Levelling Up on Stereotype Threat:

The Role of Psychological Connection to Avatar in Math Performance

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Abstract

Avatar identity can induce stereotype threat, which means that some people conform to the stereotypes about this identity and thereby perform in accordance with the stereotype. Specfically, people who used female avatars in a competitive math task performed worse than people who used male avatars, regardless of the individual's sex (Lee, 2009). The present study attempted to replicate these finding and investigated the role of connection to the avatar in this effect. It was hypothesized that people would be affected by stereotype threat when they use a gendered avatar, and that this effect would be moderated by feelings of connection to the avatar. A 2 (avatar customization: customized vs. generic) X 2 (avatar gender: female vs. male) between-subjects experiment found that females who customized and used a female avatar scored lower on the math task than did those who customized and used male avatar. Further, body-level connection to the avatar was unexpectedly found to hinder the stereotype threat effect, most likley because such a connection leads to arousal, which inhibits performance on some cognitive tasks. Overall, this research suggests that certain types of connections to certain avatar identities can be used to combat stereotype threat.

Extended Abstract

Avartars, the virtual representations of users in a video game, play an important role in the effects that the game has on the player. Research on the Proteus Effect has found that people who use an avatar behave in ways that are consistent with their avatar's identity (Yee, Bailenson, & Ducheneaut, 2009). For example, people who use taller avatars were found to act more confidently in a subsequent negotiation task. Other research has also found that avatar identity can induce stereotype threat, which means that some people conform to the stereotypes about this identity and thereby perform in accordance with the stereotype. Specfically, people who used female avatars in a competitive math task performed worse than people who used male avatars, regardless of the individual's sex (Lee, 2009). This indicates that using a gendered avatar creates some type of personal connection to the avatar that encourages users to experience stereotype threat in accordance with the avatar's identity.

The mechanism by which such connections to avatars induce behavioral effects has been largely unexplored. There are numerous ways in which people view, control, communicate through, and otherwise interact with their avatars, and so it is unclear whether some types of connections to avatars are more effective at inducing the behavioral effects of using avatars described above. The present article utilizes the concept of *self-presence,* which was introduced to describe the psychological experience an avatar as part of the self (Biocca, 1997; Lee, 2004), to operationalize three distinct levels on which a neurologically-defined self can connect to an avatar: body, emotion, and identity (Ratan, 2012, in press). These three levels of self-presence potentially moderate the effects of avatar identity on user behavior.

The present study attempted to replicate the finding of avatar-induced streotype threat and investigated the role of connection to the avatar (i.e., self-presence) in this effect. It was hypothesized that people would be affected by stereotype threat when they use a gendered avatar, such that people who use a male avatar in a video game would score higher on a math task after the game than those who use a female avatar. Also, the three types of connections to the avatar (i.e., body-, emotion-, and identity-level self-presence) were expected to moderate the effects of avatar gender on the math score such that stronger connections to the avatar would facilitate stronger effects on the math score.

A 2 (avatar customization: customized vs. generic) X 2 (avatar gender: female vs. male) between-subjects experiment, with 64 female college student participants, was conducted to test the hypotheses and research questions. Participants played the game Swordplay, in which players swing the controller ("Wii mote") to manipulate a blunt sword in a duel. After the game play, they were asked to indicate their connections to their avatars using the Self-Presence Questionnaire (Ratan, 2012, in press), which measures the three levels of connections to avatars described above (body, emotion, identity). Participants also completed 10 arithmetic questions (e.g., '526 – 258?') in their heads and input their answer on an iPad.

While the expected stereotype threat effect was not apparent across all conditions, a marginally significant interaction effect between the conditions suggested that stereotype threat was induced for participants who customized their avatars. Further tests identified results that are consistent with Lee's (2009) findings, showing that females who customized and used a female avatar scored lower on the math task than did those

who customized and used male avatar. This results implies that the streotype threat effect occurs only when a player customizes an avatar herself.

Also, one type of connection to the avatar affected the relationship between the avatar's gender and test score. Namely, the body-level connection to the avatar (i.e., proto self-presence) moderated the relationship between avatar gender and math performance. Unexpectedly, however, this connection to the avatar was found to hinder the stereotype threat. In other words, the stronger the body-level connection the participants felt to their male avatars, the lower their math score. This result could be explained by the fact that arousal may impede computational ability while relaxation promotes it (Diego et al., 1998; Field, Diego, & Hernandez-Reif, 2010). That is, feeling connected to an avatar on a body level leads to more engagement in the video game and thus more arousal, thereby hindering ability to perform well on a subsequent cognitive task. As a result, although participants felt a stronger connection to the male avatar, they did not perform better.

Overall, this research suggests that different types of connections to different types of avatar identities play unique roles in the effects on the avatar user. The results from this study will hopefully contribute to an increased knowledge of how avatars in video games can be designed to encourage better performance on cognitive tasks, such as math problems, across both males and females. In other words, players can use their avatars to level up above stereotype threat.

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