Original Article

Violent Video Games Prime Both Aggressive and Positive Cognitions

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Abstract. Previous studies have shown that violent video games prime aggressive thoughts and concepts. Interestingly, positively valenced test stimuli are rarely used in this field, though they might provide useful information on the nature of the emotional response to virtual violence and its associative structure. According to the General Aggression Model (*GAM*) and its extensions (Carnagey, Anderson, & Bushman, 2007), normal negative reactions to violence are expected. Alternatively, playing violent video games might be construed as engaging in positively valenced playful fighting behavior. To test the potential of violent video games to prime positive concepts, *N* = 29 adult males played either a violent or a nonviolent video game for 20 minutes and were subsequently tested in a standard lexical decision task consisting of positive, aggressive, nonaggressive negative, and neutral target words. The data show that the violent video game primed aggressive concepts as expected, but also raised positive concepts, and did so independently of the participants' history of playing violent video games. Therefore, the results challenge the idea that violent video games inherently stimulate negative concepts only.

Keywords: violent video games, digital games, priming of aggression, aggressive thoughts, rough-and-tumble play, play fighting

Introduction

Violent video games (also referred to as "digital" or "electronic" games) facilitate access to aggressive thoughts, motives, and behavior scripts (Anderson & Dill, 2000). This conjecture is not only based on cognitive and associative theories, but has also been empirically supported many times (see Anderson, 2004, for a review). These outcomes can be theoretically described and explained by the General Aggression Model (*GAM*). The GAM (see Buckley & Anderson, 2006, for an in-depth description on how to apply this model to violent video games) explains the impact of violent video games by conceptualizing them as situational input stimuli that will – like all stimuli and in line with countless studies – change the situational activation of the cognitive system. Every stimulus presentation will increase cognitive activity at pertinent network nodes (mandatory for long-term-memory access) so that the organism is prepared for what comes next and can respond accordingly. This phenomenon is called "priming," which leads to an increased activity for associated network nodes. These, in turn, resemble and contain previously learned stimuli, concepts, and behavior scripts that will subsequently influence appraisal and decision processes and finally affect behavior. This explains, for example, why the mere visual presentation of a gun facilitates aggressive behavior (the "weapon effect," Berkowitz & LePage, 1967).

The central focus of this study is on the activation of concepts, i.e., the "cognitive route" in terms of the GAM. For its assessment, several tests of cognitive fluency are conceivable. The idea is that the more activated a concept is, the faster a participant will respond to similar (and therefore associated) stimuli, because the activity spreads to associated network nodes. Likewise, free recall or recognition of those concepts will rise in probability as well. If a violent video game is an aggression-eliciting stimulus, then its presentation raises the cognitive fluency of aggressive concepts. Typical experimental paradigms for testing cognitive fluency compare one or more violent video games with one or more nonviolent video games with respect to their fostering aggressive solutions to word fragment completion tasks (Carnagey & Anderson, 2005) or their speeding up aggressive concepts in word pronunciation tasks (Anderson & Carnagey, 2009; Anderson & Dill, 2000) or lexical decision tasks (Glock & Kneer, 2009). For purposes of experimental control, the accessibility of aggressive concepts is often defined by the difference between reactions to aggressive and control target words or stimuli, with the nonaggressive control stimuli typically being neutral or negative but nonaggressive. In the same manner, studies of the desensitization produced by violent video games compare players' reactions to aggressive as opposed to nonaggressive negative stimuli (e.g., Bartholow, Bushman, & Sestir, 2006; Weber, Ritterfeld, & Mathiak, 2006). Intriguingly, data on reactions to positive stimuli are rarely collected in this field of research. This limitation might result from a theoretical background that assumes the feelings

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when seeing or enacting virtual aggression to be of negative valence in principle. The GAM, and especially its expansion to desensitization, construes the effects of violent video games on the assumption that the players' "aversive reactions to the sight of blood and gore" become desensitized (Bartholow, Bushman, & Sestir, 2006) and that "normal negative reactions to violence" get blunted (Carnagey, Anderson, & Bushman, 2007). Given this background, the best fitting controls for the supposedly *negative* aggressive target stimuli are in fact also *negative*, but nonaggressive stimuli, so that the negative valence of the target stimuli is held constant and only the aggressiveness varies between the stimuli compared. Nevertheless, explicitly using positive stimuli could provide valuable information.

Firstly, by comparing aggressive target stimuli to positive ones as well, one may assess how broad or specific the aggressive priming and activation processes triggered by violent video games are. They might be exclusively restricted to the activation of aggressive concepts, or they might generalize to an overall negative mood, so that the processing of aggressive test stimuli is enhanced while the processing of positive stimuli is diminished.

Secondly, and of greater theoretical significance, one might disagree with the assumption that seeing and enacting of virtual violence will (unless desensitized) result in a negative aversive emotional state per se. In contrast, one might expect a priming of positive probe stimuli, because the market's preference for violence in video games is apparent and "[t]he popularity of violent video games in particular cannot be overstated" (Kirsh, 2006, p. 228). The prevalence of violent content in current video games is high (Carnagey, Anderson, & Bushman, 2007), and sales numbers appear to increase if blood and gore are added. For instance, the "bloody" version of Mortal Kombat has been sold seven times more often than its toned-down version (Goldstein, 1998). This suggests that there are gratifications specific to interactive violent content in these games, which might even lead to enhanced performance in these games (Bösche, 2009). While this seems at odds with the GAM, it is not the case for other conceptions and theories of (virtual) aggression. Though aggression resulting from the feeling of anger or threat without the possibility to escape can be considered a negative emotion, by contrast, instrumental or revenge-motivated aggression might be a positively toned emotion. Despite possible problems with such a distinction of aggressive motives in general (Bushman & Anderson, 2001), it still remains rather doubtful that playing violent video games raises exclusively negative emotions. The question how a violent video game can be enjoyed is highly intriguing. While Kirsh (2006, pp. 85–87) lists some gratifications of violent media in general, this paper strives for an explanation that is potentially specific to violent video games and their playful interactivity.

It is conceivable that a player understands aggressive stimuli as being "not for real" or not really hazardous, but rather virtual, and habitual violent video game players often emphasize the idea of a game-reality distinction (Klimmt, Schmid, Nosper, Hartmann, & Vorderer, 2006). The conscious marking of stimuli as being virtual can indeed allow for different emotional and behavioral responses than those elicited by real stimuli (Russell, 2003). There is also evidence that aggressive behavior can be virtual, can be played, can be enjoyed, and can be clearly distinguished from aggressive behavior aimed at hurting a counterpart. For instance, juveniles of mammals like to engage in play fighting (or rough-and-tumble-play, or mock aggression) that is explicitly not aimed at hurting the opponent. This behavior might even be considered to be crucial for the development of social and other competencies (Pellis & Pellis, 2007). Depending on the species, different mimic or vocal intention signals are used to engage in and maintain play (see Sullivan & Lewis, 2003, for humans). These signals are critical for the social control of play bouts and rough play (see Flack, Jeannotte, & de Waal, 2004, for chimpanzees). The idea that the players can perceive violent video games as a digitized version of basically positively evaluated rough-and-tumble-play would predict priming of positive concepts in addition to the already well-established priming of aggressive concepts. In a broader sense, some authors strive to refocus the research on video games from the analysis of a possibly causal link between violent video games and aggressive behaviors in the real world to the games' beneficial aspects. For example, Nacke (2009) characterizes playing of all kinds of video games as a joyful activity, motivational driver for learning, and as a promoter of mental health. Furthermore, as Ferguson (in press) points out, the negative effects of violent video games have been exaggerated by prominent members of the scientific community such that potential positive effects and outcomes, such as their use as educational tools, have been ignored.

The experiment described here was designed to test these competing hypotheses regarding the ability of violent video games to prime positive concepts. Participants were assigned to play either a violent or a nonviolent video game, and after playing they completed a lexical decision task containing positive, nonaggressive negative, aggressive, and neutral target words.

Intriguingly, a positive valence of engaging in virtual aggression is often denied by habitual players of violent video games. Questionnaire studies identify autonomy and competence (Przybylski, Ryan, & Rigby, 2009) or competition and power (Ladas, 2002) as crucial motivators. But given the extreme popularity and the sales statistics of violent video games (see above), it is hardly conceivable that virtual violence is of no use at all to consumers. Furthermore, whenever a violent video game is toned down for the German market in order to reach a classification rating that allows for open advertisement, protests are bound to surface alleging that any legal restriction of violent content in media or video games amounts to governmental censorship. To remedy this situation, "blood patches" are provided to revive the original game to its full glory (http://www.bloodpatches.net, for example). But such an obvious demand for violence in video games is not unique to Germany. In Australia, some video gamers are "fighting for a better video game classification system" so that they can buy violent video games in their local stores that have been refused a rating from the Australian National Classification Scheme and therefore are practically banned from sale on the local market (www.growupaustralia.com, for example). Conclusions on the emotional valence of violence in video games drawn from questionnaires could be biased in the sense that the answers given by habitual violent video game players might be prone to social desirability. Therefore, the focus of this study is on behavioral and objective data rather than on direct questioning. Nevertheless, additional self-report data on the enjoyment of the games administered in the experiment were collected in order to assess and eventually confront the self reports with the priming data. For the self-report variable on game enjoyment, no strong hypothesis was formed. In accordance with the literature mentioned, it is expected that habitual violent video game players will not differ in the ratings for a violent and a nonviolent game. However, control participants might rate the violent video game as being less fun because violent video games are perceived negatively by the public (see Glock & Kneer, 2009). Additionally, ratings of frustration and burden while playing the game were collected in order to assure that the games administered did not differ in frustration or other factors that might influence cognitive activity or activation of aggressive concepts.

Method

Participants

Participants were recruited on the campus of the Technische Universität Darmstadt, Germany. The recruitment procedure did not involve any course credit, payment, or goods in exchange for participation. A total of 29 male students from different university departments volunteered for participation. Their age ranged from 20 to 28 years (M = 22.72, SD = 2.23). According to a questionnaire, 15 of the 29 participants were classified as habitual violent video game players because they reported at least one incident of having played a violent video game in the last seven days before the laboratory session. That particular measure of behavior was chosen as opposed to a self report of past experiences and their remembered amounts, because the latter may be distorted by systematic errors like self-serving memory biases. The classification of a video game as a "violent" one was in line with the literature, meaning that the game involved "behavior directed toward another individual that is carried out with the *proximate* (immediate) intent to cause harm" (Anderson & Bushman, 2002, p. 28, italics as in the original), and that violence is an extreme form of aggression. The participants were not simply asked if they played violent video games, but they were also asked to name the titles of the games they had played. If the experimenter was not familiar with the game, she / he asked the participant to describe its content. After gathering sufficient information, the game was classified as violent or nonviolent.

Materials and Apparatus

The selection of the video games was largely based on theoretical considerations. First, the games should be comparable to the ones used in the research literature. For this reason, custom-made games were not considered. Second, the mechanics of both types of games should be easy to understand in order to avoid frustration due to a game being less controllable for nonhabitual video game players. Third, to ensure that habitual violent video gamers might not get too bored by the games, these should be well received in the gaming community. Hence, only games listed on LAN-party tournaments were considered. Fourth, both the violent game and the nonviolent control game should feature opponents and a competitive setting, so that possible differences in the results could be attributed to the violent content and not to the competitiveness of the games per se. Both games were required to involve speeded reactions in response to computer-controlled opponents. Fifth, in line with the definition of aggressive and violent behavior in the literature, the violent video game requires inevitable violent actions by the player to reach the goals of the game, while the nonviolent game should not provide any option to act violently or aggressively. "ZDoom" by Randy Heit was chosen as the violent video game. It is a typical first-person shooter, a port of the classical "Doom" by "id Software" (1993) to Windows platforms. The objective of this violent video game is to survive, kill monsters, and collect items. A casual sports game was used as the nonviolent control game: "Blobby Volley" by Daniel Skoraszewsky and Silvio Mummert (2000). The game is a simplified volley-ball simulation, in which the player controls a blob that has to bounce a ball over a net, and a computer-controlled opponent bounces the ball back. The objective of that game is to score points against the opponent by bouncing the ball in a way that the opponent fails to bounce the ball back within three touches. Figure 1 shows typical scenes from both games.

The games were run on an IBM-compatible desktop computer with a Windows XP operating system and desktop speakers connected, at a screen resolution of 800 × 600 pixels, and were controlled by an optical mouse and keyboard. To maximize the players' attention to the game visuals and sounds, the music optionally accompanying the games was switched off, and to minimize possible frustration, the games were set to the easiest level.

A lexical decision task was used to assess the activa-

Figure 1. Typical scenes from the video games used (left: violent video game; right: nonviolent control game).

tion and cognitive fluency of aggressive concepts. The task entailed quick classification of letter strings as words or nonwords. Pseudowords were used as nonwords in order to prevent the possibility of classifying the words by a simple surface analysis of substrings. For example, a letter string containing "XX" can be quickly and easily identified as a nonword without any in-depth processing because there are no words with a double X. Similarly, any substring has a certain probability to form an existing word in a given language. Therefore, whole-word processing was fostered by using words and pseudowords taken from a thoroughly controlled German-language list of previously evaluated words (Huckauf, Heller, & Gouzoulis-Mayfrank, 2003). Huckauf et al.'s corpus consists of 84 words matched for frequency, syntactical category, number of letters, number of syllables, and concreteness, and 84 corresponding pseudowords constructed by Huckauf et al. from the real words by replacing vowels, so that the pseudowords can be pronounced easily and have comparable letter string probabilities to the real words. To allow for a distinction between negative concepts in general and aggressive concepts in particular (see Lindsay & Anderson, 2000, Experiment 2), the present study further distinguishes the negative words as being either *nonaggressive negatives* (e.g., the German equivalents of "accident," "affliction," "embarrassing") or *aggressive negatives* (equivalents of "violence," "murderer," "hate"). The classification of these terms into nonaggressive negatives and aggressive negatives was based on ratings of independent participants ($N = 66$) in exchange for course credit. This eventually led to a corpus of 28 neutral, 28 positive, 14 nonaggressive negative, and 14 aggressive negative words, along with one corresponding pseudoword for each. The lexical decision task was presented on an IBM-compatible computer with an MS-DOS operating system running a software for conducting psychological experiments ("Experimental Run Time System"; Beringer, 1993).

Procedure

The participants were tested individually. Upon arrival in the laboratory, participants filled out a short questionnaire including questions on their computer use and gaming habits, and were randomly assigned to either the violent or the nonviolent video game. They received written instructions on how to play the corresponding game; in addition, the experimenter demonstrated a short sequence of the game. After reading the instructions, the participants played the game for 20 minutes.

After playing, the participants received written instructions for the lexical decision task. They had to verify as fast and as accurately as possible by a key press whether the "word" on the screen was an existing word or not. The appropriate keys were marked on the keyboard, and correct decisions were prompted by a 1000-Hz tone delivered by the PC speaker. An incorrect or no response within 1.5 seconds was prompted by a 300-Hz tone. The words and corresponding pseudowords were presented block-wise by word type to avoid an intermixing of fast and slow emotional components, because such intermixing typically diminishes the effects (Algom, Chajut, & Lev, 2004; McKenna & Sharma, 2004). Randomly chosen, one of two sequences of word type block order was used. Sequence 1 used a start block consisting of 28 neutral words and pseudowords, followed by 28 aggressive negatives, 28 nonaggressive negatives, 28 neutrals, and ending with 56 positives. Within each block, the order of words and pseudowords was randomized differently for each participant. Sequence 2 was nearly identical to sequence 1, but had the block of aggressive negatives interchanged with the block of nonaggressive negatives. After completing the lexical decision task, participants filled out a short questionnaire indicating the degree of fun, frustration and burden involved in playing the video game. The ratings ranged from 1 for not at all to 4 for very much. Finally, the participants were debriefed.

Results

All participants complied with the instructions, no session had to be prematurely terminated due to concerns of the participants, and no equipment failure occurred. All data could be analyzed, resulting in a total $N = 29$, of which $n = 15$ had been assigned to the nonviolent game condition.

As the principal dependent variable assessed after playing the game, the verification speed was computed for the different word types (namely neutrals, nonaggressive negatives, aggressive negatives, and positives). First, for every word type in the lexical verification task, reaction times (*RTs*) for correct responses to existing words were averaged individually for each participant. The reciprocal 1/RT was computed to convert mean RTs to reaction speed so that the typical positive skew of reaction times is eliminated and the data better fit the prerequisites for an analysis of variance. A preliminary analysis of these verification speeds checked for possible confounds gathered via the post-experimental questionnaire. Neither age, nor computer use per week, nor video-game playing per week, nor violent video-game playing per week predicted verification speed (all $p > .20$).

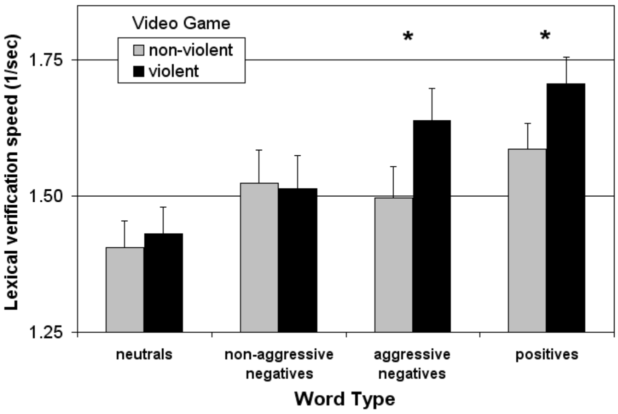

Figure 2. Lexical verification speed depending on the video game played and on word type. Error bars denote standard error of the mean (*SEM)*.

Figure 2 shows the outcome for the different word types. Lexical verification speed for the nonviolent control game (light gray bars) is a qualitatively good resemblance of the known structure of the underlying corpus (Huckauf, Heller, & Gouzoulis-Mayfrank, 2003). The neutral words are slowest, the positive words fastest, and the nonaggressive and aggressive negative words fall in-between. A visual inspection of the verification speeds after playing the violent video game (black bars) shows that aggressive and positive words are processed considerably faster while the others remain largely unchanged. A two-factor, mixed analysis of variance with the video game constituting a between-participants factor and word type constituting a within-participants factor was used to statistically analyze the verification speeds. The results reveal a strong main effect of word type, $F(3, 81) = 22.58$, $p < .01$, no main effect of the video game, $F(1, 27) = 1.01$, $p > .20$, and a significant word type × video game interaction, $F(3, 81) = 3.34$, $p < .05$. By defining the nonaggressive negatives as the comparison level, contrasts show that the word type × video game interaction effect is due to the aggressive negatives, $F(1, 27) = 8.99$, $p < .01$, as well to the positives, $F(1, 27) = 4.35$, $p < .05$.

To check for possibly confounding variables, the analysis was also run with an added factor "habitual violent video game play" to determine whether the previously reported effects interact with this participant variable. Since half of the participants shared the value of zero hours playtime, this factor was simply dichotomized rather than added as a continuous covariate (e.g., by entering the hours spent with violent video games in the last week). The results of that control analysis qualitatively confirm the principal analysis. As before, the following emerged: a main effect of word type, $F(3, 75) = 23.41$, $p < .01$, no main effect of the video game, $F(1, 25) = 1.09$, $p > .20$, and a significant word type × video game interaction, $F(3, 75) = 3.38$, $p < .05$. All other main effects or interactions did not reach statistical significance (all $p > .20$).

The answers to the questionnaires on the degree of fun, frustration, or burden involved in playing the video game are given in Table 1, broken down by player type (habitual or not).

A 2 (video game played) × 2 (habitual violent game play) between subjects analysis of variance was performed on each of the ratings. The analyses of frustration and burden ratings did not yield any significant effects (all $p > .20$). The ratings of fun resulting from video game play indeed showed a significant main effect of the video game played,

Table 1. Participants' mean ratings on a scale ranging from 1 to 4 for the fun, frustration, and burden resulting from the video game played as a function of their habitually playing violent video games or not.

	Video game played	
	Nonviolent	Violent
Fun		
Habitual players	2.38 (0.52)	2.50 (0.84)
Control participants	2.86 (0.69)	1.75 (0.46)
Frustration		
Habitual players	1.88 (1.13)	1.50 (0.84)
Control participants	2.00 (1.00)	1.38 (0.74)
Burden		
Habitual players	1.50 (0.76)	1.67 (0.82)
Control participants	1.29 (0.49)	1.75 (0.89)

Note. Numbers in parentheses are standard deviations. *n* for the conditions were as follows: Habitual players, nonviolent game = 8, violent game = 6; Control participants, nonviolent game = 7, violent game = 8.

$F(1, 25) = 4.43$, $p < .05$, no main effect of habitual violent game play, $F(1, 25) = 0.33$, $p > .20$, and a video game played × habitual violent game play interaction, $F(1,25) = 6.97$, $p < .05$. For the habitual violent video game players, the ratings for the fun resulting from playing either video game did not differ and are -in absolute terms- in the middle of the scale. In contrast, the control participants did differentiate in fun ratings (see Table 1) and rated playing the violent video game as significantly less fun than playing the nonviolent game.

Discussion

The data show that the violent video game primed aggressive concepts, which is well known from the research literature and is successfully replicated in this study. Furthermore, positive concepts were primed by the violent video game as well. While the facilitation observed for aggressive test words by the violent video game is nothing new and quite expected, the facilitation seen with the positive words is new and may pose problems for theories that define violent video games as eliciting negatively valenced concepts, at least in the initial phase. The results are at odds with the assumption of the General Aggression Model and the desensitization hypothesis that violent video games typically elicit negative thoughts and emotions, but are in accord with the high popularity of violent video games.

Additionally, the participants' ratings of the degree of fun in the game differed as expected between habitual violent video game players and control participants. Only the control participants rated the violent video game as being less fun. Therefore, the self-report measures known from the literature were also replicated, and, strikingly, only these measures distinguished habitual violent video game players from control participants, while the impact of the violent video game on priming positive and aggressive concepts did not.

Nevertheless, some possible alternative explanations and limitations of the study need to be discussed.

Firstly, owing to the rather small number of participants, and due to the fact that only two particular games were administered, the results might be considered tentative until replicated with more participants and further games. Since only two instances of the games were used, the results might not be generalizable to the entire set of nonviolent and violent video games, or might even be attributed to an unknown confounding variable. The games used might not differ in violent content only, but may also vary in other dimensions like pace, difficulty, complexity. These factors could also influence the results and provide an alternative explanation. However, the results for the neutral, aggressive, and nonaggressive words qualitatively replicate quite well other research in which several potential confounds were thoroughly controlled (e.g., Anderson et al., 2004). Since the results of the present study are in line with and replicate previous findings, it is rather improbable that the additional finding of a facilitation of positive concepts might be due to a confound.

Secondly, the priming results might be mediated by arousal, or an artifact of arousal. The violent video game could have raised (neutral) arousal or associations to activity as a general concept, which might in turn activate positive concepts. Thus, it may not be the positively perceived virtual violence that leads to faster reactions for positive words. The benefit seen for positive words could be mainly due to unspecific arousal. Nevertheless, such an association of arousal and positive concepts in general has not been reported in literature. Rather the opposite is true: valence and arousal are uncorrelated, forming a U-shaped function (see Bradley & Lang, 2000). Arousal itself might prompt the participants to search for attributions, but there has to be a source to attribute that arousal to. Even if the effect seen is mediated by arousal, something still needs to be positively evaluated if positive concepts become activated. Furthermore, other research has shown that the effects of violent video games on thoughts and cognition are unchanged, even when controlling for action, such as seen in Anderson et al. (2004). However, that study did not use positive target materials. The situation is further complicated by the fact that there is an inherent association between aggressive concepts and arousal. As nearly all definitions of aggression typically involve an active aggressor, all prototypical aggressive concepts contain activity. For this reason, when aiming at a better sampling of word material, it is quite difficult – if not impossible – to find aggressive concepts not associated with activity. By the same token, it is hard to find nonaggressive negative control words strongly associated with activity, because such nonaggressive negative concepts should consist of uncomfortable events and conditions where it is *not* possible to identify an actor who caused the negative state, but nevertheless it should be associated to activity. Finally, it is debatable whether material comprising low-activity aggressive concepts versus high-activity nonaggressive negative concepts can capture anything relevant to the activities of players in (violent) video games.

Thirdly, in comparison with the nonviolent video game, the priming of the positive words by the violent video game might be an artifact of the nonviolent control game being too hard, frustrating, or simply less fun for the players. But according to the questionnaire completed at the end of the experiment, there is no reliable difference between the two games with respect to frustration or burden. Only the item asking for fun showed a difference between the games. While for the habitual violent video game players both games are moderately fun, the control participants contend that the nonviolent game involves more fun than the violent video game. Relying on the questionnaire data, one might say that the violent video game primed positive concepts in habitual violent video game players and in control participants alike, even if the violent video game was less fun for the control participants. However biased by social desirability the questionnaire might be, it gave no indication that the control game might have been more frustrating, or burdening, or less fun. Further, if the control game was frustrating or depressing and therefore slowed down responses to positive concepts, then it should have primed the negative nonaggressive concepts as well. However, the priming data provide no supporting evidence in this respect. Hence, the results can hardly be an artifact of a potentially negatively-valenced control game.

Fourthly, one might attempt to uphold the assumption that violent video games *are* negatively valenced stimuli by arguing that in this experiment the participants were only males and half of them habitual violent video game players for whom the initially disgusting violent stimuli have become positive ones. Opposed to this supposition, the priming of the positive as well as the aggressive concepts by the violent video game certainly held true for both habitual violent video game players and for control participants. Furthermore, while one cannot fully reject the idea that the generalizability of the results might be limited because only male participants were tested, there is no need to expect females not to be able to enjoy virtual violence. If virtual violent acts are enjoyed by understanding them as a digital form of a per se positively evaluated rough-and-tumble play, one can expect such a benefit to hold for all individuals of the species – independent of gender! Furthermore, purported differences between females and males in social behaviors like aggression or helping diminish or vanish depending on context factors like the awareness of being observed (Hyde, 2005).

Fifthly, one might object by saying that the results for the different word types are confounded with positional effects. That is correct because only two control sequences were used and the positive words were always rated at the end. Therefore, the absolute speed of lexical verification is confounded with positional effects. Within-subject comparisons of the different concepts would not allow an interpretation, in the sense that one concept can be generally lexically verified faster than another. However, between-subject group comparisons still remain unaffected because they are balanced for positional effects: e.g., *both* experimental groups rated the positive words at the end, so any positional effect will be identical in both groups. The argument of balanced positional effects applies to all word types provided that between-subject group comparisons are computed. Most importantly, this reasoning applies to the crucial effect of a word type by video game interaction. Admittedly, the within-subjects effect of word type is confounded with positional effects, but that is irrelevant for the main conclusion of the present study.

To conclude, the explicit use of positive test stimuli allowed for detecting previously unseen effects of violent video games. Violent video games do not only prime aggressive concepts, but also positive ones. A possible explanation is that the players comprehend the virtuality of the violence in video games, and engaging in such games might be as rewarding and enjoyable as "rough-and-tumble play" is. While Carnagey, Anderson, and Bushman (2007) presume that virtual blood and gore needs massive compensation from other game features to make the overall gaming experience a pleasant one, it might be the "blood and gore" itself that adds to a positive experience.

Practical implications of these conclusions may be that one can expect players who play or have finished playing a violent video to be both in a rather positive mood and have thoughts circling around aggressive concepts. Typically, LAN-parties or other social events for consuming virtual violence are not known as a hotbed for outbreaks of melees or other violent behaviors. A rather friendly atmosphere tends to prevail (Bösche & Geserich, 2007). Likewise, the existence of friendly and helpful habitual violent video gamers is already known. For example, Weber, Ritterfeld, and Mathiak (2006) reported that most of the habitual violent video game players who participated in their study "even deliberately expressed their will to cooperate in similar studies again" (p. 52).

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