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BRIEF REPORT

Virtually numbed: Immersive video gaming alters real-life experience

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Abstract As actors in a highly mechanized environment, we are citizens of a world populated not only by fellow humans, but also by virtual characters (avatars). Does immersive video gaming, during which the player takes on the mantle of an avatar, prompt people to adopt the coldness and rigidity associated with robotic behavior and desensitize them to real-life experience? In one study, we correlated participants' reported video-gaming behavior with their emotional rigidity (as indicated by the number of paperclips that they removed from ice-cold water). In a second experiment, we manipulated immersive and nonimmersive gaming behavior and then likewise measured the extent of the participants' emotional rigidity. Both studies yielded reliable impacts, and thus suggest that immersion into a robotic viewpoint desensitizes people to real-life experiences in oneself and others.

Keywords Pain · Gaming · Immersion · Dehumanization · Social cognition · Imagery

As actors in a highly mechanized environment, we live in a world populated both by fellow humans and by animated characters. Not only do we engage with this animated world on a perceptual level—for example, when watching animated movies or preflight safety demonstrations; we also relate to this world on an interactive level (e.g., in communicating with companies' digital sales assistants when shopping online) and on an immersive level, during role-playing video games in which we incarnate into the virtual anatomy of an avatar. What is the consequence of taking on the role of—and identifying with—a nonhuman character? In the present study, we explored the impact of identifying with and taking on the perspective of an avatar during immersive video gaming on the expression and experience of human pain.

Video-game playing is a widespread leisure activity, and its appeal extends across the age range and social spectrum (Padilla-Walker, Nelson, Carroll & Jensen, 2010). Much has been said about video-game playing and its impacts on human attention, perception, and action (e.g., Green & Bavelier, 2003; Feng, Spence & Pratt, 2007; Jackson, von Eye, Fitzgerald, Zhao & Witt, 2010). In general, the skills practiced during video-game playing prime corresponding behaviors in real life, as studies have reported that playing aggressive or cooperative games leads to real-life aggression or cooperation, respectively (Anderson et al., 2010; Gentile et al., 2009). Aggressive video gaming has been shown to lead to dehumanization and moral disengagement (Bastian, Jetten & Radke, 2012; see also Fischer, Kastenmüller & Greitemeyer, 2010; Hartmann & Vorderer, 2010; Konijn, Bijvank & Bushman, 2007).

A central feature of role-playing video games is that the player adopts the perspective of a virtual character—or avatar. Avatars in today's role-playing games often have automaton-like, robotic characteristics. Haslam (2006) characterized the qualities and behaviors linked to robots and automata as including a mechanistic inertness, rigidity, and a lack of emotionality and warmth.

According to the general learning model (Buckley & Anderson, 2006; cf. Gentile et al., 2009), video-game playing leads to the activation of mental scripts, as well as learning and feedback mechanisms that allow the practiced skills and behaviors to become part of the player's repertoire—in particular, if the behaviors are practiced in multiple contexts (i.e., different video games; Gentile et al., 2009). This multiplicity

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of contexts is indeed often the case, as many gamers play different video games, and hence have a diverse learning environment in which to practice behaviors and adopt the corresponding skills. The more that these gamers play, and the more diverse the playing context, the more likely they are to adopt new forms of experience and behavior that can then also generalize and be extended into real life.

According to this reasoning, adopting the mantle of an avatar would have consequences for our experience and behavior as human actors in a real-world context. If robotic, automaton-like behavior is associated with a lack of emotionality and mechanistic inertness (Haslam, 2006), then adopting the perspective of an avatar that has mechanistic and robotic characteristics should lead participants to practice taking on such mechanistic characteristics, and should in turn reduce individuals' emotionality and desensitize them to pain in real life. This desensitization would be expected to be stronger, the more that it was practiced (i.e., the more video gaming took place). In the following study, we tested this assumption in a correlational (Study 1) and in an experimental (Exp. 2) context.

Study 1

In the first study, we sought to capitalize on individuals' naturally occurring gaming behavior. We invited participants into the laboratory, asked them about their weekly numbers of hours of video gaming, and correlated their responses with a measure of pain tolerance—the number of paperclips that they retrieved from ice-cold water. According to the predictions derived from the general learning model, more-active video gamers were expected to act more routinely in a virtual environment and to adopt the perspective of an avatar more frequently, and hence should be desensitized more strongly to real-life experience: They should experience less pain.

Method

Participants A group of 39 students participated in the study (M_{age} = 20.7 years). All were male and reported an average of 9.59 h of video gaming per week (min = 0 h, max = 50 h, SD = 11.48). One did not participate in the paperclip task and was hence eliminated from the subsequent analyses. The participants were paid £5 for their time.

Material and procedure Upon arrival at the laboratory, participants were asked to complete an extended demographic questionnaire that assessed their average numbers of hours of video gaming per week as our central independent variable (we also asked for video-gaming time on *weekdays* only, as well as on *weekends* only, as we expected that participants would be able to provide a more concise and accurate number when the temporal window was more narrow/specific). Following this, and to assess participants' tolerance of pain, we asked them to remove as many paperclips as possible within 30 s from a basin filled with ice-cold water (ice blocks were on the surface of the water) and 30 paperclips (Bastian, Jetten & Fasoli, 2011). The basin was 10 in. long, 8.5 in. deep, and 7.5 in. wide. The participants then took part in another task and were debriefed.

Results and discussion

Participants retrieved on average 13.05 (SD = 2.94) paperclips from the basin. As predicted, we found a significant and positive correlation between the average number of hours that participants reported playing per week and the number of paperclips that they retrieved from ice-cold water, $r(38)$ = .321, p = .050: The longer the participants played, the more paperclips they retrieved.[1] As expected, this tendency was particularly evident in cases in which participants' estimates stretched over a more circumscribed temporal interval—*weekend* days, $r(38)$ = .337, p = .039—whereas no reliable correlation emerged between the number of retrieved paperclips and the number of hours played on an average *weekday*, $r(38)$ = .267, p = .106. The results hence provide a preliminary confirmation for our hypothesis that acting in a virtual space desensitizes people to real-life experience.

However, these results are open to the various confounds that can pervade correlational studies. To overcome this constraint, we experimentally manipulated gaming.

Experiment 2

In the second experiment, we sought to corroborate and extend the findings of the correlational approach used in Study 1. In this experiment, participants played either an immersive or a nonimmersive computer game, and then participated in the pain-resistance task. We also assessed the consequences of video gaming on perceiving other people's experiences by asking participants to evaluate images that depicted pain and pleasure in other people.

Method

Participants A group of 49 students participated in the experiment in return for course credit or payment. Of these, three

[1] When the individual claiming 50 h of weekly video gaming was removed, the correlation remained largely unchanged, $r(27)$ = .317, p = .056.

did not follow the task instructions and were eliminated from the analyses. Of the remaining participants, 33 were female, and the average participant age was 19.26 years.

Material and procedure For 7 min, participants in the immersive gaming group played an immersive video game in which they acted in a virtual 3-D world through the eyes of a robotic avatar. The game play was first-person. We used a game that was nonviolent so as to ensure that our findings would not be due to confounding violent gaming with immersive gaming. Control participants played a nonimmersive puzzle game. Participants then completed the paperclip task described in Study 1. Next, they viewed five pictures of people expressing various levels of pain and displeasure and rated the experienced emotion of those people on a 7-point scale (from *extreme pleasure* to *extreme displeasure*). Likewise, they viewed five pictures of people expressing various levels of pleasure and rated the most likely experience of those people on a similar scale.

Results and discussion

In both the pain-in-self and pain-in-others tasks, immersive video-game players exhibited a reduced sensitivity to pain: Participants removed significantly more paperclips from ice-cold water, $t(44) = 2.23$, $p = .031$, and attributed a more indifferent experience to people depicted as experiencing displeasure, $t(44) = 2.12$, $p = .040$, than did the nonimmersive players (see Fig. 1). Neither age nor gender interacted with condition to qualify these results. We observed no effect of video gaming on rating other people's experience of pleasure, $t(44) = 0.839$, $p = .406$.

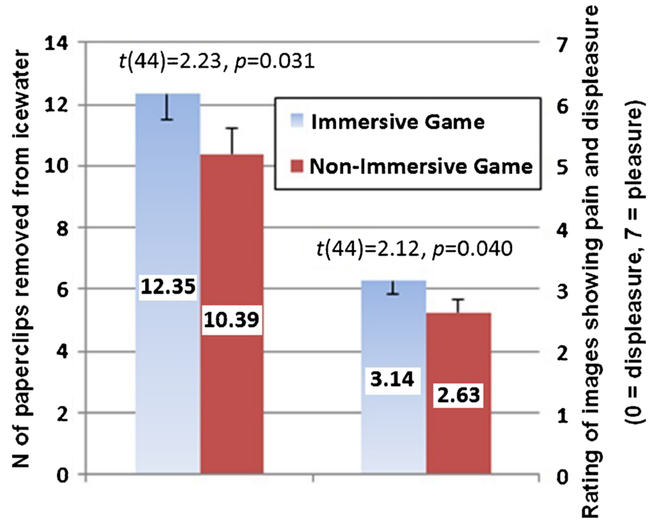

Fig. 1 Experience of pain in self and others in Experiment 2

Experiment 3

Immersive video-game players might have enhanced levels of manual dexterity—and the increased number of paperclips removed in Experiment 2 may have been due to increased manual dexterity rather than to changes in pain tolerance.[2] In an effort to rule out such a confound, we conducted the experiment again. Instead of using ice-cold water, however, we used a measure that included no pain component. If manual dexterity could account for the findings in Experiment 2, the same pattern should be replicated in this experiment. If the effect was due to differences in pain tolerance, no effect should be observed in this experiment, because no element of pain was involved.

Method

Participants A group of 16 students participated in the experiment in return for course credit. Of these, ten were female, and the average participant age was 18.76 years (the ages of three participants were not recorded).

Material and procedure As in Experiment 2, participants first played an immersive video game or a nonimmersive puzzle game on a computer. Instead of a basin with ice-cold water, however, the paperclips were placed in a box and covered up with scrunched-up pieces of paper towel to hide the paperclips from view (as the ice had in Exp. 2).

Results and discussion

Participants playing an immersive video game removed approximately the same number of paperclips as did participants playing the puzzle game. In fact, immersive gamers removed slightly more paperclips than the nonimmersive gamers, $M = 10.5$, $SD = 2.45$, versus $M = 9.7$, $SD = 3.91$, but the difference was not significant, $t(14) = 0.459$, $p = .653$.

The logic of our control experiment depended on a null effect, and with the relatively small number of participants, the experiment may have suffered from low power. At the same time, we also wish to point out that the type of manual dexterity needed for video gaming is different from the type of dexterity needed for fishing paperclips out of water (the former is more directing in nature, the latter more grasping). Our student participants were also likely to spend a significant amount of their time writing/typing, an effect that would have easily dominated over learning effects from the manual dexterity acquired through video-game practice. In light of the

[2] Thanks to a reviewer for raising this possibility.

findings from this experiment, as well as the overall considerations, differences in manual dexterity in Experiment 2 were unlikely to account for the effect of video gaming on pain sensitivity.

General discussion

Derived from both a correlational and an experimental approach, our findings suggest that taking on and acting from the perspective of an automaton-like avatar desensitizes people to pain in oneself and in others. The point of view that we adopt during video gaming thus appears to have implications that extend beyond the virtual environment, into real life (see also the general learning model: Buckley & Anderson, 2006; Gentile et al., 2009).

If immersion into a robotic viewpoint during video gaming attenuates qualitative experience, we are called to reflect on the way that we integrate such gaming practices into our daily life—in a culture in which the playing of video games is commonplace, especially among males. We are not advocating a general code of conduct as a result of these findings, because it is the responsibility of the competently judging individual to find their own line between having the experience of an enjoyable game, on the one hand, and living with its impact, on the other. Nonetheless, in light of the present findings, we suggest that individuals reflect on and scrutinize the impact of their immersive gaming practice on their own experience and then come to a conclusion as to whether they see a need to change this practice and/or balance its impact.

In addition to humans entering virtual machines/robots, the human–machine boundary is blurred from the other end by anthropomorphizing machines (see animated figures, toys, or other machines that are programmed to attract human inclinations) and by virtual characters and robots taking on tasks or roles that have traditionally been occupied by human actors—for example, in the counseling context (e.g., robot therapists). We are thus creating an environment in which it becomes increasingly easy and normal to regard artificial beings as being akin to human beings. We see this blurring as a reality of our time but also as a confused development that has begun to shape society, and we believe this development should be watched and scrunized and at the very least balanced by other developments in proportion—for example, by working on our awareness of what it really means to be human; by exploring where and when we experience human qualities and human nature, and when not; and by enquiring into how we can best make use of robotic/artificial intelligence developments and their beneficial applications without becoming enslaved by them. Interpreting the blurring as normal is, in our view, akin to committing a *category mistake*, in a philosophical context.

We do not wish to divert attention from the fact that our study has a number of shortcomings: It is tentative in nature, with only one correlational study (which, in the overall analysis, only just reached the significance level at .050) and one experiment; it illuminates only one dimension—the experience of pain; and it only speaks to one potential confound—the interpretation of our results in terms of manual dexterity. Yet we see it as an important starting point, and hope to raise an awareness of this underresearched and yet important aspect of our interaction with virtual characters.

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