Enhancing Distributed Corporate Meetings with 'Lightweight' Avatars

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Abstract
The difficulties remote participants of distributed meetings face are widely recognized. In this paper we describe the design of an avatar-based e-meeting support tool named Olympus, which aims to ameliorate some of the challenges remote participants face in distributed meetings. Olympus provides a customizable peripheral display on the bottom of existing e-meeting solutions. An initial observational study was conducted of the use of Olympus in 6 meetings, three each of a status meeting and a presentation meeting. Avatars fostered team bonding through social play during status meetings, while minimalist dots allowed focused attention during presentation meetings.

Keywords
Distributed meetings, avatars, virtual worlds.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Design, Human Factors, Measurement.

Introduction

There has been recent interest in exploring the value of using virtual worlds for distributed meetings. In particular, the popularity of fully immersive 3D virtual environments such as Second Life (www.secondlife.com) have caused researchers to ponder whether the richness of the medium can mitigate the bottlenecks of distributed meetings [4]. However, these immersive virtual environments have a high barrier to entry because of technological requirements such as high end computing resources and setup effort [6]. In this research, we sought to explore whether lightweight avatars offer some of the same affordances as their more resource intensive 3D counterparts, but in a more accessible manner. Our solution is Olympus, a Flash-based (www.adobe.com/flashplatform) strip of avatars presented at the bottom of e-meeting solutions that provides awareness of meeting participants.

Related work

Several researchers have investigated the use of graphical avatars in meetings. Welbergen et al. describe the design of a 3D anthropomorphic presenter that presents information based on captured meeting data [7]. Harry and Donath use avatars' position in various spaces of a virtual world as a reflection of meeting participants' feelings [3]. The SLMeeting website interfaces with Second Life to provide support for online meetings [4]. Porta-Person is a rotating display that shows a remote participant's video image or animated representation [8]. These studies mostly focus on implementation details of using avatars in meetings, without much empirical data of the affordances they provide. We aim to extend this body of research through an exploration of what avatars may really be good for and in what context.

Motivation

The design of Olympus was motivated by our own experience developing fully immersive 3D virtual environments. Our prior work involved designing a virtual world that integrates into a collaborative software development environment [6]. We wanted to explore how a Windows desktop virtual world could support meetings of distributed software teams. In pilot trials, we found that adoption was low. When we inquired about their low usage, users emphasized the high barriers to entry. Significant time had to be invested to download, install, and configure the virtual world. Running it demanded computing resources that dwarfed other processes running on a user's computer. Our experience was consistent prior research suggesting that the success of collaborative systems is dependent on the costs and benefits of usage to the individual user [1, 2]. As the barriers to use are reduced, more users participate. Consequently, we felt that a more lightweight approach would increase adoption. Rather than support completely 3D environments, we focused on one interesting aspect of virtual worlds - the expressiveness of avatars. We implemented this in a lightweight manner without placing significant demands on users in terms of computing power and time needed for installation and configuration. Corporate users are typically reluctant to go through such hassles for their meetings.

Olympus: Lightweight avatars in meetings

Our philosophy in designing Olympus was to augment existing web based meeting solutions with avatars. The client is Flash based. The server uses both a commercial product for state sharing and a web proxy service to help mash-up our Flash-based avatar service with existing e-meeting services in the company. We

Figure 1. The complete Olympus interface. Presentation space (A) was minimized to reduce height of screenshot.

streamlined the login process for the company's e-meeting services into a single, shareable, authenticated URL. As a result, Olympus works across Flash-enabled browsers and operating systems. By mashing up with existing e-meeting systems, users do not log into a virtual world for a meeting. Instead, we bring the virtual world to users in a familiar e-meeting context via one click with zero hardware or software setup. Our approach emphasizes the expressiveness of avatars, and minimizes decorative features of a virtual world.

Figure 1 displays the complete user interface of Olympus. The main area of the interface is dedicated to slides or screen sharing (A). Every user in Olympus is represented with dots along two parallel lines. The top horizontal line is the 'local view' and only shows those visible on a user's browser screen. Users can go off the screen, but they are always represented by a dot on the bottom horizontal line or 'global view' that shows everyone in the meeting. A user's own avatar is represented with a slightly larger green dot (B), while others are represented with orange dots. Hovering over a user's dot with the mouse (C) reveals more information about that user. There is a text box at the bottom of the interface (D) that allows users to enter chat. Chat appears as chat bubbles as well as in a scrolling chat log (E). Users can minimize the scrolling chat log to just show a single line of chat if they want. On the right of the interface there is an area for users to scroll through over 30 gestures (F). The interface provides a stage for presenters and participants to queue up to ask questions or comment (G). It gives meeting participants awareness of who the presenter is, as well as an avenue for remote participants to be more visible, should they choose. Participants go on the stage by clicking on their own avatar and confirming they want to enter the stage. The dot representing them then turns into a star. There is a limit of 3

participants on the stage. Others are queued up with a number in the order they clicked, and their dot displays their order in the queue (H).

Olympus acts as a customizable peripheral display allowing users to choose the amount of information they want displayed. The interface allows users to toggle between four modes by clicking (I). Figure 2 provides sample screenshots of each mode. By default the first time a user logs in, they are asked to customize their avatar and are then presented in 'avatar' mode. As avatars are the only customizable representation, we wanted users to have an avatar they were comfortable with before entering the meeting. Users then had the option of switching between any of the other 3 modes. 'Dot' mode provides the most minimal representation where users are represented with dots. 'Picture' mode, where users are represented with pictures from the corporate directory, is a more expressive yet static representation. 'Avatar' mode is a more expressive animated representation where users can customize the look of their avatars and gesture. 'Avatar with picture' mode combines the animated expressiveness of avatars with the static representation of a picture. In light of the 'uncanny valley' effect [5] - the tendency of humans to feel uncomfortable with avatars that photo-realistically resemble humans - our avatars are intentionally cartoonish. Users can also upload their own content by downloading a photoshop template, making changes, and uploading it back to the server. Olympus remembers the mode users were last in so they appear in that mode the next time they log in.

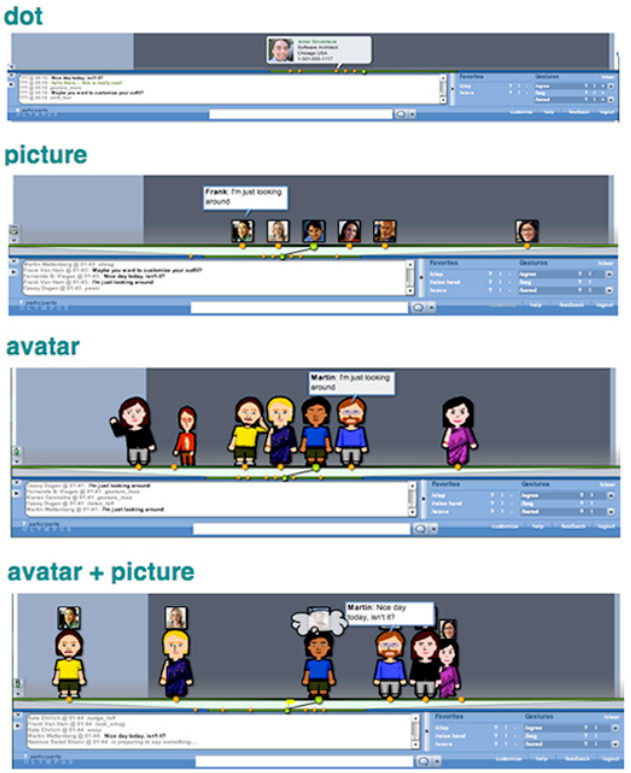

Figure 2. Four different modes of avatar representation.

Observational study

We wanted to understand user behavior using Olympus in the context of real meetings. As such this is not a controlled experiment. We had 2 teams of a large IT services company use Olympus in a total 6 of their hour long distributed meetings. The first is an 8-person team (3 male, 5 female) of editors in charge of publishing relevant articles on the corporate intranet. Their meetings are weekly status meetings where they address issues regarding the projects they work on. The second team is the innovators club – a group of

individuals that come together weekly to hear a presentation on a topic on innovation. It has an official membership of 215 individuals but an average of 15 members attend any given meeting.

We chose to study the 2 teams over 3 meetings to avoid biases of novelty and learning. In the meeting invites of the 2 teams, members were provided a link to our project website that had a video, FAQ and other background information about using Olympus. Realizing not all members would use this information, we provided a brief demo of Olympus at the start of the first of the three meetings (hereafter referred to as meeting 0). We discarded all data from meeting 0 realizing that it would be colored by novelty or learning effects. Nonetheless, meeting 0 served the purpose of making team members familiar with the system while they engaged in their regular meeting activities. The data reported here are from meeting 1 and 2 of both teams. We collected three forms of data; a) a log of all user actions in Olympus, b) observations of meetings and recorded audio, and c) 15 minute semi-structured interviews with meeting participants scheduled as close as possible to the conclusion of the meeting.

Results

Our participants uniformly praised how easy it was to enter the meeting and customize their avatar compared to 3D virtual worlds such as Second Life. Mean customization time across both teams was 68.94 sec.

The blue bars in figure 3 show the percentage time users spent in each mode in the status meetings. The results show a significant effect of mode type on the percentage of time users spent in a mode ($F[1,10]=6.47$, $p < 0.05$). Post-hoc pairwise comparisons reveal that users spent significantly more time in avatar with picture mode than dot mode ($p < 0.05$) and picture mode ($p < 0.05$). The red bars in figure 3 show the percentage time users spent in each mode in the presentation meetings. Similar to the status meetings, the results show a significant effect of mode type on the percentage of time users spent in a mode ($F[3,54]=3.28$, $p < 0.05$). Post-hoc pairwise comparisons reveal that users spent significantly more time in dot mode than picture mode ($p < 0.05$). No further pairwise differences were found ($p > 0.05$).

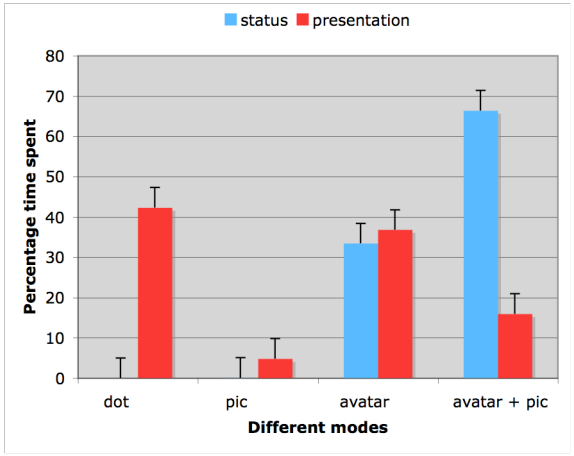

Figure 3. Percentage time spent in different modes by users that changed mode at least once.

We observed that in both the status and presentation meetings, avatars afforded social play, particularly at the beginning of meetings while waiting for everyone to join. Meeting participants would comment about each other's avatars:

D (to female colleague whose avatar had a moustache): Wow you got a little buzz on your upper lip there. Let me tell ya puberty is tough!

M: You need a wax job. Wax that moustache.
Y: You look like my Aunt Louise.

The avatars were also used to inject humor into the meeting and made the meetings more fun and engaging. There was an incident in meeting 2 of the status meetings where the team leader wanted to remind team members to wash their hands in light of the H1N1 virus scare. He looked for the 'wash hands' gesture, but there wasn't one. So he said *"I'll bet 'clap' looks like 'hand washing'. Oh yeah look (laughter) my guy's washing his hands."* All the team members then gestured using 'clap', as if they were washing their hands. Such social play increased team bonding.

In our interviews, we probed participants regarding their preference for the avatar with picture mode. Avatars were expressive and fun, while the pictures on top of them provided a real world context.

"Even an unchanging picture of someone gives me more cues to who they are than an avatar… I don't think I get that level of information from avatars quite yet. But the avatar does add something -- some of the members used the expressions and gestures and the playfulness is useful and enjoyable to me."

On the other hand, during the presentation meetings, when the presentation began, users preferred the 'dot' representation over others. Users reported wanting to focus on the slides. The animated avatars took their attention away from the slides of the presentation.

Future work

Our preliminary data suggest that lightweight avatars may reduce barriers to entry in utilizing 'virtual world' features, make the experience more enjoyable, and might increase adoption. In particular, avatars may be useful for socializing before and after a meeting, which may lead to increased team cohesion. Our future research will test such predictions through a more systematic study. Clearly there is a need for more research in understanding how and why avatars may make a difference in distributed corporate meetings.

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