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SEEING THE WORLD THROUGH MORTAL KOMBAT-COLORED GLASSES

Violent video games and the development of a short-term hostile attribution bias

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This study investigated the effects of playing violent vs non-violent video games on the interpretation of ambiguous provocation situations. The participants played either a very violent video game or a relatively non-violent video game for several minutes. Children were then read five stories in which a same-sex peer caused a clearly negative event to happen but where the peer's intent was ambiguous. After each story, children were asked a series of questions about the peer's intent, subsequent actions and potential punishment. Responses were coded in terms of amount of negative and violent content. Results indicated that children playing the violent video game responded more negatively on three of the six ambiguous provocation story questions than children playing the non-violent video game. These data suggest that playing violent video games leads to the development of a hostile attribution bias.

Since the late 1970s, one of the preferred leisure activities of children has been playing video games (Cesarone, 1994). Although positive effects of children playing video games have been found (e.g. aiding hand-eye coordination, improving children's attention to detail and aiding the recovery of oncology patients [Funk, 1993]), recent research suggests that exposure to violent video games may lead to an increase in aggressive behavior (Cooper and Mackie, 1986; Funk, 1993; Irwin and Gross, 1995; Silvern and Williamson, 1987). However, the mechanisms through which violent video games might cause aggressive behavior have yet to be established.

Several theories have been posited to explain the connection between violent video game exposure and subsequent aggression. According to social learning theory, violent video games allow children to practice aggressive behavior and to be rewarded for successful aggressive behavior (Silvern and

Williamson, 1987). Furthermore, violent video games are physiologically arousing (Silvern and Williamson, 1987). Given that contextual cues are an important determinant in the interpretation of general arousal (Schachter, 1964), it may be that when certain environmental cues are present, the physiological arousal accompanying video game play may be interpreted as anger, resulting in aggressive actions.

An additional explanation for the link between violent video game play and aggressive behavior comes from the literature on social information-processing in aggressive children. Dodge (1980, 1982) contends that aggressive children act aggressively, in part, due a hostile attribution bias. That is, when exposed to a frustrating social stimulus (e.g. being hit in the back with a ball), a hostile attribution bias results in cue distortion, which leads aggressive children to interpret the stimulus as an aggressive cue and thus respond aggressively (Dodge and Frame, 1982). Similarly, Graham et al. (1992) contend that negative inferences about a harmdoer's intentionality lead to the development of anger and that anger leads to aggressive retaliation.

Dodge contends that past social experiences lead to the formation of a hostile attribution bias. However, it is possible that exposure to violent video games may contribute to the development of a hostile attribution bias. If this were the case, then children's increased aggression following video game play (Cooper and Mackie, 1986; Funk, 1993; Irwin and Gross, 1995; Silvern and Williamson, 1987) may result from cue distortion caused by a short-term hostile attribution bias.

To test the proposition that violent video games lead to a hostile attribution bias, children were asked to play either an action-oriented, very violent video game or an action-oriented, non-violent video game. Given that arousal has been linked with aggression (Rule et al., 1979), both video games were action oriented in an attempt to mitigate the impact of arousal. Immediately following video game play, children interpreted a series of ambiguous provocation stories. After each story, children were asked six questions: two questions about the harmdoer's intent; two questions about potential retaliation and punishment; and two questions about the harmdoer's emotional state.

It was hypothesized that children exposed to the very violent video game would ascribe more hostile intent to the harmdoer than children exposed to the non-violent video game. Given that a hostile attribution bias is thought to influence retaliatory aggression (Dodge, 1980), it was hypothesized that children playing the violent video game would suggest more retaliation and expect more punishment than children playing the non-violent video game. Based on the social cognitive contention that children with a hostile attribution bias need to justify their actions, it was hypothesized that children playing the violent video game will ascribe a negative emotional state to the harmdoer.

Method

Subjects

Participants were 52 3rd and 4th grade children (44 percent female; 90 percent European-American) from a middle-class community of 150,000 in northeastern Kansas. Age ranged from 104 to 131 months ($M = 118$; $SD = 7$).

Procedures

Within gender, subjects were randomly assigned to either the violent video game or non-violent video game condition. Children were then asked several questions about their experience with video games. Next, children were instructed on how to use the remote control box connected to the video game. To increase familiarity with the game controls, children were then allowed a 2-minute warm up period. After the warm up period, children played one of the experimental video games for approximately 13 minutes. Following video game play, children were read five ambiguous provocation stories. After each story, children were asked a series of questions and their responses were tape recorded.

Measures

Video game experience: Children were asked about the number of hours a day they played video games, the number of days a week they played video games and their experience with the experimental video game.

Video game system: A 16-bit video game system produced by Genesis was used during the experimental manipulation. The Genesis system consisted of a video game cassette player connected to a hand-held remote control box. A series of six buttons and a directional pad on the remote control box allowed the player to manipulate computerized figures about the screen. The two Genesis games used were *Mortal Kombat II* and *NBA JAM:TE*. *Mortal Kombat II* involves rounds of hand-to-hand combat between two martial artists with the winner proceeding to the next round. *NBA JAM:TE* is a two-on-two basketball game.

Previous research has shown that frustration influences aggressive behavior (Berkowitz, 1965). Thus, in an attempt to reduce the frustration associated with performing poorly in a video game, *Mortal Kombat II* was rigged so that participants either won or tied a round. Also, in order to reduce parental anxiety about the graphic nature of *Mortal Kombat II*, the game was rigged so that mutilation moves (e.g. a body is cut in half or split in two) were not allowed. Furthermore, the game was rigged so that blood would not spurt following a direct hit. In addition, children were required to use a same-sex, same-race combatant. The game was rigged so that children

of similar races and genders used the same player. During the game, players engaged in combat with both male and female opponents. Children in the middle of a round (which lasts about 1 minute) when the experimental time limit of 13 minutes expired were allowed to complete the round. Mortal Kombat II was designated as a very violent video game. The average number of acts of aggression (e.g. punches, kicks) per minute for a randomly selected set of 10 games was 137 (SD = 48).

NBA JAM:TE was rigged so that the basketball player participants had an increased probability that field goal attempts would be successful. However, NBA JAM:TE could not be rigged so that participants always won the basketball game. Thus, the possibility exists that children who lost the basketball game could become frustrated. However, if children did become frustrated as a result of losing the basketball game, it actually makes it *more* difficult to reject the null hypothesis because the frustration should lead to more negative responses for children playing NBA JAM:TE. In addition, children always controlled the same basketball team, the Chicago Bulls. Children played one full game, which lasted approximately 13 minutes. The winner of the basketball game (computer or player) was recorded. The average number of acts of aggression (e.g. shoving) per minute for a randomly selected set of 10 games was four (SD = 2)

Ambiguous provocation stories: In the ambiguous provocation stories task a same-sex peer caused a clearly negative event to happen (e.g. a child is hit in the back with a ball) but the intent of the peer causing this negative event was ambiguous. These stories were adapted from Dodge and Frame (1982). After each story was presented, children were asked a series of six questions: two questions about the harmdoer's intent; two questions about potential retaliation and punishment; and two questions about the harmdoer's emotional state. Responses were coded in terms of amount of negative and violent content. Interrater reliability for a randomly selected 29 percent ($N = 15$) of the children (450 total responses) was .88 (Cohen's kappa). Responses were summed across all five stories for each question (possible range, 0–5).

Results

Preliminary chi-square analyses were computed to see if age, sex and familiarity with the video game differed between the violent and non-violent video game conditions. None of the analyses were significant. Additional analyses were conducted to assess the relation between children's responses to the ambiguous provocation stories and age, sex, familiarity with the video game and whether or not the child won the experimental video game. Results indicated that age and winning/losing the video game were significantly related to four of the six questions (all $p < .05$). In general, older

Table 1 Children's responses as a function of video game play

Question type	Video game	
	Mortal Kombat II	NBA Jam:TE
Intent questions		
'Why did the kid . . .?'	2.4 (1.2)	1.5 (1.1)
'Do you think that the kid . . . on purpose or by accident?'	1.7 (1.0)	1.6 (1.2)
Retaliation questions		
'What would you do next after . . .?'	1.3 (1.1)	0.7 (1.0)
'Do you think the kid should be punished a lot, a little, or not at all?'	2.6 (1.5)	2.7 (1.6)
Emotion questions		
'How do you think the boy/girl feels after . . .?'	1.5 (1.4)	1.3 (1.3)
'Do you think the boy/girl liked you?'	1.7 (1.3)	1.3 (1.2)

Note: Standard deviations are given in parentheses.

* $p < .05$; ** $p < .01$.

children responded more negatively than younger children and children tying the basketball game responded more negatively than children either winning or losing the basketball game. Thus, to control for these factors, age and winning/losing the video game were entered as covariates in subsequent analyses.

Next, for each question a one-way analysis of covariance was conducted. Results indicated that children exposed to the very violent video game (Mortal Kombat II) responded more negatively to the ambiguous provocation stories than children exposed to the relatively non-violent video game (NBA JAM:TE) on three of the six questions: 'Why did the kid . . .?' $F(1,51) = 8.85, p < .01$; 'What would you do next after . . .?' $F(1,51) = 8.34, p < .01$; and 'Do you think the boy/girl liked you?' $F(1,51) = 4.54, p < .04$. Table 1 presents the means and standard deviations for the ambiguous provocation story task questions.

Discussion

The results of the present study offer some support for the contention that violent video games lead to the development of a short-term hostile attribution bias. As expected, when asked about the intent of the harmdoer, i.e.

'Why did the kid . . .?'' (an open-ended question), children playing the violent video game responded significantly more negatively than children playing the non-violent video game. However, the second question about intent, 'Did the kid . . . on purpose or accident?' (a closed question), was not significant. One possible explanation for this difference may be that for the closed question the hostile attribution bias induced by the violent video game was not strong enough to overcome socially desirable responding. Specifically, in the second question about intent, children were asked to choose between a positive and a negative reason for the harmdoer's behavior (purpose or accident). The socially desirable answer was to say that the negative event occurred by accident. In contrast, the first question about intent was an open-ended question. Thus, in order to answer this question, the child must generate a list of potential responses and then choose the appropriate one. It may be that questions in which the child generates a list of potential responses and then chooses one are more likely to be influenced by a hostile attribution bias than questions in which the child must choose from an experimenter-provided list of potential responses. Thus, for the open-ended question, the response 'accident' might not even be considered as a possibility, but once the possibility is given in the close-ended question, socially desirable responding occurs.

Based on the social information-processing model's contention that a hostile attribution bias influences retaliatory aggression, children playing the violent video game were expected to retaliate more and expect more punishment than children playing the non-violent video game. This hypothesis was partially supported. When asked, 'What would you do next?', children playing the violent video game responded significantly more negatively than children playing the non-violent video game. This finding is consistent with research showing an increased rate of aggression following video game play (Cooper and Mackie, 1986; Funk, 1993; Irwin and Gross, 1995).

However, the question about prospective punishment for the harmdoer, 'Do you think the kid should be punished a lot, a little or not at all?', was not significant. Interestingly, the greatest amount of negative responding for both groups occurred for this question. Children's responding may be related to their moral developmental level. According to Piaget (1965), between the ages of 5 and 10, children judge the rightness or wrongness of an act based on the visible consequences of an act. The *outcome* of an action, and not the *intent* of the action is taken into consideration. Children in this stage also believe that punishment is inevitable. Thus, moral development and not a hostile attribution bias may be influencing children's responses to this question. Furthermore, the punishment question was a closed question, which may have reduced the potential influence of a hostile attribution bias.

The hypothesis that children playing the violent video game will ascribe a negative emotional state to the harmdoer was partially supported. Children playing the violent video game were significantly more likely than

children playing the non-violent video game to say that the harmdoer did not like them. However, when asked about the emotional state of the harmdoer, 'How does the boy/girl feel . . .?', no significant differences emerged. Most children believed that children causing harm felt bad afterward. Thus, the emotional state attributed to the harmdoer does not always match the intent of the harmdoer's actions. This apparent inconsistency may be based on children's own experience in which they have done something negative to another person because they did not like them, but then felt bad about it afterwards.

Previous research has shown that playing violent video games leads to an increase in aggressive behavior (Cooper and Mackie, 1986; Funk, 1993; Irwin and Gross, 1995; Silvern and Williamson, 1987). In addition to social learning theory and general arousal theory explanations of the relation between violent video games and aggressive behavior, the current data suggest that an additional reason for this relation may be, in part, due to short-term hostile attribution bias. The specific mechanism is as follows: exposure to video game violence results in a hostile attribution bias which creates a predisposition to attribute malignant intent from others' behavior which, in turn, increases the likelihood that children will respond to real-life ambiguous provocation situations with aggression. However, additional research is necessary to determine how long after playing a violent video game the hostile attribution bias lasts.

In conclusion, the results of the present study offer some support for the contention that violent video games lead to the development of a short-term hostile attribution bias and subsequently seeing the world in a negative way. Children playing the violent video game responded more negatively on three of the six ambiguous provocation story questions than children playing the non-violent video game. To some extent, children exposed to the violent video game come to perceive the world through Mortal Kombat-colored glasses.

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