastic, and more extroverted than was PF. Furthermore, animated character's appearance and his behaviors on slides satisfied participants to a greater degree than did the pointing finger and its behaviors. As expected, the human voice was more satisfactory than synthetic voice regardless of the type of pointing character to which it was attached.

4 Conclusions

The study examined the effect of animated character on users' comprehension of and their attention to multimedia presentation. The study did not find that the presence of animated character increased comprehension of the presentation. This finding corresponds to other studies, which did not find any cognitive impact of animated character in learning systems.

However, the study shows that the animated character featured with synthetic voice produced better recall involving attended objects. This finding may confirm the notion that animated character could draw users to visual attention while attention to verbal information was poor.

The study did not find the significant effects of presenting voices. This result may indicate that the quality of synthetic voice has been improved and becomes more comparable to human voice although users are less likely to continue viewing presentation with computer-generated voice.

The study found no significant effect of individual differences regarding the degree of extroversion. This

finding may result from no interactivity between the learning system and users.

Finally, the presence of animated character or the pointing finger did not influence users in rating the learning system differently. However, the rating of animated character in the present study supports that the human-like representation was rated greater positively than other forms.

References

- [1] E. Andre, T. Rist, and J. Mueller, "WebPersona: a lifelike presentation agent for the World-Wide Web" *Knowledge Based Systems*, Vol. 2, No. 1, pp. 25-35, 1998.
- [2] C. Okonkwo, and J. Vassileva, "Affective Pedagogical Agents and User Persuasion" in C. Stephanidis (ed.) Proc. "Universal Access in Human - Computer Interaction (UAHCI)", held jointly with the 9th International Conference on Human-Computer Interaction, New Orleans, USA, pp. 5-10 August 2001.
- [3] J. C. Lester, C. B. Callaway, B. A. Stone, and S. G. Towns, "Mixed initiative problem solving with animated pedagogical agents", Working Notes of the AAAI Symposium on Computational Models for Mixed Initiative interaction, AAAI spring symposium series, Stanford University, pp. 98 - 104, March 1997.
- [4] J. C. Lester, J. Voerman, S. Towns, and C. Callaway, "Deictic Believability: Coordinating Gesture, Locomotion, and Speech in Lifelike Pedagogical Agents", *Applied Artificial Intelligence*, Vol. 13, No. 4-5, pp. 383-414, 1999.
- [5] P. Faraday, and A. Sutcliffe, "Designing effective multimedia presentations", Proceedings of CHI'97 Conference Compassion, ACM Press, pp. 272 - 278, 1997.
- [6] P. H. Miller, and M. G. Weiss, "Children's attention allocation, understanding of attention, and performance on the incidental learning task", *Child Development*, Vol. 52, pp. 1183-1190, 1981.