To Reveal or To Cloak?
Effects of Identity Salience on Stereotype Threat Responses in Avatar-Represented Group Contexts

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Abstract: With rapid advances in digital technologies, the popularity of avatars – digital representations of people in computer-mediated environments – is growing. Avatars allow people to visually represent their offline social identity, or selectively render certain layer(s) of their social identity less identifiable or unidentifiable in online environments. The present research investigated how African Americans, whose racial identity often suffers negative stereotyping, responded to stereotype threat when they performed a stereotype-relevant task with 2 ostensible coactors in an avatar-represented group setting. A 2 × 2 between-participants design manipulated salience of racial identity (salient vs. nonsalient) and performance context (competition vs. cooperation), and assessed the extent to which participants persisted on an extremely challenging stereotype-relevant task (unsolvable anagram). The results showed that in the context of competition, participants in the race-nonsalient avatar group persisted significantly longer on the unsolvable anagram than did those in the race-salient avatar group; however, in the context of cooperation, no significant difference was found between the 2 avatar groups. The findings indicate that the effects of identity salience as varied by different types of avatars (identity-revealing vs. identity-cloaking) on identity-associated threat may be moderated by the contexts of performance in which the target individuals are situated.

Keywords: Avatars, online groups, identity salience, stereotype threat

Introduction

With rapid advances in digital technologies over the years, the ways in which people interact with one another via computers have changed to a great extent. In its earlier form, computer-mediated communication (CMC) was solely based on text and thus disembodied in nature (Tanis & Postmes, 2007). Although text continues to be the dominant modality in which people interact with each other via computers, the forms of CMC are being remarkably diversified, moving beyond its traditional text-only form.

One notable trend in this regard is the growing popularity of avatars – digital representations of people in computer-mediated environments (Bailenson & Blascovich, 2004; Bente, Rüggenberg, Krämer, & Eschenburg, 2008). With avatars, people can visually represent their offline social identity, or selectively render certain layer(s) of their social identity less identifiable or unidentifiable, or engage in identity-bending by adopting a social category that does not correspond to their offline identity. This way, avatars challenge the notion of visual anonymity, which has been considered a key characteristic of computer-mediated environments. How do such challenges to visual anonymity shape social identity dynamics in computer-mediated groups?

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The present research investigates how psychological threats associated with social category memberships translate into computer-mediated group settings in which avatars can be used to reveal or cloak one's offline social identity. In particular, the current work focuses on stereotype threat (Steele, 1997; Steele & Aronson, 1995) – a type of identity-associated threat that impairs performance and motivation of people whose group identity is negatively stereotyped in a domain – and examines how avatars affect one's experience of stereotype threat in computer-mediated group settings. With avatars becoming "the dominant mode of self-representation in virtual environments" (Yee & Bailenson, 2007, p. 287), addressing these issues will be important to our understanding of how psychological threats associated with social identity transition from the real to the virtual realms. Specifically, the present research will address the following question: When performing a stereotype-relevant task (i.e., a task for which a certain social category group is stereotypically considered to show good or poor performance), how would the target individuals' experience of stereotype threat differ when they are situated in an identity-nonsalient avatar group (based on identity-cloaking avatars) and in an identity-salient avatar group (based on identity-revealing avatars)?

Theoretical considerations

One key characteristic of computer-mediated group interaction is *physical isolation* of interactants in that participating individuals engage in group activities by staying connected via computer networks while being physically isolated from each other (DeAngelis, 2000; Lea, Spears, & de Groot, 2001). Another important characteristic of computer-mediated groups – particularly the ones formed via CMC in its earlier, text-based format – is *visual anonymity* of interactants, which is partly due to the physical isolation factor (i.e., people cannot see each other because they are in separate locations), and also due to the text-based modality of communication which filters out physical and social cues of interactants (Postmes & Spears, 2002). Together, these two characteristics make interactions in computer-mediated groups disembodied in nature (Tanis & Postmes, 2007). With respect to how disembodiment of social interaction facilitated by physical isolation and visual anonymity factors of CMC would affect social identity dynamics in computer-mediated groups, two distinct perspectives have been presented: the equalization hypothesis and the social identification model of deindividuation effects (SIDE) theory (Postmes, Spears, & Lea, 1998).

The equalization hypothesis

Some scholars claimed that disembodiment based on computer mediation would break down not only space and time barriers but also intergroup divides of social categories such as gender, race, and social status (Dubrovsky, Kiesler, & Sethna, 1991; Kang, 2000; Kiesler, Siegel, & McGuire, 1984). This prospect, named as the equalization hypothesis, posited that CMC would allow individuals to benefit from a low-threat environment (Valacich, Dennis, & Nunamaker, 1992). Some early CMC studies did provide empirical support for the equalization hypothesis. For instance, Dubrovsky et al. (1991) conducted an experiment that compared high-status (MBA graduate students) and low-status (average freshmen) members' participation in group interaction on choice-dilemma tasks. In their study, participants in the computer-mediated group condition were physically separated from one another (i.e., each participant performed the task in a separate room), while those in the face-to-face group condition were seated around a table. Their data on the number of total remarks and participation rates indicated that computer-mediated group interaction reduced status effects, with the group discussion significantly less dominated by high-status members in CMC than in face-to-face interaction (Dubrovsky et al., 1991).

Along similar lines, Sproull and Kiesler (1991) demonstrated gender-related equalization effects of computer-mediated group interaction. In the context of decision-making at the level of executives, male executives were five times more likely to advance a first decision proposal than female executives. However, when the group interaction was performed via computer, the female executives made the first decision proposal as often as the male executives did (Sproull & Kiesler, 1991). These findings suggested that computer-mediated group interaction, which allows interactants to engage in group work in an disembodied social space based on physical isolation and visual anonymity, might contribute to equalizing group interaction by minimizing anticipated disadvantage or threats associated with one's social identity (Bordia, 1997; Connolly, Jessup, & Valacich, 1990).

The social identification model of deindividuation effects (SIDE)

The equalization hypothesis was later challenged by CMC scholars who contended that physical isolation and visual anonymity, which contribute to "breakdown of physical boundaries," may not necessarily accompany "breakdown of social boundaries" (Postmes et al., 1998, p. 694). According to this view, what the equalization hypothesis disregarded is the other side of the disembodiment coin. On one hand, disembodied interaction might make social boundaries invisible and consequently insignificant. In a disembodied interaction setting, on the other hand, participating individuals are *less individuated*, that is, led to feel less differentiated from other individuals (Maslach, Stapp, & Santee, 1985) than in face-to-face settings (Postmes, Spears, & Lea, 2002). In

such a state of reduced individuation, or deindividuation, the interactants may become even more susceptible to the influence of social categories and intergroup difference as a result of the heightened awareness of one's social identity as opposed to personal identity (Postmes et al., 2002; Reicher, 1987). It is the Social Identification Model of Deindividuation Effects (SIDE) that has put these psychological processes in perspective (Flanagin, Tiyaamornwong, O'Connor, & Seibold, 2002; Spears, Postmes, Lea, & Wolbert, 2002). The SIDE model has posited that physical isolation and visual anonymity of interactants in computer-mediated groups constitute a condition that reduces individual differences among group members, which, in turn, may accentuate category-based differentiation in the presence of any available cues to social identity. As a consequence, identity cues that are associated with "role, status, and category membership" would remain influential and could not "be divorced from their underlying social context" (Flanagin et al., p. 70).

Research based on SIDE has documented how deindividuated interaction, when compared with individuated interaction, enhances interactants' susceptibility to group membership and categorized perception of self and others. Postmes and Spears (2002, Study 1) showed that simple labeling which signals gender identity in a disembodied, computer-mediated group setting would reproduce unequal gender relations that are often witnessed in face-to-face interaction. Their study was conducted in a setting in which participants interacted in a dyad (1 male and 1 female) with their identity unknown to each other except for gender. In the text-based interface used in the experiment, each message input made by participants was displayed along with the senders' nickname with gender cues (e.g., Man1). Their findings indicated that a significant gender difference in dominance emerged in a stereotype-consistent way: That is, even when participating individuals were (1) physically isolated from each other and (2) remained anonymous except for their gender identity as revealed in the assigned nicknames, men showed greater dominance than female. These findings suggest that the offline unequal gender relations may persist in disembodied online interactions when gender-related cues are made salient through simple labeling.

Avatars and social categories: Rethinking the equalization hypothesis and the SIDE

Given the views on (text-based) CMC posited by the equalization hypothesis and SIDE, manifestation of social categories via avatars raises intriguing questions. The equalization hypothesis posited that physical isolation and visual anonymity of interactants would break down social categories and thereby reduce identity-associated threats for individuals with marginalized social identity. SIDE, on the other hand, challenged this view by arguing that social categories would persist and that CMC would not automatically alleviate threats associated with social identity (Postmes et al., 1998). In avatar-represented CMC, one's avatar does convey visual "cues" that tell something about the avatar user, or lead other individuals to form an impression of the user based on the avatar they see (Cheng, Franham, & Stone, 2002), which may or may not correspond to the person's offline identity. It is also possible for people to "cloak" – make invisible or less salient – one or more layers of their offline social identity. For example, the default (i.e., pre-customization) avatars offered by *Yahoo!Answers* and *Google Talk* are silhouette images that make either gender- or race-related cues unavailable or ambiguous (see Figure 1).

Google Talk   Yahoo! Answers

Figure 1. Default (pre-customized) avatars based on silhouette images.

These various avatar-use practices are important to note, not only in terms of how avatars challenge visual anonymity in computer-mediated environment; they also raise an important question as to whether and how identity-associated threats such as stereotype threat (Steele, 1997; Steele & Aronson, 1995) might be experienced differently by potential targets of the threat in avatar-represented groups.

Stereotype threat: The concept

In general, harmful effects of negative social stereotypes are directly exerted via biased judgment, prejudicial statements, and discriminatory behaviors of stereotype holders against the stereotyped individuals. However, the target individuals may also be affected indirectly when simply perceiving that such negative stereotypes, prejudice, and stigmatization are attached to their social identity, "even in the absence of overt prejudicial behavior" (Stangor, Carr, & Kiang, 1998, p. 1191). One such route in which negative stereotyping exerts indirect influence on the target individuals is *stereotype threat* (Steele, 1997; Steele & Aronson, 1995). Stereotype threat refers to a type of psychological threat induced by situations in which negative stereotyping about a group leads

its members to fear the risk of confirming, or "being reduced to," the negative stereotype (Steele, 1997, p. 614). Such fear in turn brings about behavioral consequences to the target individuals such as performance and/or motivational deficits (Stangor et al., 1998; Steele, 1997; Steele & Aronson, 1995).

The concept of stereotype threat was first introduced by Steele and Aronson (1995). The authors hypothesized that African-American students whose group identity is often negatively stereotyped in intellectual domains would experience a psychological threat when situated in a context in which such a negative stereotype is made salient, and would thereby show significant decrements in performance and motivation on a stereotype-relevant task. For testing the hypothesis, a series of experiments were conducted with African-American and Caucasian-American student participants. Findings demonstrated that African-American students performed significantly worse than Caucasian-American students when the purpose of the experiment task, i.e., solving items taken from the verbal section of the Graduate Record Examination, was framed as "diagnostic of intellectual ability", but not when the task was presented as "a laboratory tool for studying problem solving" (Steele & Aronson, 1995, p. 799: Experiment 1 & 2). Further investigation revealed that African-American participants, when they expected to perform an ability-diagnostic task as opposed to a non-diagnostic task, experienced higher levels of stereotype activation concerning their racial identity (Experiment 3). Moreover, even when the test was presented as non-diagnostic, simply recording their ethnic background prior to taking the verbal GRE test (which served as a race prime) led to significant underperformance for African-American students but not for Caucasian-American students (Experiment 4).

The theory of stereotype threat was initially developed with an emphasis on understanding "how societal stereotypes about groups can influence the intellectual functioning and identity development of individual group members" (Steele, 1997, p. 613), particularly in academic settings (Steele, 1997). Research on the phenomenon, however, has elucidated that stereotype threat is "a general threat" that can be widely experienced "in some setting or another and at some time or another by virtually everyone" (Steele, Spencer, & Aronson, 2002, p. 390), particularly when situational factors increase evaluative concerns for people whose group identities bear the burden of negative stereotypes prevalent in a given society or culture.

Identity salience and stereotype threat in group contexts

Particularly in group settings, increased identity salience has been identified as one of the key situational factors that trigger stereotype threat. For example, as far as members of a negatively stereotyped group are concerned, being a numerical minority in a heterogeneous group may be a situational factor that makes them particularly vulnerable to stereotype threat as their stereotyped identity becomes salient (Inzlicht & Good, 2006). Inzlicht and his colleagues confirmed the role of numerical representation in evoking stereotype threat in face-to-face group settings. In one study, females showed significant underperformance when they took a math test as the only female in a three-person group, although they did not experience performance deficits when they took the test in a group of three females, or in a group of two females and one male (Inzlicht & Ben-Zeev, 2000). Inzlicht and his colleagues further demonstrated that African-American female students performed significantly worse on a GRE-format verbal test when they took the test as a numerical minority in a mixed race, three-person group than those who took the same test as a non-minority (Inzlicht, Aronson, Good, & McKay, 2006).

This line of research was extended by another team of researchers (Beaton, Tougas, Rinfret, Huard, & Delisle, 2007). Beaton et al. (2007) not only replicated the findings of Inzlicht and Ben-Zeev (2000), but, more importantly, illuminated how stereotype anxiety (i.e., anxiety about being judged on the basis of the negative stereotype associated with females in mathematics, or anxiety about confirming the stereotype) mediated the effects of the numerical distinctiveness (i.e., being the only female in the group) on performance deficits. Along similar lines, Sekaquaptewa, Waldman, and Thompson and her colleagues (2007) compared the effects of solo and non-solo status on responses related to stereotype threat. Their study found that solo status in a four-person group led to greater performance apprehension and higher levels of race-representativeness (i.e., feelings of representing one's race) only for African-American participants, not for Caucasian American participants (Sekaquaptewa, Waldman, & Thompson, 2007).

Would stereotype threat operate in avatar-represented group settings, in which individuals are physically isolated but their visual anonymity is challenged by the use of avatars? More specifically, how would different types of avatars – identity-revealing and identity-cloaking avatars (i.e., avatars that make unidentifiable a certain layer of their users' social identity and thereby render that particular social category nonsalient) – affect the ways in which potential targets respond to stereotype threat? When a negatively stereotyped identity is made nonsalient by avatars that "cloak" the relevant social category, can such a setting contribute to reducing stereotype threat, creating a low-threat environment for target individuals of the threat? The identity-nonsalient environments created by identity-cloaking avatars may not mirror the kind of visual anonymity in text-only computer-mediated environments on which the equalization hypothesis was based. However, by comparing situations in which

avatars serve as visual cues to their users' social identity with other situations in which avatars make the identity unidentifiable/nonsalient, we could revisit the equalization hypothesis in light of the challenge posed by avatar-use practices to visual anonymity in CMC, and test whether and how stereotypes that tend to operate in the offline world would also operate in the online world, in which avatars, as virtual representations, embody social categories.

Research questions and hypotheses

The present study will focus on the social identity of race, which tends to exert strong influence on categorization of the self and others, particularly in ethnically heterogeneous social environments (Hitlin, Brown, & Elder, 2006; Ito & Urland, 2003). Race is becoming increasingly embodied in various avatar-based online venues, as technologies allow people to select or customize the race of their avatars (Groom, Bailenson, & Nass, 2009), and this trend poses intriguing questions regarding how the representation of race afforded by avatars shape the experience of potential targets of stereotype threat in online group settings. Specifically, when performing a stereotype-relevant task in online groups, how would targets' response to stereotype threat differ when they are situated in a race-nonsalient avatar group (based on identity-cloaking avatars) and in a race-salient avatar group (based on identity-revealing avatars)?

Studying the experience of racial minorities such as African Americans would be germane to addressing this question. Particularly in the contexts of the United States, African Americans as a racial minority have long suffered negative social and cultural stereotyping about their intelligence, academic achievements, and verbal ability (Steele, 1999), and a considerable amount of research has been devoted to understanding their experience of stereotype threat and its psychological consequences (e.g., Steele & Aronson, 1995; Inzlicht et al., 2006; Marx & Goff, 2005). As a matter of fact, this was one of the key considerations that motivated Steele and colleagues to investigate the effects of stereotype threat (Steele & Aronson, 1995). In the present research, I focused on the motivational aspects of response to stereotype threat. "The threat of being negatively stereotyped," as Nussbaum and Steele (2007) noted, "might cause considerable distress" (p. 127) to target individuals when they perform a task associated with the negative stereotype. Particularly when the target individuals are faced with a challenging stereotype-relevant task, such threat would undermine the target's motivation to deal with the predicament relevant to the domain (Nussbaum & Steele, 2007). Hence, assessment of target individuals' persistence on an extremely challenging, stereotype-relevant task would provide important insight into their response to identity-associated threat.

Revisiting the equalization hypothesis in avatar-represented groups

The equalization hypothesis, as discussed earlier, claimed that the physical isolation and visual anonymity of CMC would help breaking down social boundaries among participating individuals. This perspective may guide us to predict that when identity-cloaking avatars – particularly those which cloak the visual layer of racial categories – are used in a group, the racial identities of the participating individuals are rendered unidentifiable. In such a group setting, it is likely that there would be no "boundaries" that differentiate the social category of race, and, as a result, African Americans are less likely to be concerned about their racial identity; namely, they are less likely to to experience race-representativeness (Sekaquaptewa et al., 2007). Therefore, I posit the following hypothesis:

H1: African-American participants in a race-nonsalient avatar group, when compared with those in a race-salient avatar group, would feel race-representativeness to a lesser extent.

The equalization hypothesis also claimed that the break-down of social boundaries in computer-mediated groups would contribute to forming a low-threat environment for individuals with marginalized and/or stereotyped social identities. If this claim were to hold for avatar-represented groups in which racial identities are made nonsalient, African Americans as a potential target of stereotype threat would be less affected by the threat in such a setting than when they are situated in a group where their racial identity is made salient by identity-revealing avatars. Therefore, the following hypothesis is posited:

H2: African-American participants in a race-nonsalient avatar group, when compared with those in a race-salient avatar group, would exhibit greater persistence on an extremely challenging threat-relevant task.

Testing the moderating role of performance contexts

In computer-mediated group settings where individuation is limited, as the SIDE theory has theorized, the influence of social categories on people's perception and behavior may be determined, to a great extent, by the social contexts in which they are situated. In particular, whether or not contexts of task performance – competitive versus cooperative – interact with identity salience/nonsalience afforded by avatars in a given group may be worth investigating as a possible moderator variable.

When individuals perform a task in a group, their interests or goals may more or less conflict or align with other people's interests or goals. Conflicting interests/goals situate the individuals in a competitive context while aligning interests/goals situate them in a cooperative context (Deutsch, 1949; Van Knippenberg & Schippers, 2007). As demonstrated in social psychological research on cooperation, the context of cooperation among individuals with different group memberships tends to reduce subgroup categorization, allowing the individuals to focus more on the shared identity of the superordinate group as opposed to the identity of the subgroups (Gaertner & Dovidio, 2000; Gaertner, Dovidio, Banker, Houlette, Johnson, & McGlynn, 2000); hence, in the context of cooperation, the varying degrees of identity salience as instantiated by avatars may not lead to differences in terms of target individuals' threat response. On the other hand, in the context of competition in which the pressure to win tends to be inherently high, target individuals may be more prone to experience stereotype threat when they are situated in a race-salient group (e.g., based on identity-revealing avatars) than in a race-nonsalient group (e.g., based on identity-cloaking avatars). Therefore, I posit the following hypotheses[1]:

H3a: The persistence difference between the race-nonsalient avatar group and the race-salient avatar group would be greater in the context of competition than in the context of cooperation.

H3b: In the context of competition, African-American participants in the race-nonsalient avatar group would show greater persistence than would those in the race-salient avatar group.

Method

In this study, African-American college students solved an unsolvable anagram puzzle using a game play interface, in which participants and the other two "players" (who were in actuality computer-simulated images) represented themselves with avatars. Half of the participants were randomly assigned to a same-gender virtual group in which race cues were made salient with identity-revealing avatars, which were presumed to correspond to the players' offline racial identity; in addition, the participant was represented by an avatar that looked like an African American while the other "players" in the virtual group were represented by Caucasian-looking avatars; this approach based on numeric minority representation in a triad, which followed the experimental paradigm employed by previous research on stereotype threat (e.g., Inzlicht & Ben-Zeev, 2000), was intended to maximize the salience of racial identity. The other half were assigned to a same-gender group in which race cues were made nonsalient with identity-cloaking avatars based on silhouette images. Then, within each condition, half of the participants engaged in competition, and the other half engaged in cooperation.

Participants and design

Forty-eight African-American students attending a large private University in the United States (26 female and 22 male) volunteered to participate in the study. Participants were recruited via (1) classes offered by the Department of Communication (i.e. courses that required fulfilling certain hours of experiment participation) and (2) emailing lists of various African-American student groups. At this school, African-American students account for approximately 10.6 % of the entire undergraduate population.

To make the competition/cooperation manipulation effective, this study employed monetary reward structures. The announcement of the study, advertised as *Research Study on Game Playing Using Avatar-Based Interfaces*, stated that participants would receive experiment participation credit (if they participated to fulfill course requirements) or $10 (if they participated for payment); in addition, participants were informed that they would receive additional payment based on their performance on the game on top of the course credit or the $10 baseline payment. Regardless of their actual performance, all participants were awarded $5 in addition to the course credit/$10. These participants were randomly assigned to one of the four experimental conditions in a 2 (identity salience: race-salient vs. race-nonsalient) $\times$ 2 (performance context: competition vs. cooperation) between-participants factorial design. Participants' ages ranged from 18 to 24 years, $M = 20.6$, $SD = 1.4$.

Materials

Avatars. For the race-salient condition, six African-American avatars (three male and three female) and four Caucasian avatars (two male and two female) were used in this study. The African-American avatars were presented to participants during the avatar selection phase; the Caucasian avatars were presented as coactors during the game play session along with the African-American avatar selected by participants. These ten avatars

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[1]Although some may point out that H3b is implied by H2, it should be noted that H2 and H3b have different goals. While H2 aims to test the main effect of avatar-based race salience, H3b is testing the interaction effects between avatar-based race salience and coaction contexts to explore the possibility of the latter playing the role of a moderating variable.

were pretested by a group of 14 pre-testers (five Caucasians, four Asians, two African Americans, and three mixed-race individuals) in terms of (a) identifiability of race, (b) perceived intelligence, and (c) attractiveness. First, all of the ten avatars were correctly identified by the pre-testers in terms of the racial categories they were intended to represent. Second, the avatars were rated in terms of attractiveness and perceived intelligence on a five-point scale (1 = *not at all*, 5 = *very much*). Repeated-measures analyses of variance showed that there was no significant difference across the ten avatars. For attractiveness, the ratings ranged from 2.6 (SD = 0.8) to 3.2 (SD = 1.4), $F(9, 117)$ = 1.02, p > .42. For perceived intelligence, the means ranged from 2.4 (SD = 0.9) to 3.3 (SD = 1.0.), $F(9, 117)$ = 1.67, p > .10. The silhouette-image avatars used in the race-nonsalient avatar groups were created based on the avatars used in the race-salient avatar groups with the Adobe Photoshop application.

Anagram Task. For assessing participants' motivation as indicated by the extent to which they persisted in the face of a difficult challenge, a seven-letter unsolvable anagram ("ORNTAAL") was used, which has been documented in previous research as an effective item to be used as an unsolvable problem (Calef et al., 1992).

Procedure

Participants were run individually in an experiment room equipped with a laptop computer. After providing consent, participants were seated in the experiment room and were asked to carefully read the instructions provided on the screen. Participants were presented with an instruction page, which informed them that their gaming task would be anagram-solving, and that the task was "designed to assess people's verbal ability." Inclusion of this information (i.e., the task being diagnostic of verbal ability) followed the stereotype threat manipulations used in the existing research (e.g., Steele & Aronson, 1995; Marx & Goff, 2005).

Participants were then provided with more information on how to solve the anagrams:

> Anagrams are puzzles that require you to unscramble a set of letters to form a *meaningful* word (For example, ICPLNE → PENCIL). When solving these puzzles, there are two rules you must follow. For each anagram:
> 1) You must use ALL of the letters presented
> 2) You cannot add any other letters when you come up with a word.

Performance Context Manipulation. After the general instruction, the next screen informed participants that they would be selecting an avatar to represent themselves during the game-play session. Participants were then presented with information intended as a manipulation of the performance contexts (competition vs. cooperation). In the competition condition, the instruction read

> Anyone who participates in this game will receive $10 or 1-hour course credit. **And the player who achieves the highest score in the group will be honored as the BEST PLAYER with additional prize money. To beat the other players and win the prize**, you should manage your time well and do your best when you solve the puzzles.

In the cooperation condition, the instruction read

> Anyone who participates in this game will receive $10 or 1-hour course credit. **And the team that achieves the highest average score will be honored as the BEST TEAM and each member of the winning team will receive additional prize money. To help your team achieve the highest average score and win the prize**, you should manage your time well and do your best when you solve the puzzles.

Background Information Session. Before proceeding to avatar selection, participants were presented with a short questionnaire page that contained questions about their gender, ethnic background, and hours they generally spent on using the Internet. The first two questions on gender and ethnic background were intended to make participants – particularly the ones in the race-salient conditions – believe that avatar choices would later be given based on the information they had provided in this information page. These questions were important for the race-salient condition, because participants would be choosing one out of three African-American avatars within the same gender group so that only the racial identity would be made salient. Although participants in the race-nonsalient condition would be presented with silhouette-image avatars from which only gender, not race, was identifiable, they answered the same set of questions. It was based on the consideration that simply asking participants to indicate their racial identity might trigger stereotype threat (Steele & Aronson, 1995), and unless both the race-salient and race-nonsalient participants answered the same set of questions, it would be impossible to isolate the effects of identity representation via avatars. Therefore, both race-salient and race-nonsalient participants answered the ethnic background question.

Identity Salience Manipulation. Manipulation of identity representation (race-salient vs. race-nonsalient) was threefold: (1) avatar selection, (2) log-on process, and (3) avatar display. First, during the avatar selection process which followed the background information session, participants in the race-salient condition were presented with three African-American-looking avatars. The gender of these avatars was the same as the participants' gender (see Figure 2).

Male Version

Female Version

Figure 2. Sample screenshots of the avatar selection section (race-salient condition).

The race-nonsalient condition offered three same-gender, race-unidentifiable avatars based on silhouette-like images that varied in color/shape. The gender of these avatars was the same as the participants' gender (see Figure 3).
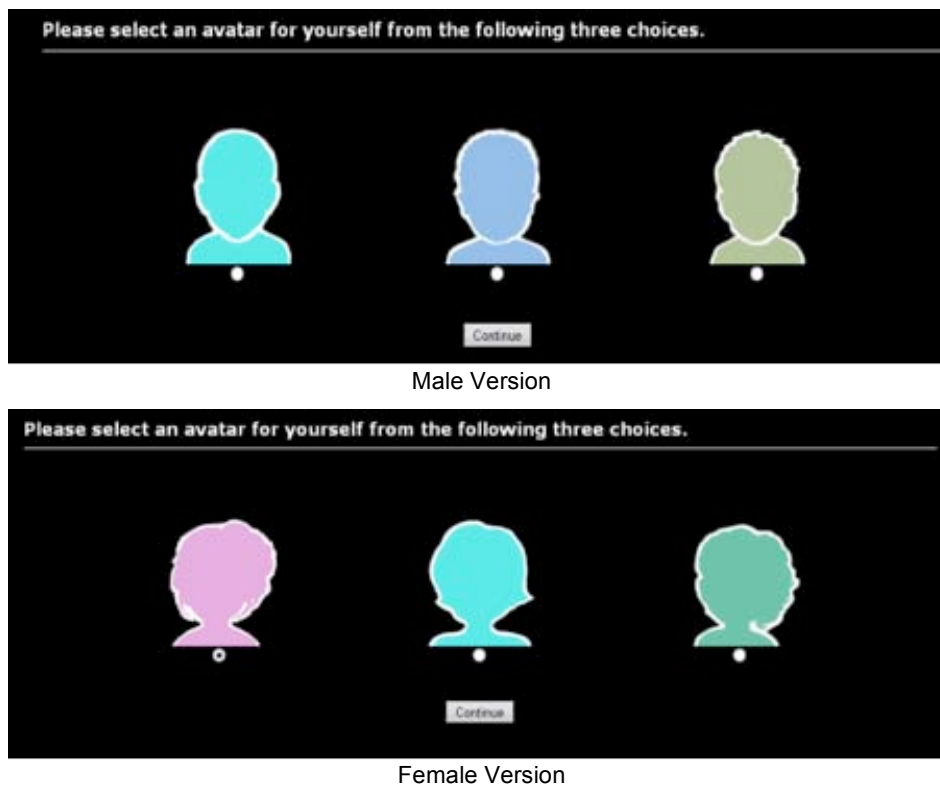

Male Version

Female Version

Figure 3. Sample screenshots of the avatar selection section (race-nonsalient condition).

As soon as participants selected an avatar for themselves, the interface confirmed their selection, and informed that they could now log on to play the game and check the log-on status of the other players, as illustrated in Figure 4.
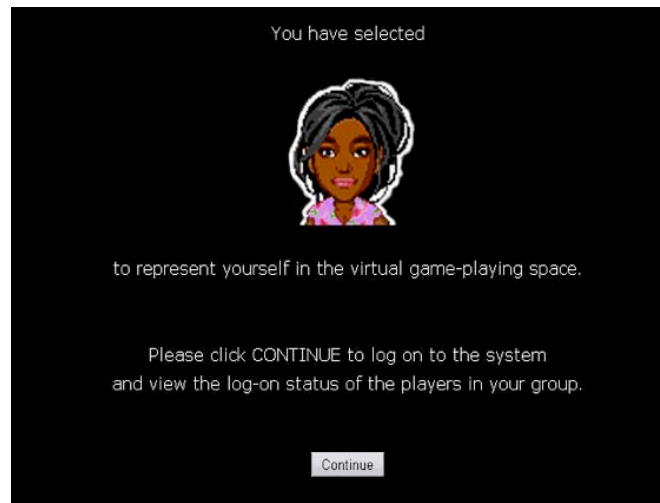

Figure 4. A sample screenshot of avatar selection confirmation (race-salient condition for female participants).

On the log-on status screen, participants could see avatars of the simulated co-players. Participants saw their own avatars displayed first, followed by the other avatars of the simulated co-players. Participants in the race-salient condition, representing themselves with African-American avatars, had two Caucasian-looking avatars as co-players. Participants in the race-nonsalient condition represented themselves with silhouette image avatars and the simulated co-players' avatars were also based on race-unidentifiable silhouette images (Figure 5).
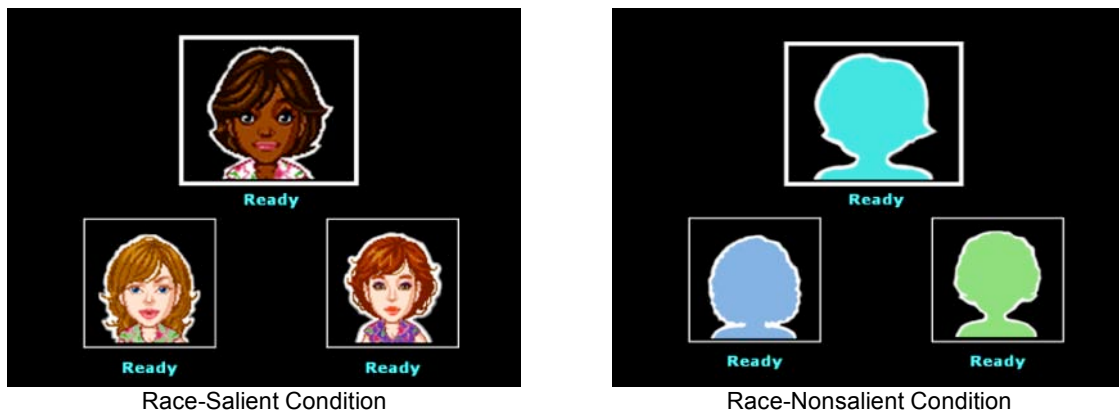

Race-Salient Condition   Race-Nonsalient Condition
Figure 5. Sample screenshots of the log-on animation (female version).

Anagram Solving. For measuring persistence during the anagram-solving session, a timer function was programmed and embedded in the computer application so that the time spent on the item could be recorded and that participants would be automatically stopped after 10 minutes of time from the start and move onto the next phase, i.e., answering the post-questionnaire. This timer function was kept invisible to the participants so that the participants' awareness of time spent on the difficult item would not affect their willingness to persist. As a way to measure persistence more effectively (i.e., to see whether participants were willing to give up or not), the instruction informed participants to type "give up" if they couldn't solve the extra credit item.

Transition to Post-Questionnaire. The post-questionnaire section, which followed the anagram-solving session, included (1) dependent measures, (2) items for manipulation checks, and (3) questions about demographic information. When participants finished answering the post-questionnaire, they were debriefed, paid, and thanked by the experimenter.

Measures and manipulation checks

Race-Representativeness. Three items, adapted from the items used in Sekaquaptewa et al. (2007), were employed for measuring race-representativeness: "I felt that I was viewed as a member of my race/ethnic group before I was seen as an individual"; "I felt like I had to represent my race/ethnic group"; and "If I didn't do well on the task, it will reflect negatively on other people like me who may do this later." Each of these items were

rated on a seven-point scale (1 = *strongly disagree*, 7 = *strongly agree*). A factor analysis showed that these three items loaded on a single factor, and this factor accounted for 68% of the variance in response (*eigenvalue* = 2.1), with no other factor yielding an eigenvalue greater than 1. Thus, the items were averaged into a reliable index (*α* = .77).

Persistence. Persistence was assessed by measuring the number of seconds participants spent on the unsolvable anagram (Harris, 1986). The length of time spent on the anagram by participants until they typed "give up" in the answer box was recorded by a timer function script embedded in the computer application used for the game playing interface. Meaningless words entered (e.g., "ORNATAL") were considered equivalent to "give up".

Feelings of Co-Presence. This item was included for checking whether the manipulations (i.e., identity salience/nonsalience and competitive/cooperative performance context) affected participants' sense of co-presence with the ostensible coactors in the computer-mediated group, which might in turn affect their engagement with the experiment task. Three items were adapted from the *Networked Minds Social Presence Inventory* (Biocca & Harms, 2002): "I often felt as if the other players and I were not far away from each other"; "I often felt as if my co-players and I were in the same space together"; and "I often felt as if my co-players and I were in different places rather than together in the same space" (reversed item). These items were rated on a seven-point scale (1 = *strongly disagree*, 7 = *strongly agree*). A factor analysis showed that all three items loaded on one factor, and this factor accounted for 61% of the total variance (*eigenvalue* = 1.8), with no other factor yielding an eigenvalue greater than 1. Thus, the items were averaged into a composite index (*α* = .66).

Manipulation Checks. Items for manipulation checks were included in the post-questionnaire. The identity salience (race-salient vs. race-nonsalient) manipulation was checked with a multiple-choice question with five choices (a. one white & two non-whites; b. two whites & one non-white; c. three whites; d. three non-whites; e. unidentifiable); participants were asked to identify the racial composition of their respective group. I checked the performance-context manipulation by asking participants to rate their agreement to the following two statements on a seven-point scale (1 = *strongly disagree*, 7 = *strongly agree*): "My primary goal was to beat the other players in my group" (competition manipulation) and "My primary goal was to do my best to help raise the average score of my group" (cooperation manipulation).

Results

Data analytic considerations

Analysis of variance (ANOVA) tests were conducted for the three key measures, i.e., *race-representativeness* (*M* = 2.9, *SD* = 1.6) and *persistence* (*M* = 121.8, *SD* = 64.5), which were the two dependent variables of the present experiment, as well as *feelings of co-presence* (*M* = 2.4, *SD* = 1.0), which was included as an additional measure for addressing possible alternative accounts. Table 1 presents means and standard deviations of the three measures by condition. A correlational analysis showed that none of these key measures was significantly correlated with the other measures (all r's < .23, p's > .12).

Table 1.
Means and Standard Deviations of the Key Measures by Condition

Experimental conditions		Measures		
Identity salience	Coaction context	Race-Representativeness	Persistence (in seconds)	Feelings of co-presence
Race-salient avatar group	Competition	3.4 (1.4)	89.4 (30.1)	2.5 (0.8)
	Cooperation	3.7 (1.7)	123.9 (44.4)	2.0 (0.6)
Race-nonsalient avatar group	Competition	2.9 (1.7)	156.3 (93.5)	2.6 (1.2)
	Cooperation	1.8 (0.7)	117.6 (60.8)	2.3 (1.4)

Note. Standard deviations are presented in parentheses.

Manipulation checks

Identity Salience Manipulation. First, the identity salience manipulation was checked by participants' recall of the racial composition of the group. All of the 24 participants who were assigned to the race-salient condition correctly recalled that their group had one African-American and two Caucasian avatars, and all of the other 24 participants who were assigned to the race-nonsalient condition chose "unidentifiable." Taken together, these results demonstrated that the group composition manipulation was successful.

Performance Context Manipulation. Next, I checked the performance context manipulation by conducting a series of t-tests on participants' responses to statements that reflected competitive vs. cooperative goal orientations. First, independent samples t-tests were employed for direct comparison of the competition and the cooperation conditions on two items, i.e., "My primary goal was to beat the other players in my group" (competition) and "My primary goal was to do my best to help raise the average score of our group" (cooperation). For the competitive goal orientation, the competition participants, $M = 5.5$, $SD = 1.8$, gave higher ratings than did the cooperation participants, $M = 4.0$, $SD = 2.3$, and the mean difference was significant, $t(46) = 2.47$, $p < .02$, Cohen's $d = 0.71$. Conversely, the cooperation participants gave significantly higher ratings, $M = 5.5$, $SD = 1.7$, than did the competition participants, $M = 2.9$, $SD = 1.9$, on the cooperation goal orientation item, $t(46) = 4.92$, $p < .001$, $d = 1.42$. In addition, I tested whether the mean scores of the competition and the cooperation conditions were significantly higher than the mid-point value of 4 on the competitive and cooperative goal orientation items, respectively. One-sample t-tests (one-tailed) showed that the mean competitive goal orientation of the participants in the competition condition was significantly higher than the mid-point, $t(23) = 4.15$, $p < .001$, and the mean cooperative goal orientation of the participants in the cooperation condition was significantly higher than the mid-point as well, $t(23) = 4.16$, $p < .001$. Taken together, these tests confirmed that the performance context manipulation was successful.

Race-representativeness

A 2 (identity salience: race-salient vs. race-nonsalient) × 2 (performance context: competition vs. cooperation) ANOVA was conducted for race-representativeness. The main effect of identity salience, which was relevant to testing H1, was significant, $F(1, 44) = 8.49$, $p < .01$, $\eta^2 = .15$. As hypothesized, the race-nonsalient participants, $M = 2.3$, $SD = 1.4$, showed significantly lower levels of race-representativeness than did the race-salient participants, $M = 3.6$, $SD = 1.6$. Thus, H1 was supported. The main effect of performance context, $F(1, 44) = .78$, $p > .38$, $\eta^2 < .01$, and the interaction effect, $F(1, 44) = 2.79$, $p > .10$, $\eta^2 = .05$, were not significant.

Persistence

A 2 (identity salience: race-salient vs. race-nonsalient) × 2 (performance context: competition vs. cooperation) ANOVA was conducted for the time-based persistence measure. The analysis showed that the main effect of performance context, $F(1, 44) = 0.01$, $p > .93$, $\eta^2 < .01$, was not significant. The main effect of identity salience, which was relevant to testing H2, was only marginally significant in the hypothesized direction, $F(1, 44) = 2.87$, $p < .10$, $\eta^2 = .05$, with the race-nonsalient participant, $M = 136.9$, $SD = 79.6$, persisting slightly longer on the unsolvable anagram than the race-salient participants, $M = 106.7$, $SD = 41.1$. Thus, H2 was not supported.
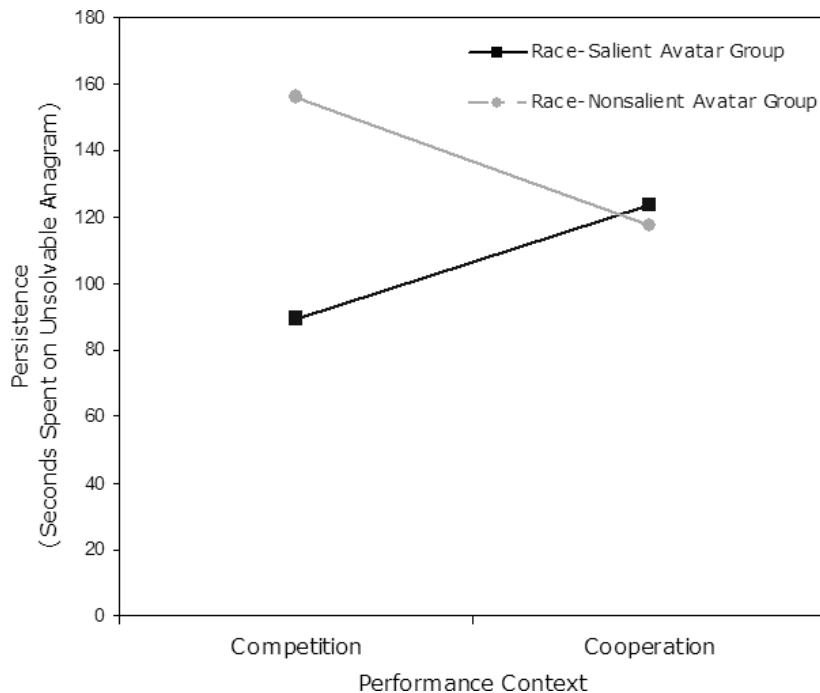

Figure 6. Effects of identity salience and performance context on persistence.

However, the interaction effect, which was relevant to testing H3a and H3b, was significant, $F(1, 44) = 4.19$, $p < .05$, $\eta^2 = .08$ (Figure 6). For teasing apart the interaction effect, a simple effects test was conducted. The analysis revealed a significant mean difference for the context of competition, $F(1, 44) = 6.99$, $p < .01$, $\eta^2 = .13$, but not

for the context of cooperation, $F(1, 44) = 0.06$, $p > .80$, $\eta^2 < .01$. Hence, H3a was supported by the data. Furthermore, the race-nonsalient participants persisted significantly longer on the unsolvable anagram, $M = 156.3$, $SD = 27.0$, than did the race-salient participants, $M = 89.4$, $SD = 8.7$; therefore, the data supported H3b.

An additional simple effects test showed that the competition and the cooperation contexts did not show a significant difference within the race-salient avatar group, $F(1, 44) = 1.86$, $p > .18$. Likewise, within the race-nonsalient avatar group, the difference between the competition and the cooperation contexts was not significant, $F(1, 44) = 2.34$, $p > .13$.

Additional analysis: Feelings of co-presence

To determine whether the experimental conditions affected feelings of co-presence, I conducted a 2 (identity salience: race-salient vs. race-nonsalient) $\times$ 2 (performance context: competition vs. cooperation) ANOVA. Neither the main effect of identity salience, $F(1, 44) = 0.41$, $p > .53$, $\eta^2 < .01$, nor the main effect of performance contexts, $F(1, 44) = 1.20$, $p > .28$, $\eta^2 = .02$, was significant. Also, the interaction effect, $F(1, 44) = 0.13$, $p > .72$, $\eta^2 < .01$, was not significant.

Discussion and conclusion

The findings of this study show that the effects of reduced identity salience achieved via identity-cloaking avatars may contribute to creating a low-threat setting (Valacich et al., 1992) for targets of stereotype threat to a certain extent. The results concerning the effect of identity salience on race-representativeness echoed the equalization hypothesis, which claimed that the visual anonymity of CMC would eliminate the boundaries of social categories (Dubrovsky et al., 1991). African Americans who were situated in a race-nonsalient group based on identity-cloaking avatars reported significantly lower levels of race-representativeness than did those who were situated in a race-salient group based on identity-revealing avatars.

However, when participants' persistence on the unsolvable anagram was examined, the data were not in line with the equalization hypothesis. That is, the persistence level exhibited by the race-nonsalient avatar group participants and that exhibited by the race-salient avatar group participants did not show a significant difference. Rather, the data revealed that the context of coaction moderated the effects of identity salience on persistence. Specifically, it was only in the context of competition that the African-American participants in the race-nonsalient group persisted longer on the unsolvable anagram (avg. 156 seconds) than did the race-salient participants (avg. 89 seconds); the race-nonsalient and the race-salient participants who engaged in cooperation persisted on the unsolvable anagram for similar, middling length of time (avg. 117 and 123 seconds, respectively). These patterns suggest that in avatar-represented groups where the levels of visual anonymity (or reduced identity salience) vary depending on the types of avatars used by participating individuals, the effects of identity salience/non-salience on identity-associated threat response may be moderated by the contexts of coaction in which the target individuals are situated.

The pattern which emerged within the context of competition is intriguing, particularly in reflection of the equalization hypothesis and SIDE. African-American participants in the race-salient avatar group, in which the only available *and* salient social category information was one's (African-American) ethnic identity, showed significantly lower levels of persistence when compared with those in the race-nonsalient avatar group. This pattern, when compared with the pattern shown by the context of cooperation in which no significant difference was found between the race-salient and the race-nonsalient avatar groups, presents an interesting contrast between the equalization hypothesis and SIDE. The low persistence levels exhibited by the race-salient avatar group point to the process in which the heightened sense of identity salience could have led to experience of stereotype threat when combined with the pressure to win against the "outgroup members" who were expected not to bear the burden of a negative stereotype in the given domain. In contrast, it is likely that participants in the race-nonsalient avatar group – who remained "anonymous" to the other "coactors" and to whom the identity of the competitors was unknown – could persist to a greater extent because they were free from such a psychological burden.

Although research on stereotype threat or identity threat has yet to document the moderating role of coaction contexts in group performance settings, the present finding resonates with the insight provided by Rosenthal and Crisp (2006). Although Rosenthal and Crisp (2006) did not directly examine the effects of competitive and cooperative contexts on stereotype threat responses in group performance settings, they demonstrated that stereotype threat could be reduced when ingroup-outgroup boundaries were to be blurred (e.g., by asking target individuals to think of characteristics that their ingroup members and outgroup members have in common). Given that individuals from different subgroups could achieve shared membership of one larger group when

engaging in intergroup cooperation, the boundary-blurring, as noted by Rosenthal and Crisp (2006), could occur in the context of cooperation in group performance settings. In the present findings, unlike the pattern shown by the competition conditions, the persistence level shown by the race-salient avatar group condition did not significantly differ from that shown by the race-nonsalient avatar group condition in the context of cooperation. This pattern may reflect the boundary-blurring effects of cooperation.

Cooperative contexts call for further research with respect to motivational responses in virtual team settings. Research on cooperation in anonymous online groups (Wittchen, Schlereth, & Hertel, 2007) has demonstrated that when engaging in online group work as opposed to individual work, people exhibit motivational gains particularly when they are aware of the indispensability of their contribution, even in highly anonymous settings. In the cooperation manipulation of the present experiment, participants were instructed that they should perform well to help the team win; such a manipulation may be considered to involve only a moderate level of indispensability. It will be interesting to investigate whether and how the effects of indispensability on the target's motivational responses to threat vary depending on the levels of identity salience as manifested by different types of avatars in virtual team settings.

There are limitations to the present research that may qualify the interpretations and generalizability of its findings. It could be pointed out that, for a more systematic examination of underlying psychological processes relevant to the deindividuating effects of avatars in virtual group settings in reflection of SIDE, it would be necessary to include experimental manipulations that could illuminate the role of self. For example, adding another factor that allows us to compare individuated versus deindividuated states (e.g., Ambady, Paik, Steele, Owen-Smith, & Mitchell, 2004) may shed light on the influence of (1) the self (with a negatively stereotyped social identity), (2) avatars that vary the visual anonymity of the stereotyped social identity, and (3) performance contexts on the target's identity threat response. In addition, the present research does not disentangle the cognitive processes and the strategic processes of SIDE. According to more recent developments in the SIDE theory, the cognitive dimension of SIDE largely concerns identity salience as varied by anonymity/identifiability of others to the self, and the strategic dimension of SIDE, such as identity management and identity performance, implicates anonymity/identifiability of the self to others (Klein et al., 2007; Sassenberg & Postmes, 2002). Future research should examine how the cognitive and the strategic dimensions of SIDE shape stereotype threat responses in avatar-represented groups.

Regarding the avatars used in the present experiment, it should be noted that participants' choice of avatars was limited and constrained for experimental manipulation purposes. In particular, for manipulating identity salience, the present study forced participants to either reveal their African-American ethnic identity (through race-revealing avatars) or "cloak" it (through silhouette avatars). The majority of online environments (e.g., online games, immersive virtual worlds) provide users with greater flexibility and diversity in terms of avatar choice and customization (Lim, 2006; Yee & Bailenson, 2007). Given such avatar-use practices, the disparity between the avatar choice/customization practices outside the laboratory and the "forced" choice procedures used in the present research should be noted.

Another critical limitation to the present research, and also to most single-session laboratory experiments that have studied social and psychological effects of avatars, concerns the issue of self-avatar identification. In most avatar-based online environments, particularly in immersive virtual worlds and multiplayer online games, participating individuals tend to establish psychological connection to and identification with their avatars, keeping them for months, or even years (Bessiére, Seay, & Kiesler, 2007). In most one-time laboratory experiments, however, participants are often forced to use avatars predetermined by the researchers or are given very limited choice. In these laboratory settings, participants may not be able to feel a sense of identification the avatars they use. These issues concerning avatar use in experimental contexts should be addressed in future research.

In addition, because the present experiment did not compare identity-salience manipulations through avatars with other representations of social category information (such as cues that could be conveyed through one's user name), its findings do not allow us to understand avatar-specific effects. In this regard, another question that could be raised is whether the social category information conveyed by the visual cues made available through avatars would be more influential than non-visual cues made available through other types of representations such as one's user name. By comparing experimental conditions that directly reveal or mask social category information through means other than avatars with avatar-based conditions, future studies could systematically demonstrate avatar-specific effects on identity threat responses in CMC.

Additionally, with respect to the race-salient avatar group conditions, one may point out that the identity salience manipulation used in the present experiment was problematic. The race-salient avatar group employed in the present experiment might have been effective for maximizing the salience of racial/ethnic identity of the

African-American participants, as demonstrated by the existing research that examined the effects of numerical representations (e.g., Inzlicht & Ben-Zeev, 2000; Inzlicht et al., 2006; Sekaquaptewa et al., 2007). However, a concern could be raised that identity salience and numerical minority salience might have been confounded in the race-salient avatar group manipulation as used in the present experiment. Future research could systematically address such a concern by including race-revealing avatar conditions with different numerical representations (e.g., a condition in which African-American avatars constitute a numerical majority and another condition which has only African-American avatars).

Despite these limitations, the findings of the present research have important implications for understanding the social dynamics of virtual groups, and for designing and managing computer-mediated interfaces for virtual teams. With the advances in digital technologies, virtual teams are increasingly adopting avatar-based interfaces for networked collaboration (Bente et al., 2008). As demonstrated by the findings reported here, contexts of performance may play a key moderating role in shaping the effects of identity salience on identity threat responses in a stereotype-relevant domain. With that said, for designing and determining what avatar practices would be most appropriate for a virtual team, it will be important to consider (1) participating individuals' social identity, (2) types of the task to be performed, and (3) framing of the performance context.

As the present study demonstrates, computer-mediated environments are not free of identity-associated threats. Stereotypes prevalent in the offline world do play out in the online world, where the social identity dynamics become increasingly complex as avatars embody social categories such as gender and race in otherwise disembodied space. As computer-mediated, online interactions are increasingly involving avatars, understanding how identity-associated threats such as stereotype threat operate in avatar-represented environments will be important to addressing the challenges and opportunities that arise in the online world.

References

Ambady, N., Paik, S. K., Steele, J., Owen-Smith, A., & Mitchell, J. P. (2004). Deflecting negative self-relevant stereotype activation: The effect of individuation. *Journal of Experimental Social Psychology, 40,* 401–408.

Bailenson, J. N., & Blascovich, J. (2004). Avatars. In W. S. Bainbridge (Ed.), *Encyclopedia of human-computer interaction* (pp. 64–68). Great Barrington, MA: Berkshire Publishing Group.

Beaton, A., Tougas, F., Rinfret, N., Huard, N., & Delisle, M.-N. (2007). Strength in numbers?: Women and mathematics. *European Journal of Psychology of Education, 22*, 291–306.

Bente, G., Rüggenberg, S., Krämer, N. C., & Eschenburg, F. (2008). Avatar-mediated networking: increasing social presence and interpersonal trust in net-based collaborations. *Human Communication Research, 34*, 287–318.

Bessiére, K., Seay, A. F., & Kiesler, S. (2007). The ideal self: identity exploration in World of Warcraft. *CyberPsychology & Behavior, 10*, 530–535.

Biocca, F., & Harms, C. (2002). Networked minds social presence inventory (Scales only, Version 1.2): Measures of co-presence, social presence, subjective symmetry, and intersubjective symmetry. Retrieved September 15, 2006, from http://www.mindlab.msu.edu/Biocca/pubs/papers/2002_netminds_scales.pdf

Bordia, P. (1997). Face-to-face versus computer-mediated communication: a synthesis of the experimental literature. *Journal of Business Communication, 34*, 99–120.

Calef, R. S., Choban, M. C., Calef, R. A., Brnad, R. L., Rogers, III, M. J., Geller, E. S. (1992). Effects of unsolvable anagrams on retention. *Bulletin of the Psychonomic Society 30*, 164–166.

Cheng, L., Franham, S., & Stone, L. (2002). Lessons learned: building and deploying shared virtual environments. In R. Schroeder (Ed.), *The social life of avatars: presence and interaction in shared virtual environments* (pp. 90–111). London: Springer.

Connolly, T., Jessup, L. M., & Valacich, J. S. (1990). Effects of anonymity and evaluative tone on idea generation in computer-mediated groups. *Management Science, 36*, 689–703.

DeAngelis, T. (2000). Is Internet addiction real? *APA Monitor on Psychology, Special Issue on Psychology and the Internet, 31*(4), Retrieved April 19, 2008, from http://www.apa.org/monitor/apr00/addiction.html

Deutsch, M. (1949). A theory of cooperation and competition. *Human Relations, 2*, 129–152.

Dubrovsky, V. J., Kiesler, S., & Sethna, B. N. (1991). The equalization phenomenon: status effects in computer-mediated and face-to-face decision-making groups. *Human-Computer Interaction, 6*, 119–146.

Flanagin, A. J., Tiyaamornwong, V., O'Connor, J., & Seibold, D. R. (2002). Computer-mediated group work: the interaction of member sex and anonymity. *Communication Research, 29*, 66–93.

Gaertner, S. L., & Dovidio, J. F. (2000). *Reducing intergroup bias: The common ingroup identity model.* Philadelphia, PA: Psychology Press.

Gaertner, S. L., Dovidio, J. F., Banker, B. S., Houlette, M., Johnson, K. M., & McGlynn, E. A. (2000). Reducing intergroup conflict: From superordinate goals to decategorization, recategorization, and mutual differentiation. *Group Dynamics: Theory, Research, and Practice, 4*, 98–114.

Groom, V., Bailenson, J., & Nass, C. (2009). The influence of racial embodiment on racial bias in immersive virtual environments. *Social Influence, 4*, 1–18.

Harris, K. R. (1986). The effects of cognitive-behavior modification on private speech and task performance during problem solving among learning-disabled and normally achieving children. *Journal of Abnormal Child Psychology, 14*, 63–67.

Hitlin, S., Brown, J. S., & Elder, J., G. H. (2006). Racial self-categorization in adolescence: Multiracial development and social pathways. *Child Development, 77*, 1298–1308.

Inzlicht, M., Aronson, J., Good, C., & McKay, L. (2006). A particular resiliency to threatening environments. *Journal of Experimental Social Psychology, 42*, 323–336.

Inzlicht, M., & Ben-Zeev, T. (2000). A threatening intellectual environment: Why females are susceptible to experiencing problem-solving deficits in the presence of males. *Psychological Science, 11*, 365–371.

Inzlicht, M., & Good, C. (2006). How environments can threaten academic performance, self-knowledge, and sense of belonging. In S. Levine & C. Van Laar (Eds.), *Stigma and group inequality: Social psychological perspectives* (pp. 129–150). Mahwah, NJ: Lawrence Erlbaum Associates.

Ito, T. A., & Urland, G. R. (2003). Race and gender on the brain: Electrocortical meaures of attention to the race and gender of multiply categorizable individuals. *Journal of Personality and Social Psychology, 85*, 616–626.

Kang, J. (2000). Cyber-race. *Harvard Law Review, 113*, 1130–1208.

Kiesler, S., Siegel, J., & McGuire, T. W. (1984). Social psychological aspects of computer-mediated communication. *American Psychologist, 39*, 1123–1134.

Klein, O., Spears, R., & Reicher, S. (2007). Social identity performance: Extending the strategic side of SIDE. *Personality and Social Psychology Review, 11,* 28–45.

Lea, M., Spears, R., & de Groot, D. (2001). Knowing me, knowing you: anonymity effects on social identity processes within groups. *Personality and Social Psychology Bulletin, 27*, 526–537.

Lim, S. (2006). *The effect of avatar choice and visual POV on game play experience.* Unpublished doctoral dissertation, Stanford University.

Marx, D. M. & Goff, P. A. (2005). Clearing the air: The effect of experimenter race on target's test performance and subjective experience. *British Journal of Social Psychology, 44,* 645–657.

Maslach, C., Stapp, J., & Santee, R. T. (1985). Individuation: conceptual analysis and assessment. *Journal of Personality and Social Psychology, 49*, 729–738.

Nussbaum, A. D., & Steele, C. M. (2007). Situational disengagement and persistence in the face of adversity. *Journal of Experimental Social Psychology, 43*, 127–134.

Postmes, T., & Spears, R. (2002). Behavior online: Does anonymous computer communication reduce gender inequality? *Personality and Social Psychology Bulletin, 28*, 1073–1083.

Postmes, T., Spears, R., & Lea, M. (1998). Breaching or building social boundaries? SIDE-effects of computer-mediated communication. *Communication Research, 25*, 689–715.

Postmes, T., Spears, R., & Lea, M. (2002). Intergroup differentiation in computer-mediated communication. *Group Dynamics: Theory, Research, and Practice, 6*, 3–16.

Reicher, S. D. (1987). Crowd behavior as social action. In J. C. Turner, M. A. Hogg, P. J. Oakes, S. D. Reicher & M. S. Wetherell (Eds.), *Rediscovering the social group: a self-categorization theory* (pp. 171–202). Oxford: Blackwell.

Rosenthal, H. E. S. & Crisp, R. J. (2006). Reducing stereotype threat by blurring intergroup boundaries. *Personality and Social Psychology Bulletin, 32,* 501–511.

Sassenberg, K., & Postmes, T. (2002). Cognitive and strategic processes in small groups: Effects of anonymity of the self and anonymity of the group on social influence. *British Journal of Social Psychology, 41,* 463–480.

Sekaquaptewa, D., Waldman, A., & Thompson, M. (2007). Solo status and self-construal: Being distinctive influences racial self-construal and performance apprehension in African American women. *Cultural Diversity and Ethnic Minority Psychology, 13*, 321–327.

Spears, R., Postmes, T., Lea, M., & Wolbert, A. (2002). When are net effects gross products? The power of influence and the influence of power in computer-mediated communication. *Journal of Social Issues, 58*, 91–107.

Sproull, L., & Kiesler, S. (1991). *Connections: new ways of working in the networked organization.* . Cambridge, MA: MIT Press.

Stangor, C., Carr, C., & Kiang, L. (1998). Activating stereotypes undermines task performance expectations. *Journal of Personality and Social Psychology, 75*, 1191–1197.

Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist, 52*, 613–629.

Steele, C. M. (1999). Thin ice: "Stereotype threat" and black college students. *The Atlantic Monthly, 284,* 44–47, 50–54.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology, 69*, 797–811.

Steele, C. M., Spencer, S., & Aronson, J. (2002). Contending with images of one's group: The psychology of stereotype and social identity threat. In M. Zanna (Ed.), *Advances in experimental social psychology* (pp. 379–440). San Diego, CA: Academic Press.

Tanis, M., & Postmes, T. (2007). Two faces of anonymity: paradoxical effects of cues to identity in CMC. *Computers in Human Behavior, 23*, 955–970.

Valacich, J. S., Dennis, A. R., Jr., & Nunamaker, J. F. (1992). Group size and anonymity effects on computer-mediated idea generation. *Small Group Research, 23*, 49–73.

Van Knippenberg, D., & Schippers, M. C. (2007). Work group diversity. *Annual Review of Psychology, 58*, 515–541.

Wittchen, M., Schlereth, D., & Hertel, G. (2007). Social indispensability in spite of temporal and spatial separation: Motivation gains in a sequential task during anonymous cooperation on the Interent. *International Journal of Internet Science, 2,* 12-27.

Yee, N., & Bailenson, J. N. (2007). The Proteus Effect: the effect of transformed self-representation on behavior. *Human Communication Research, 33*, 271–290.