

Me and My Avatar: Exploring Users' Comfort with Avatars for Workplace Communication

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ABSTRACT

This paper describes results from a large-scale survey to explore users' comfort with different styles of avatars for workplace communication. Thirty-one avatars were evaluated based on users' ratings along several dimensions and grouped into five different clusters. The highest rated cluster was the set of formal, realistic avatars that users did not feel were creepy. These avatars were ranked comparatively with webcam photos, and users felt that they would be appropriate for work. Our results also revealed that realism is nuanced, as avatars in another cluster were also rated high on realism, but were felt to be inappropriate for work. Finally, this work also demonstrates that people are more particular concerning which type of avatar they are represented by, compared to ones they interact with.

Author Keywords

Avatars, identity, workplace, communication, CSCW.

ACM Classification Keywords

H4.3 Communications Applications: computer conferencing, teleconferencing, and videoconferencing;
H5.3 Group and Organization Interfaces: CSCW.

General Terms

Design, Experimentation.

INTRODUCTION

An avatar is a 2D or 3D graphical representation of a computer user, often resembling a human (see Figure 1). Avatar use in entertainment environments has grown tremendously in recent years, particularly in virtual worlds (e.g., Second Life, World of Warcraft) and online gaming environments (Xbox Live). Although previous research has suggested the potential of using avatars for workplace activities, such as workplace virtual worlds [2] and avatar email [7] or chat [11], current use is relatively low.

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We are interested in exploring the use of avatars for workplace videoconferencing. With the increase in globally distributed work, enterprise-based videoconferencing is on the rise. Typically, the goal is to “see” remote colleagues; however, there are many situations where streaming live video may not be appropriate, for example, in low bandwidth situations or when using limited computing devices such as mobile phones. Additionally, users are sometimes not comfortable sharing live video because they may be self-conscious about their appearance [14] or have privacy concerns [5, 13]. In situations such as these, using avatars can provide benefits over audio-only conferencing [1] and can help increase users' sense of co-presence [12].

Most previous work related to the design of avatars has focused on avatar personalization for entertainment environments, such as games or virtual worlds, to better understand issues of identity and personalization by examining how users customize their avatars [2,3,4,5,10]. This work is important because users must be comfortable with the avatars they use to represent themselves; however it is equally important to understand what avatar users are comfortable interacting *with* (as representations of their colleagues). For example, although Bob may enjoy using a “blue shark” as his avatar, his colleagues may find this distracting to their work activities. Thus, the work in this paper extends previous research by also examining users' comfort when interacting with others' avatars.

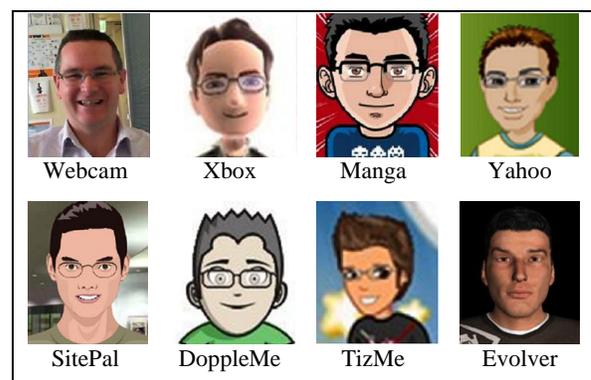


Figure 1. One avatar set used in the survey. The set includes Bob's webcam photo (top left), along with 7 different avatar representations. These avatars were all created by “Bob” with the goal of using them for workplace communication. The software used to create each avatar is noted below the image.

AVATAR SURVEY

We deployed a large-scale survey to explore users' comfort with different styles of avatars for workplace communication. The survey first gathered demographic information, previous experience with avatars, and comfort with the use of avatars in work situations. Users were then asked to rate both a webcam photo and a number of different avatars on several dimensions (comfort, resemblance, realism, formality, appropriateness for work, and creepiness) using a 10-point scale.

One key question when designing the survey was what avatars to use. There are numerous avatar software applications and an infinite number of design parameters. Most existing avatars have been designed for leisure activities and may not be appropriate for work. To minimize bias in the choice of stimuli, we ran a small preliminary study in which users were asked to provide a webcam photo, and create 4 different avatars for use in work activities using suggested software packages. Users also submitted any additional avatars they currently use. Six participants completed this preliminary study, providing us with 6 avatar sets, where each set represents one person. The sets included a webcam photo and 4-7 user-generated avatars (see Figure 1 for an example of an avatar set).

Each avatar set was sent to 1600 email addresses randomly selected from the corporate directory of a large company. Respondents provided background information and answered a series of questions for one avatar set (webcam + avatars) and received an entry for a raffle. Respondents could also choose to complete the survey for additional avatar sets and received additional entries for the raffle.

RESULTS

1020 people completed our survey (806 males and 211 females) and were roughly evenly split across the six different avatar sets (146 - 199 respondents for each set). Our respondents were between the ages of 21-68 (median 37) and none knew the people represented in the avatar sets.

Avatar Use

In terms of avatar use, 76% of our respondents indicated that they have created an avatar at some point, and avatar use was split fairly evenly among *almost never* (22%), *a few times a year* (19%), *a few times a month* (20%), *a few times a week* (22%), and *daily* (17%). Work use of avatars was quite sparse, with 73% indicating that they *almost never* use avatars for work. Despite the low use of avatars for work tasks, our respondents were moderately open to the idea, with 47% indicating that they would be likely to use an avatar in a work setting.

The remainder of the survey involved questions relating to users' comfort with avatars in a work setting. On a 10-point scale, when asked how important it is that someone's avatar looks like them, 65% of our respondents indicated yes (rating greater than 5). Our respondents also felt that it was important for someone's avatar to convey their personality,

with 65% rating it greater than 5. The importance of an avatar conveying someone's personality was greater for females than males (females: $M=6.8$, $SD=2.7$, males: $M=6.1$, $SD=2.7$, $z=-3.56$, $p<.001$). No other gender differences were found in any of our results ($p>.05$).

Table 1 shows participants' ratings on their comfort either interacting with or using an avatar in certain situations (1=extremely uncomfortable, 10=extremely comfortable). People indicated they would be relatively comfortable interacting with and using avatars for IM, email, when interacting with coworkers, or for development trainings or forums. Comfort with avatars for international work was rated lower, and people indicated that they would be uncomfortable with avatars for a job interview. In all of the work settings, people were significantly less comfortable *using* an avatar to represent themselves as compared to interacting with someone else's avatar ($p>.05$). People also indicated that they would be significantly more comfortable with avatars when interacting with people they know versus people they don't know ($p<.001$).

Table 1. Mean comfort ratings for avatar use in work settings (1=extremely uncomfortable, 10=extremely comfortable)

Work Situations	Using		Interacting With	
	M	SD	M	SD
IM and email	7.3	2.5	7.5	2.5
with coworkers	6.9	2.7	7.2	2.7
development trainings/forums	6.4	2.8	6.9	2.8
working internationally	4.7	2.9	5.9	2.9
with customers	4.1	2.8	5.6	3.1
during a job interview	2.6	2.6	3.3	2.9
with people you already know	8.1	2.3	8.0	2.4
with people you don't know	5.1	2.9	5.8	3.0

Comfort with Avatars

For each avatar set, respondents ranked the webcam photo along with all of the avatars in terms of preference for use in work activities. The webcam photo was always ranked highest; however, in all cases there was at least 1 avatar that had similar rankings to the webcam photo. This suggests that there are avatars that may be possible replacements for a webcam image (see Figure 2).



Figure 2. An example of an avatar that was ranked similarly to the user's webcam photo.

Table 2. Resulting categories from the cluster analysis. The clusters are presented in order of appropriateness for use in work settings. The means represent the average rating of the avatars in that cluster for each dimension on a scale from 1 to 10.

Cluster	Example Avatars	Formal	Not Creepy	Realistic	Comfortable	
					Interacting with	Using
# 1: (4 avatars) Formal, non-creepy, realistic		6.5	8.4	6.2	7.2	6.3
#2: (5 avatars) Casual, non-creepy, cartoonish		3.7	7.6	3.4	6.4	4.7
#3: (8 avatars) More casual, cartoonish, but still not creepy		3.3	7.1	3.0	6.0	4.3
#4: (8 avatars) Slightly creepy, casual, cartoonish		3.0	5.6	3.0	4.6	3.3
#5 (6 avatars) Somewhat formal, creepy, realistic		5.7	3.8	6.2	4.2	3.3

Respondents were then asked to rate the avatars on a 10-point scale for different dimensions, including: how casual (vs. formal) the avatar is, how creepy/eerie the avatar is, how realistic (vs. cartoonish) the avatar is, how comfortable they would be interacting with the avatar, and how comfortable they would be using a similar avatar. A two-step cluster analysis was used to group all of the avatars based on these dimensions which resulted in the identification of five different clusters (see Table 2).

Cluster 1 represents the avatars that were rated as most appropriate for work purposes. The avatars in this cluster were the highest rated in terms of users' comfort interacting with them and using avatars like these. All of the avatars in this cluster were also rated as being appropriate for work by a significant number of respondents (84% - 91%, $p < .001$). The rankings for each of these avatars were not significantly different than the rankings for the corresponding webcam photo, which suggests that this cluster represents avatars that may be appropriate substitutes for webcam photos.

Cluster 2 represents avatars that are more casual and cartoon-like than Cluster 1, and that people are still comfortable interacting with; however, they are less comfortable using avatars like these as their own. Four of these five avatars were rated as being appropriate for work by a significant number of people (66% - 85%, $p < .001$); however, these percentages are lower than those for Cluster 1. Additionally, three of the avatars were ranked significantly lower than their corresponding webcam photo.

Cluster 3 represents avatars that are more casual and more cartoonish, but still not eerie or creepy. People are comfortable interacting with these images, but are again less comfortable using avatars like these as their own. Similar to Cluster 2, some of the avatars in this cluster are seen as being appropriate for work and are ranked high in comparison to the webcam photo, while others are not.

Cluster 4 contains casual cartoonish avatars that people find slightly creepy. People are not comfortable interacting with these avatars, or using avatars like these as their own. They fall in the mid-range of being creepy, and three of these avatars were rated as being inappropriate for work by a significant number of respondents ($p < .001$).

Cluster 5 contains avatars which were felt to be somewhat formal and realistic, but also more creepy. Although a couple of these avatars were felt to be appropriate for work, people were not comfortable interacting with these avatars or using avatars like these as their own. All of these avatars were ranked significantly lower than the webcam photos. These avatars seem to be invoking an uncanny valley response, which is a negative emotional response that people feel when a robot is too human-like in its appearance and motion [9]. Although this effect is consistent with previous work, it is interesting that the avatars in Cluster 1 had statistically similar ratings for realism ($p = .99$); yet in Cluster 1 the avatars were found to be desirable and appropriate for work, while in Cluster 5 they were not.

Avatar Creepiness

Respondents were asked to record what physical characteristics of an avatar made it seem eerie or creepy.

Although all of the characteristics were significantly correlated with the overall rating of eerie/creepy ($p < .001$), the most strongly correlated factors were hair style and hair color ($r = .68$ and $.58$ respectively). Concerns about hair were present for many of the avatars (and some of the webcam photos). For seven of the avatars, more than 60% of the respondents indicated that the hair style was creepy. Another factor that people felt was creepy in several of the avatars was skin color ($r = .46$). Fifteen avatars were rated as having creepy skin color by 10% or more of the respondents. Face shape, facial features, and eyes were moderately correlated ($r = .33, .26, .22$) with creepiness. The remaining 2 characteristics (background and clothing) had weak correlations ($r = .18, .13$).

CONCLUDING REMARKS

The results from this survey demonstrate that people are open to the idea of using avatars for workplace communication; however, the choice of avatar can significantly impact people's comfort. In general, the respondents in our survey were open to interacting with a wide variety of avatars, from cartoonish to realistic and casual to formal, as long as the representation wasn't too eerie or creepy. In contrast, users' preferences for avatars they are willing to use to represent themselves were much more stringent. People primarily wanted more formal, realistic avatars, similar to those from Cluster 1.

Our results also demonstrate that *realism* in avatars is a delicate issue. The avatars in Cluster 1 were rated highly on realism, and this was viewed positively by our respondents. However, the avatars in Cluster 5 were also rated highly on realism, but were felt to be eerie or creepy. This is similar to previously published results on the uncanny valley effect [8, 9]. Although our results provide preliminary data on what people found creepy or eerie about the avatars, further research is needed to more fully understand which characteristics cause avatars to fall into each of the clusters (particularly, differentiating between Cluster 1 and 5). One key characteristic revealed from our results is the importance of hair. Hair color and style were two dimensions that respondents in our survey were very sensitive to, and in general they are not well supported in current avatar software.

In this work we asked respondents to rate the avatars on how creepy or eerie they were. In this context, creepy is formally defined to be "annoyingly unpleasant; repulsive"; however, this is a very subjective term and can mean quite different things to different people. It is important that future work in the area explore more objective measures of this characterization, to better understand the dimensions that cause an avatar to be creepy (or not).

In summary, for avatars to be used for work communication, it is important that we understand how to design avatars so that people will feel comfortable using and interacting with them. The results in this paper provide

preliminary guidelines for avatar design, but future work is needed to better understand how specific characteristics impact users' comfort.

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