

Chapter 4

Animated Pedagogical Agents: The Effect of Visual Information on a Historical Figure Application

R. Heller

Athabasca University, Canada

M. Procter

Athabasca University, Canada

ABSTRACT

The role of Animated Pedagogical Agents (APAs) depends on an understanding of the persona effect as a mechanism for increasing student engagement and motivation. We argue that historical figure applications of APAs may be helpful to identify the parameters that give rise to a persona effect. Given the importance of visual information, an experimental approach was used to examine how different image conditions would affect perception of a historical figure APA interaction. Eighty-eight participants were randomly assigned to one of three conditions; no image, static image, or animated image. Contrary to expectations, the no image condition was associated with significantly higher ratings for 6 of the 12 measures, including 3 measures of social presence. These findings stand in contrast to previous research and suggest that historical figure applications may be unique in their evocation of a persona effect and valuable for understanding the nature of the persona effect.

INTRODUCTION

Animated Pedagogical Agents (APAs) can be defined as computer-based characters with 2D or 3D animated representation and interactive capabilities through one or more modalities (e.g. text, speech, emotion, gesture, eyes movements) (Clarebout, Elan, & Johnson., 2002; Clark & Choi., 2005, Craig, Driscoll, & Gholson, 2004; Craig,

Gholson, & Driscoll, 2002; Gulz & Haake, 2006). Importantly, APAs have some type of artificial intelligence or intelligent tutor system backend that allows the designer to simulate communicative agent behaviour while guiding human-agent interactions towards pedagogical goals and objectives. Johnson, Rickel, and Lester (2000) argue that APAs were created when animated interface agents were combined with intelligent tutor systems. According to Johnson et al., “APAs present two key advantages over earlier work; they increase the

DOI: 10.4018/978-1-60960-153-9.ch004

bandwidth of communication between students and computers and they increase the computer's ability to engage and motivate students" (p2). It is further assumed that these two features, traditionally problematic in distance education, ultimately improve learning outcomes and experiences. Lester, Converse, Kahler, Barlow, Stone, and Bhogal (1997) refer to these predictions as the 'persona effect' based on their findings that the mere presence of an animated agent had a strong positive effect on learner perceptions of the learning experience. More recently, Hadwin, Winne, & Nesbit (2005) identified APAs as an important research field at the "juncture of HCI and educational psychology" with the potential to improve learner interest, retention, and knowledge transfer. Clearly, understanding the persona effect and the variables that interact with the persona effect are important pre-requisites in the design of effective APAs. In this article, we provide a brief review of the persona effect, a rationale for using historical figure applications to investigate the scope of the persona effect and the results of an experimental investigation into the role of visual information and its modulation of the persona effect.

THE PERSONA EFFECT

Although there have been numerous investigations of the persona effect in APAs (e.g. André, Rist, & Müller, 1999; Atkinson, 2002; Dirkin, Mishra, & Altermatt, 2005; Heller, Procter, Mah, Jewell, & Cheung, 2005; Johnson et al., 2000; Koda & Maes, 1996; Mayer, Sobko, & Mautone, 2003; Sproull, Subramani, Keisler, Walker, & Waters, 1996), a close examination of the literature concludes that the evidence for a persona effect is mixed (Clark & Choi, 2005; Dehn & van Mulken, 2000). Dehn & van Mulken (2000) identify 3 possible effects on the user as a result of an APA interaction. Evidence for a persona effect could be found in the user's (1) subjective experience and perceptions of the system (2) behavioural record produced during the interaction, and (3) learning outcome as revealed

by performance measures taken subsequent to the interaction.

In terms of subjective experience, as assessed through self report, there are numerous reports that interactions with animated agents are perceived by users to be engaging and entertaining (Takeuchi & Naito, 1995; Koda & Maes, 1996; Van Mulken, André, & Müller, 1998), believable (Lester et al., 1997), comfortable (Koda & Maes, 1996), and useable (Cassell & Thórisson, 1999; Lester et al., 1997; Takeuchi & Naito, 1995). Although the use of self-report data is important, the construct validity of many of the self-report measures has not been established (Dehn & van Mulken, 2000). Moreover, many of the studies lack suitable control conditions to establish the degree of attitudinal preference (Clark & Choi, 2005). Importantly, Gulz and Haake (2006) have pointed out that issues of visual rendering have been virtually ignored despite the close relation between visual information and attitude formation. Finally, an evaluation of the agent will be closely related to the overall performance of the system with respect to task goals and objectives (Dehn & van Mulken, 2000).

Compared to subjective experience, there have been fewer studies that have examined the behavioural record for evidence of a Persona effect. One important source of behavioural data is the conversational record between the user and the APA. Cassell and Thórisson (1999) examined the efficiency of communication by documenting linguistic indices of errors (hesitations, repetitions, & communicative overlap). However, their findings were mixed, revealing that more natural acting animated agents were associated with users providing less repetitions but more hesitations and overlaps in comparison to less natural acting agents. Similarly, Takeuchi & Nagao (1993) calculated an index of communicative efficiency by recording the topic shifts and correct answers per unit time. They found that animated agents initially led to a better efficiency index but, as the communicative sessions increased, the improvement wore off.

11 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/animated-pedagogical-agents/49297

Related Content

Introduction to Learning Management Systems

Diane D. Chapman (2009). *Encyclopedia of Distance Learning, Second Edition* (pp. 1280-1286).

www.irma-international.org/chapter/introduction-learning-management-systems/11910

The Influences and Responses of Women in IT Education

K. J. Maser (2008). *Online and Distance Learning: Concepts, Methodologies, Tools, and Applications* (pp. 3293-3298).

www.irma-international.org/chapter/influences-responses-women-education/27634

Improved Personalized Recommendation based on Causal Association Rule and Collaborative Filtering

Wu Lei, Fang Qing and Jin Zhou (2016). *International Journal of Distance Education Technologies* (pp. 21-33).

www.irma-international.org/article/improved-personalized-recommendation-based-on-causal-association-rule-and-collaborative-filtering/155128

Challenges Facing Faculty Members When Using a Learning Management System

Emad A. Abu-Shanab, Jumana Samara and Mohamed Arselene Ayari (2020). *International Journal of Information and Communication Technology Education* (pp. 35-47).

www.irma-international.org/article/challenges-facing-faculty-members-when-using-a-learning-management-system/262565

Application of the Cognitive Walkthrough Method to Evaluate the Usability of PhET Simulations Package to Teach Physics

Gustavo de Oliveira Almeida and Cesar Augusto Rangel Bastos (2018). *International Journal of Information and Communication Technology Education* (pp. 34-48).

www.irma-international.org/article/application-of-the-cognitive-walkthrough-method-to-evaluate-the-usability-of-phet-simulations-package-to-teach-physics/212576