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Impact of violent video game realism on the self-concept of aggressiveness assessed with explicit and implicit measures

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ABSTRACT

We compared the standard 2D representation of a recent violent computer game to its 3D representation realized by shutter-goggles in a lab experiment. Assuming that the higher degree of realism of media violence would impact stronger on players in a pretest–posttest design, we analyzed the influence of violent video game exposure on implicit and explicit measures of aggressiveness. According to an explicit questionnaire on aggressiveness, participants reported having becoming more peaceful, whereas an Implicit Association Test on aggressiveness (Agg-IAT) indicated that the association between self and aggressive behavior became stronger after violence exposure, confirming the unique utility of Agg-IATs in media research. The 3D visualization mode, however, did not further strengthen this association, and a mediation model of increases in aggressiveness by participants' flow experiences was not supported. When inspecting flow experiences, an interaction effect between gender and visualization mode was evident: Male participants were more likely to have flow experiences in the high-realism (3D) format, whereas female participants were more likely to experience flow in the standard (2D) mode. We discuss the findings in the context of automatic information processing in aggression, and we contend possible changes in automatic behavioral precursors due to media influence.

1. Introduction

This contribution investigates the psychological consequences of a potent factor in violent video and computer games (VVG): a player's immersion into realistic game scenarios. The present experiment has been designed to test whether the impact of VVG on automatic aspects of players' aggressiveness concept is a function of the game's realism, potentially mediated by a player's higher flow experiences in more realistic scenarios. The introduction will first briefly review short- and long-term effects of violent media exposure and theoretical explanations. Then potential mediators between game realism in VVG and subsequent changes of aggressiveness will be discussed. Drawing on current dual-process models of social cognition and behavior, it is contended that the observation of possible effects should encompass more objective measures of aggressive dispositions, such as implicit measures, as they capture crucial automatic processes that matter in the generation of aggressive behavior and may be shifted by VVG.

1.1. Violence exposure in video games

Computer game features help players get immersed into the games. Carefully calibrated challenges and rewards, well-balanced with elements of chance, engage a player in various tasks. Not denying the positive effects on players' enjoyment, social ties, mental relaxation, visual acuity and other cognitive benefits (e.g., Adachi & Willoughby, 2013; Granic, Lobel, & Engels, 2014; Green & Bavelier, 2006, 2012), what has concerned many researchers is that violence exposure can stimulate aggressive cognition, affect, and behavior, while reducing empathy and prosocial behavior (e.g., Anderson & Bushman, 2002; Bartholow, 2005; Bushman & Anderson, 2001). In line with social learning theory (Bandura, 1977), gratification after observing aggressive models is held responsible for acquiring aggressive behavioral scripts (Crick & Dodge, 1994). Contemporary approaches underscore learning even in the absence of immediate reinforcement (e.g., mimicry of aggressive scripts; Bushman & Anderson, 2001; Bushman & Huesmann, 2006; Huesmann & Kirwil, 2007).

One prominent model for comprehensively explaining detrimental VVG effects in the short and long run is the General Aggression Model (GAM; Anderson & Bushman, 2002; Anderson & Dill, 2000; Bushman & Anderson, 2002; for a critical note see

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Ferguson & Dyck, 2012). In the short run, situational factors—moderated by personality traits (Bushman, 1995)—can trigger aggressive scripts (short-time effects refer here to minutes up to hours; i.e., on the level of a state). The supposed mechanisms are unspecific arousal, angry emotions, and aggressive cognitions. A multitude of primary lab experiments as well as meta-analyses have demonstrated a significant causal effect of computer game violence on aggression (Anderson, 2004; Anderson and Bushman, 2001; Anderson et al., 2003). Long-term effects have been described for emotional desensitization to violence and chronic activation of aggressive behavioral scripts (Carnagey & Anderson, 2004; Cline, Croft, & Courier, 1973; long-time effects refer to time periods of months and years; i.e., they are rather on a trait level). Paralleling research on TV violence (Huesmann, Moise-Titus, Podolski, & Eron, 2003), long-term studies have shown that consuetudinary use of VVG throughout childhood significantly predicts physical aggression during adolescence (Anderson et al., 2008).

Despite these stable effects, the cause-effect debate is still going on, partly because meta-analytical conclusions diverge (Anderson et al., 2010; Ferguson & Kilburn, 2009). To the extent that preformed attitudes and gamer's explicit self-views contrast with autonomous effects, which may even be hidden from introspection, a reconciliation seems difficult to achieve, especially if players feel as if they need to defend themselves against accusations of negative effects from common leisure activities (Kneer, Glock, Beskes, & Bente, 2012; Przybylski, Deci, Rigby, & Ryan, 2014). One way to partially reconcile the contradictory evidence then, apart from critically discussing any sophisticated meta-analytical strategies, is to highlight the limits of self-report measures of aggressive dispositions (Bender, Rothmund, & Gollwitzer, 2013) and to use objective implicit measures as a complement. The latter are based on objective indicators; being less blatant, they are more difficult to control than subjective measures. It has been firmly established that implicit measures of the aggressiveness self-concept sensitively reflect the influence of different computer games, and that implicit measures, under controlled conditions, reflect the impact of violent, but not nonviolent game conditions (Bluemke, Friedrich, & Zumbach, 2010; Bluemke & Zumbach, 2012; Uhlmann & Swanson, 2004). What is still unclear, though, is whether implicit measures reflect the influence of game realism as sometimes found with subjective measures, and whether the altered psychological state actually serves as a mediator in this process.

1.2. Involvement, identification, and realism in computer gaming

We use as a starting point the recent computer games that often attempt to maximize the *realism* of computer games. Here, *virtual reality* is intended to help players immerse themselves totally in a game, and, thus to increase realism (Hoorn, Konijn, & van der Veer, 2003; Konijn & Hoorn, 2005). Modern *Immersive Virtual Environment* (IVE) technologies, which are typically head-mounted displays with 3D visualization and motion-based input devices, are used more frequently nowadays, partly with the approved goal to establish aggressive skills, for instance, in military training units (Persky & Blascovich, 2008; Tamborini & Skalski, 2006). This drives our overall research question: Do VVG effects become stronger, the more real the games feel, and can this be demonstrated independently of subjective self-reports?

Our first working hypotheses are here: (1) Directing one's game character through a virtual world connects the player's self with the virtually executed behaviors to some extent in the short run, and if exposed to violent actions repeatedly, a player's self-concept may be altered such that aggressive schemata are advanced as the dominant ones (Crick & Dodge, 1994). (2) This automatic association between self and aggressive schemata will be picked up by implicit measures (though it can be censored from an explicit view of the self).

As a preliminary answer, research has shown that the mere *involvement* of a computer game player with a game character (avatar) is sufficient for stronger media effects than when watching similar content passively (Carnagey & Anderson, 2004). *Identifying* with the virtual protagonist can blur the distinction between the virtual and the real world and exacerbate subsequent aggressive behavior (Konijn, Nije Bievank, & Bushman, 2007). Support for the relevance of a player's involvement in realistic VVG comes from a lab experiment by Fischer, Kastenmüller, and Greitemeyer (2011). When participants created their own avatars so that these were optically reminiscent of the players themselves, the detrimental effect of violence exposure on aggression was markedly intensified in comparison to pre-selected avatars, and this effect was mediated by players' involvement (cf. Hoffner & Buchanan, 2005).

In another study, Tamborini et al. (2004) compared VVG effects of a modern IVE with those of a classic desktop version of the game. Participants in the IVE condition reported that they experienced being present in the game (so-called "telepresence") more strongly and felt more hostile affect afterward (cf. Eastin & Griffiths, 2006). Persky and Blascovich (2008) showed that, in comparison to less immersive desktop platforms, IVE platforms promoted particularly the experience of presence and aggressive thoughts, not necessarily of aggressive behavior; they also found higher levels of aggressive cognition among active players than among passive game observers. Krcmar, Farrar, and McGloin (2011) showed that IVE participants reported higher levels of aggression to the extent that they strongly identified with their characters, suggesting that *experienced realism* mediated between platform and individual effects (cf. Ivory & Kalyanaraman, 2007). Rajae-Joordens (2008) observed long-term effects of using 2D and 3D devices for watching movies and playing a VVG. The 3D device significantly intensified not only aggressive, but all sorts of emotional experiences. It appears that blurring the distinction between virtual world and reality by increasing telepresence aggravates any emotional experiences, and possibly also unwarranted VVG effects.

The different processes—identification, involvement, and experienced realism—feed into a common signal: the experience of immersive flow, that is, the total absorption in a task, which is a specific state of mind and powerful explanatory concept. According to Csikszentmihalyi (1991), flow is an increased sense of psychological immersion, a holistic sensation that people feel when acting with total involvement. The primary antecedents of flow in computer-based tasks are congruency between skills and challenges and narrowly focused attention, complemented by secondary antecedents such as interactivity and telepresence (Hoffman & Novak, 1996; Novak, Hoffman, & Yung, 2000). Telepresence refers to the perception of being present in virtual reality, once one is fully immersed. Equally, immersion has been defined as the state of flow when navigating a virtual environment (Koh & Kim, 2003). Hence, flow experiences and immersion are mutually related in the sense that flow is an affective outcome that follows from the cognitive phenomenon of interpreting spatial, acoustic, tactile, visceral, and social cues as if one were enveloped by a virtual world (Grinberg, Careaga, Mehl, & O'Connor, 2014). In a cyclic fashion, the more flow a gamer experiences, the stronger the sense of immersion into virtual reality. Though immersion and flow can be disentangled, they are conceptually and empirically related (Faiola, Newlon, Pfaff, & Smyslova, 2013); many authors simply equate the two (see also Huang, Chiu, Sung, & Farn, 2011). Also the scale we used (see Methods) refers to *telepresence*