

## The Impact of Avatar Self-Representation on Collaboration in Virtual Worlds

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Schools and universities around the world have begun to use collaborative virtual worlds such as [Second Life](#) and [Active Worlds](#) as distance learning environments (Dickey 2005; Bronack, Riedl, and Tashner 2006). Compared with more traditional distance learning venues, virtual worlds offer increased opportunities for interaction and an increased sense of community, both of which can enhance student engagement in learning and reduce the feeling of disconnection that leads to drop-out. Within virtual worlds, users represent themselves with graphical characters called [avatars](#), which are generally three-dimensional models chosen from a list or created from a simple prototype. The use of avatars for representation in virtual worlds can increase a student's sense of social presence, the feeling that others are present with the user in the mediated environment (Nowak and Biocca 2004). Avatars in virtual environments can help promote a feeling of community in distance learning by providing students the opportunity to make connections with each other through activities such as discussion groups, debates, and collaborative learning groups (Rovai 2002).

As in face-to-face classrooms, small-group collaboration among students is important to the development of community in virtual worlds. However, because social interactions in virtual worlds are governed by the same social norms as interactions in the real world (Yee et al. 2007), negative social attitudes, such as prejudice based on appearance, can affect the quality and extent of collaboration in virtual worlds just as they may in the real world. In the case of appearance-based prejudices, a user's choice of avatar can shape social interaction in virtual worlds. In this context, the importance of avatar choice and the effects of visual embodiment on social interaction in multicultural cooperative groups are clearly crucial areas of investigation. We investigated the effects of negative social attitudes based on avatar appearance in multiethnic groups collaborating within virtual worlds.

### Background

In [Micronesia](#), colleges and universities in the region are investigating the potential of technologies like virtual worlds to provide expanded educational opportunities for islanders spread across great distances. In these circumstances, "courses taught in distance learning formats provide islanders with opportunities to further their education without requiring them to leave the islands" (Rao 2007, ¶1) and expose them to collaborative activities with students of different cultures and ethnic groups. Micronesia has a long history of negative attitudes and prejudices among the many ethnic groups residing on the various islands making up the greater Micronesian region ([Exhibit 1](#)).

Negative social attitudes such as ethnic prejudice have been shown to persist in virtual worlds; participants in virtual settings tend to respond to avatars as they would respond to real people with similar characteristics. For instance, in a study of users in a virtual environment, Dotsch and Wigboldus (2008) found that Dutch participants maintained more social distance when approaching avatars with Moroccan ethnic features than they did with avatars with Northern European features. Users' common tendency to create virtual counterparts that resemble their real-world selves (Reuters 2008) means that the same attitudes and beliefs that shape their real-world interactions are likely to be a factor in virtual interactions ([Exhibit 2](#)).

Successfully using virtual worlds for collaborative group activities in this context requires an understanding of the impact of such attitudes on students' willingness to collaborate. We sought to explore the extent to which these issues affect learning in virtual worlds by investigating self-representation as expressed by avatar choice and willingness to collaborate with avatars representing various ethnic groups among a multicultural sample. Specifically, we wanted to answer two research questions:

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- Do students from a multicultural population within Micronesia choose avatars for self-representation that resemble their physical selves?
- Is there a difference in willingness to collaborate in online learning groups with avatars of different ethnicities?

## Method

We sought answers to these questions from a group of undergraduate students who provided demographic information and then chose an avatar and responded to a question about their choice. Finally, each student looked at a selection of avatars with features resembling different ethnic groups and indicated the degree to which he or she would be willing to collaborate with that avatar in a virtual learning space.

### *Participants*

The student sample consisted of Chamorro and Filipino students in two sections of a first-year education methods course at a public university on Guam. All enrolled students were invited to participate; 29 of the 35 students completed the instrument, yielding 2 white, 1 African American, 2 Micronesian, 15 Chamorro, and 9 Filipino participants. The ethnic groups with 1 or 2 participants were dropped as there were too few to test for significance in this study. Among those retained for further analyses were 22 women and 2 men, aged 18 to 26 years ( $M=20.92$ ,  $SD=2.73$ ).

### *Avatars*

To develop the avatars for this study, we recruited university students of various ethnic groups to pose for photographs. These students indicated their primary ethnicity and signed waivers to release their photographs for use in the study and subsequent publications. Using [AvMaker](#) from [CyberExtruder](#), we superimposed two-dimensional digital photographic images of each student's face onto a three-dimensional avatar face in Second Life ([Figure 1](#)). This process provided a set of avatars with much more realistic ethnic facial features than those that could be produced using the avatar customization controls in Second Life. Screen shots of the avatars taken at a common location in the virtual environment provided male and female images for the four ethnic groups used in this study: Chamorro, Filipino, Micronesian, and European ([Figure 2](#)).

### *Instrumentation*

We developed an online instrument to collect demographic data, assess reasons for choosing a particular avatar for self-representation, and measure willingness to collaborate in online activities with avatars of various ethnic groups. Demographic information collected included age, ethnicity, and gender. A single question assessed participants' reasons for selecting a particular avatar for self-representation with two possible answers ("it looks like me" or "it allows me to be someone different").

To measure participants' willingness to collaborate in online class activities with avatars of various ethnicities, we developed a collaborative distance scale based on the Bogardus Social Distance Scale ([Exhibit 3](#)). Designed by Emory Bogardus (1933) to measure attitudes toward racial and ethnic groups, the Bogardus Social Distance Scale has remained one of the most commonly used methods of measuring prejudice (Wark and Galliher 2007). In the original instrument, social distance is a measure of how willing participants are to associate with members of a designated group. The Collaborative Distance Scale ([Exhibit 4](#)) that we developed for this study modifies the Bogardus Social Distance Scale by adding statements related to willingness to collaborate in online class activities ranging from intimate collaboration (direct partners) to more extended collaboration (small groups and whole-class activities) to unwillingness to collaborate at all. As in the Bogardus instrument, participants who choose to collaborate at a specified distance are assumed to refuse closer contact. A lower score on the Collaborative Distance Scale indicates willingness to collaborate at a closer distance with the avatar in question than would a higher score.

### *Procedures*

Participants completed the Web-based instrument in a computer lab at a designated time. The online system first instructed each participant to input demographic information. The participant was then shown high-resolution images of each avatar created for this study and asked to choose one to use as his or her self-representation in a virtual-world classroom. He or she was then asked to indicate a reason for selecting a particular avatar. Finally, male and female avatars of each of the four ethnicities chosen for this study were shown to the participant in random pairs along with the Collaborative Distance Scale to be completed for each avatar pair. Data for each participant were collected and stored by the system and exported in spreadsheet format for statistical analysis in [Minitab](#) version 15.

## Results

Results of these tests indicate a preference for avatars for self-representation that "look like me" and an overall preference for all participants to collaborate more intimately in online classroom activities with Filipino-appearing avatars. The tests also revealed differences in collaborative distances between the two sample groups—with Chamorro participants significantly less willing to collaborate closely with avatars exhibiting European characteristics and Filipino participants significantly less willing to collaborate closely with avatars exhibiting Micronesian characteristics.

### *Choice of Avatar for Self-Representation*

In order to determine whether participants in this study preferred avatars for self-representation that were similar to their physical selves, we used a question from the instrument that dealt with the reason for choosing a particular avatar. A majority of participants indicated that they chose their avatar because "it looks like me" (83%) rather than "it allows me to be someone different" (17%) ([Figure 3](#)). These results are consistent with previous studies (Nowak and Rauh [2005](#); Yee [2008](#); Messinger et al. [2008](#); Reuters [2008](#)) showing that people choose avatars for self-representation based primarily on similarity to self.

To investigate possible differences in reasons for choosing a particular avatar related to the ethnicity of participants, we employed a one-way ANOVA with participants' ethnicity and reason for choosing as factors. There was no significant difference ( $p=0.59$ ) found between Chamorro ( $N=15$ ,  $M=1.27$ ) and Filipino ( $N=9$ ,  $M=1.44$ ) groups related to their reason for choosing a particular avatar for self-representation ([Table 1](#)).

### *Collaboration with Avatars of Different Ethnic Groups*

Our second research question related to willingness to collaborate with avatars representing various ethnic groups. Scores for the Collaborative Distance Scale for two avatars (one male and one female) representing each ethnic group were averaged and tested for differences in means using a one-way ANOVA. Results of this test revealed a significant difference ( $p=0.01$ ) in collaborative distance related to avatar ethnicity ([Table 2](#)). Post-hoc comparisons using the Tukey honestly significant difference (HSD) test indicated that the mean score for Filipino avatars ( $M=1.38$ ,  $SD=0.45$ ) was significantly lower than for that of Micronesian avatars ( $M=1.96$ ,  $SD=0.62$ ). In other words, this sample of Chamorro and Filipino students indicated a general preference to work more closely with Filipino avatars than with Micronesian avatars.

We sought to investigate individual differences between Chamorro and Filipino participants' willingness to collaborate with various avatars. One-way ANOVAs were used to test the mean scores for each group. The first, testing Chamorro preferences for collaborative distance with various ethnic groups, resulted in significant difference in means ( $p=0.02$ ) ([Table 3](#)). Tukey HSD post-hoc comparisons revealed that among Chamorro participants the mean score for Filipino avatars ( $M=1.53$ ,  $SD=0.48$ ) was significantly lower than for European avatars ( $M=2.20$ ,  $SD=0.86$ ), indicating that the Chamorro group was willing to work more closely with Filipino avatars than with European avatars. There was no significant difference found between mean scores for the other avatars ([Figure 4](#)).

A significant difference in mean scores ( $p=0.03$ ) was also found for the Filipino participants ([Table 4](#)). In this group, post-hoc comparisons using the Tukey HSD test indicated that among Filipino participants the mean score for Filipino avatars ( $M=1.11$ ,  $SD=0.22$ ) was significantly lower than for Micronesian avatars ( $M=1.72$ ,  $SD=0.57$ ), which indicated a willingness among Filipino participants to work more closely with Filipino avatars than with Micronesian avatars. There was no significant difference found between mean

scores for avatars representing the other ethnic groups ([Figure 5](#)).

## Discussion and Future Work

We found differences in participants' willingness to collaborate closely in online cooperative groups with avatars exhibiting physical characteristics of various ethnic groups. Both Chamorro and Filipino participants rated Filipino avatars with lower scores on the collaborative distance scale, indicating that both groups preferred to collaborate more intimately with Filipino avatars. Chamorros rated Chamorro avatars with higher scores in collaborative distance, indicating less willingness to work closely with those avatars, than Filipino avatars. Chamorro participants were least willing to collaborate with European avatars while Filipino participants were least willing to cooperate with Micronesian avatars.

These differences likely arise from cultural conditions. For example, the Chamorro group may harbor feelings of resentment toward mainland white residents associated with the U.S. military bases and government on the island of Guam who are felt to disregard Chamorro rights to control their island's destiny (United Nations [2008](#)). These feelings toward the mainland white residents may be more negative than those toward Micronesian immigrants, leading to less willingness to associate closely with avatars that resemble Europeans.

While this is a relatively small exploratory study, it is one of the first to examine differences in willingness to collaborate in virtual worlds based on avatar ethnicity. There are several limitations to this study that warrant further research on a larger scale. First, the sample size was small (N=24), and there were very few male participants in the study (N=2). A larger sample with an equal number of male and female participants may show somewhat different attitudes toward collaboration in group activities with ethnic out-group avatars.

The physical attractiveness of avatars may be another factor related to willingness to collaborate at closer distances. Research shows that attractive students are more likely to be accepted by their peers and are more active in social activities than those deemed to be less attractive (Creekmore 1980). Participants in our study may simply have found the Filipino avatars more attractive than avatars with other ethnic features.

Moreover, in this population many people have ancestors from more than one ethnic group. Chamorro participants in this study with ancestors from the Philippines or East Asia may have identified more closely with the physical appearance of the Filipino avatars than with the Chamorro avatars. We did not label the avatar with an ethnicity nor did we ask participants to indicate which avatar belonged to which ethnic group, so future studies should allow participants to choose which avatar represents each of the ethnicities in order to more specifically identify their feelings toward each group.

This study did not employ a means to measure participants' reasons for their willingness or unwillingness to collaborate. We recommend that future studies seek to obtain not only a score for collaborative distance but also the reasons for an expressed willingness to collaborate more closely with one avatar over another. Lastly, little is known about the impact of personality traits on collaboration. Further studies should investigate the effect of traits such as sociability and emotional empathy on intimacy in collaborative relationships within virtual worlds.

## Conclusion

Despite the growing use of virtual worlds in education, very little research has been done to investigate how self-representation in these environments impacts collaboration in multicultural learning groups. This preliminary study provided empirical evidence that users of virtual worlds for learning do prefer avatars that resemble themselves. In addition, we found significant differences in willingness to collaborate with avatars representing various ethnic groups. Small-group collaborative activities among students using avatars for self-representation are important to the development of community in distance learning programs. Therefore, the study of willingness to collaborate with avatars based on physical characteristics is important to the successful implementation of distance learning systems in places with diverse populations such as Micronesia.

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