Anthropomorphisation of Software Agents as a Persuasive Tool

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Abstract
In this position paper, we make an argument for the
anthropomorphism of software agents as a persuasive
tool. We begin by discussing some of the relevant
applications, before providing a brief introduction to the
CASA theory of social interaction with computers. We
conclude by describing a selection of the evidence for
anthropomorphism, and an argument for further research
into this area.

Author Keywords
Anthropomorphism, Software Agents, HCI, HAI, CASA

ACM Classification Keywords
H.5.m [Information interfaces and presentation (e.g.,
HCI)]: Miscellaneous.

Introduction
In many Human-Computer Interaction (HCI) applications,
there is an aspiration for the computer to appear as an
intelligent, active and personalized collaborator [6].
Consequently, the traditional interaction metaphor of
direct manipulation [17] (where events are initiated,
monitored and interpreted by the user) is gradually
replaced by one where software agents are used to enable
more natural, 'human' interaction. This is an interaction
metaphor referred to as indirect management [4].

This endowment of computer agents with human qualities is often referred to as *anthropomorphisation* [1] and is an ongoing objective of HCI systems and applications, with the intention of allowing users to interact more naturally with the software. Anthropomorphisation can encompass different aspects of human-like behavior, and the the goal of the designer is to provide more 'natural interaction', such as voice interaction on Apple's Siri. We propose that anthropomorphisation could also be a key factor in persuasive technologies, and warrants ongoing research.

Computers are Social Agents

An argument against the anthropamorphism of software agents is the Computers Are Social Actors (CASA) theory, which states that interactions between humans and computers are "fundamentally social" and "not the result of conscious beliefs that computers are human or human-like" [12]. Evidence has been provided to support this, and similar theories [15] providing one argument against the need for further anthropamorphism. However, even if we accept this theory, we propose that the humanization of software agents could still be a powerful tool for persuasive technologies as social interaction alone is not inherently persuasive.

Arguments for the Anthropamorphism

There is compelling evidence that supports the position that anthropomorphism is an important persuasive factor. For example, anthropomorphic agents used in marketing have been shown to have a positive influence on advertising effectiveness [1]. Research has also demonstrated that in some applications (such as games) a human player will show preference towards agents they accept as human controlled or human-like [8]. Users have also been shown to be more comfortable communicating

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[1]from the Greek *anthropos* (human) and *morphe* (form/shape)

Various different HCI paradigms make use of the concept of humanization, in varying degrees. For example, wearable computers, as defined by Steve Mann, ideally exhibit a series of attributes that enhance the 'humanity' of the computer, e.g., *attentive to the environment* and context aware, so as to *unmonopolise of the user's attention* [7].

Humans are social with a variety of non-human entities (such as pets for example), without these entities being inherently persuasive. The CASA paradigm doesn't preclude that anthropomorphism could be a persuasive quality.

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with real-time avatars that move like humans [19]. This also impacts trust, as humans may view behavior from an agent they believe to be human (or human-like) more favorably and notice positive behavior more often [9]. Conversely, players are more likely to assign blame to agents identified as AI controlled [10].

Taking a case study of data visualization, where developers create novel methods to display data, it is possible that the choice of interface design, layout and interaction behaviors can persuade the user (or not) that the data is accurate, or that there are correlations visible in the depiction. Kahneman's stage 1 thinking [3], and prior work on uncertainty would suggest that anthropomorphism would be an important factor in persuasion [5], but to date there has been little research in this area – especially in the field of data visualization.

There is also evidence that the visual appearance of agents can elicit behaviors. For example, changing the qualities of the agent (such as male or female attributes) will have a direct effect on our behavior towards them [14]. Avatars with a female appearance prompt stereotypical masculine behaviors, and vice versa [16]. In addition a study by Slater et al. [18] (reprized Milgram's [11] classic electric shock experiment in a virtual world) identified that participants may show greater concern for visually anthropomorphic characters.

Conclusion

If anthropomorphic agents engender greater trust in humans that interact with them, and if these agents can elicit desirable behaviors, then there are clear applications for persuasive technologies. With character agents specifically, we can draw links between anthropomorphism and the narrative transportation theory of persuasion [2],

which could be an important consideration for serious games and training in virtual environments.

We also need to explore how anthropomorphism impacts data perception. Increased trust on behalf of the user could allow for implicit, or unintentional deception. This could lead to miss-identification of trends and correlations; over confidence in the credibility of a data-set; or more worryingly, targeted deceit. This has clear implications for the field of data visualization and warrants investigation.

There is a need to perform further research to investigate how anthropomorphic agents influence behavior, and can they be used to persuade especially in a constructive, positive and beneficial way?

> Studies have demonstrated that although participants will interact socially with both human and computer controlled avatars, users experience greater telepresence with avatars that were anthropomorphic [13]. A sense of greater presence within a virtual world may better engage a user in the narrative.

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