

## RESEARCH ARTICLE

## Contextual Features of Violent Video Games, Mental Models, and Aggression

Kirstie M. Farrar, Marina Krmar & Kristine L. Nowak

Department of Communication Sciences, University of Connecticut at Storrs, Storrs, CT 06269

*This experiment employed a 2 (third vs. first person) × 2 (blood on/off) × 2 (sex) design in order to examine the effects of two internal video game manipulations: the presence of blood and point of view on participants' perceptions of the game. Overall, when the blood manipulation was on, participants perceived greater gore. Players were significantly more focused when they played in the third-person point of view than when they played in first person. Males were more involved in the game overall regardless of point of view, but females were more focused and involved when they played in third, not first, person. In addition, we wanted to see if game manipulations and perceptions of the game affected aggressive outcomes. Those who played the game in the blood-on condition had more physically aggressive intentions, and when players were more involved and immersed in the game, they reported greater hostility and physically aggressive intentions. Findings are discussed as they relate to mental models of media violence.*

doi:10.1111/j.1460-2466.2006.00025.x

Video and computer games combined grossed \$6.9 billion in sales in 2002, and the industry is growing at a phenomenal pace (Entertainment Software Association [ESA], 2003), with estimates of sales reaching \$16.9 billion in 2003 (Kaiser Family Foundation, 2002). Although adolescents spend less time with video games than younger children, their exposure is still substantial. Adolescents aged 15–18 play video or computer games for just under 1 hour per day. There are substantial gender differences, however, with boys playing approximately 1.5 hours per day, whereas girls average about 40 minutes (Roberts, Foehr, & Rideout, 2005). This level of exposure is cause for concern among parents, community activists, and especially among communication scholars (e.g., Sherry, 2001) as recent content analyses have indicated that most video games are violent in nature (Children Now, 2001; Smith, Lachlan, & Tamborini, 2003). Not only are most games violent, children, particularly boys, state that violent video games are their favorite type to play (Buchman & Funk, 1996). These various points suggest that adolescents are being exposed to substantial amounts of violence while playing their favorite video games.

---

Corresponding author: Kirstie M. Farrar; e-mail: kirstie.farrar@uconn.edu.

The general consensus of the extant literature is that exposure to media violence, including television and film violence, leads to several problematic outcomes, from increased behavioral aggression to desensitization to real-life violence (e.g., Paik & Comstock, 1994; Surgeon General's Scientific Advisory Committee on Television and Social Behavior, 1972; U.S. Department of Health and Human Services, 1992). Although less research has been done on the topic of video game violence, it seems unlikely that video games function to reduce youth violence, as suggested by the ESA. In fact, recent meta-analyses on the effects of violent video game exposure have found a significant positive relationship between play and aggressive outcomes (Anderson & Bushman, 2001; Sherry, 2001).

However, it is unclear how internal game features, such as point of view or presence of blood, mitigate or enhance effects. In this study, we examine the role of two internal game features, point of view and blood and gore, in order to understand how these features affect the players' perceptions of the game and also how these features may impact aggressive outcomes.

### Literature review

Although research on video game violence is still in its infancy, most is consistent with the notion that video game violence does affect players in numerous ways. Early correlational work, for example, demonstrated a relationship between video game exposure and real-world aggressive behavior in children ranging from 4th to 12th grade (Dominick, 1984; Fling et al., 1992; Lin & Lepper, 1987). More recent research has provided stronger evidence of effects, both for children and adolescents. For example, violent video games can influence aggressive cognitions, or thoughts (Anderson & Dill, 2000; Anderson et al., 2004; Kirsh, 1998; Tamborini et al., 2001); can influence aggressive affect, leading to feelings of hostility (Anderson, 1997; Anderson & Dill, 2000); and has been found to be associated with aggressive delinquent behavior, even after controlling for aggressive personality (Anderson & Dill, 2000). Experimental work using more current games and conducted with college students has also found violent game exposure to be linked to aggressive behavior (Anderson & Murphy, 2003; Anderson et al., 2004).

Several reviews, both narrative and meta-analytic, have also supported an effect. For example, Dill and Dill (1998) and Bensley and VanEenwyk (2001) in their narrative reviews of the empirical literature concluded that concerns over short-term exposure to violent video games appear well founded. A meta-analysis conducted by Anderson and Bushman (2001) found that exposure to violent video games was positively associated with increased levels of aggression ( $r = .19$ ). A meta-analysis by Sherry (2001) of over 25 studies found evidence for a small effect of video game play on aggression ( $r = .15$ ). However, Sherry also found that effect sizes have increased over time, with more current studies producing stronger effects presumably due to the greater realism of today's games. In addition, games classified as human or fantasy violence were more strongly related to aggression than sports

games. Sherry's meta-analysis points to the importance of exploring how contextual features can influence aggressive outcomes.

### **Mental models and interpreting the game**

In attempting to understand how game features as well as player perceptions can influence outcomes, the mental models approach offers insight. Mental models are cognitive representations of events or situations, including the people, concepts, settings, and interrelations involved. As such, we can think of them as the mental abstractions that we draw from things that we see and experience. Although mental models arise early in life and are built up from our individual experiences, they are also susceptible to change and can be adapted over time based on new and incoming information. Therefore, they are flexible in that they both guide and are affected by new information. Mental models have been used, therefore, to explain both our interpretations of stimuli (Roskos-Ewoldsen, Roskos-Ewoldsen, & Killman Carpenter, 2002) and our responses to them (Krcmar & Curtis, 2003).

For example, Potter, Pashupati, Pekurny, Hoffman, and Davis (2002) use schema theory, which is itself related to the concept of mental models (Roskos-Ewoldsen *et al.*, 2002), to explain how people understand televised violence. They argued that our mental scripts are learned in childhood and that when viewers see certain elements in a television narrative, they may call upon that stored script to help interpret the story. Another way of understanding the argument of Potter *et al.* is that we each use our individual mental model for violence in order to help us interpret fictionalized depictions of violence. Potter *et al.* offer evidence that viewers' schemas (or mental models) affect their interpretations of violence. Indeed, Krcmar and Curtis (2003) argued that the mental models approach can offer a theoretically meaningful way to understand why fantasy violence affects children's moral reasoning. In their study, children saw a clip in which two characters are arguing. In one condition, the characters end up in a physical fight, and in the other, they are shown walking away from the conflict. Children in the physical aggression condition judged subsequent violent stories as more correct. Therefore, it is clear that our mental models can be influenced by the information we encounter. What then does this mental models approach offer to a study of video game violence?

First, through frequent play of violent (shooter) video games, it is possible that more elaborated and accessible mental models of aggression are formed. Second, the internal game manipulations can be thought of as features of a violent event that may affect one's interpretation of the game and of the violence. Potter *et al.* found that individuals share schemas, or models, of violence. These shared schemas are based largely on the explicitness and graphicness of the violence. In their research on violent schema, Potter *et al.* found that when viewers perceived greater violence in film clips, for example, the common element was not necessarily the number of acts of violence. Rather, viewers perceived greater violence when the clips were more graphically and explicitly violent. This led Potter *et al.* conclude that to the degree that violent schema or violent models are shared, it is due to the graphic nature of

the violence. In sum, then, frequency of violent game play and the presence or absence of blood and gore in a game may affect viewers' mental model of the violent content of that game. We ask, therefore:

R1: Controlling for frequency of violent game play, does the game feature of blood on/off affect viewers' interpretations of how graphic the violence is?

In addition, although little research has examined this topic, initial findings suggest that playing video games in first person appears to enhance the feeling of being involved, or present in the mediated action (Tamborini *et al.*, 2001). This sense of presence, or telepresence, may be thought of as a suspension of awareness that an experience is mediated. Presence indicates a sense of being "in" a mediated environment rather than simply perceiving (seeing and hearing) a mediated environment from a source (Heeter, 1992; Kim & Biocca, 1997; Lombard & Ditton, 1997; Steuer, 1992). Biocca (1997) explained, "Users experiencing presence report having a compelling sense of being in a mediated space other than where their physical body is located" (p. 9). Conversely, attention to a compelling natural stimulus, such as bright sunlight or loud conversations, will divert attention away from the mediated message, reducing viewer immersion in the medium. This sense of telepresence is central to our understanding of how people are responding to mediated messages. Presence has been shown to be highly correlated with individuals' ability to recall material (Kim & Biocca, 1997) and is associated with their interest in the message (Slater & Usoh, 1993). Tamborini (2000) also argues that telepresence can enhance identification with aggressive media characters.

Presence may also be enhanced by active engagement with media, as is the case with interactive video games. How is this related to internal game features? It is possible that point of view may increase presence. When a user plays in first-person perspective, he/she is playing as if he/she is looking through the eyes of the character representing him/her in the video game. Perhaps seeing through the eyes of the character, rather than seeing the entire character's body, enhances the player's sense of presence, or the sense that the user is "in" the game and reduces conscious awareness that the experience is mediated. Conversely, being represented by an entire body may lead the player to feel less immersed in the game and increase awareness of the mediated nature of the stimulus. If this is true, then people will feel less present when playing in third-person perspective than they will when playing in first-person perspective. Therefore, in order to understand individuals' mental models of video game violence, it may be important to ask if the players' point of view affects the interpretations of the violence. We ask

R2: Controlling for frequency of violent game play, does point of view affect viewer's sense of immersion, or presence in the game?

It is also possible that gender influences interpretations of violence in the game as well. For example, Gunter (1985) found that compared to men, women were more likely to perceive depictions of violence as more aggressive. In addition, Bartholow

and Anderson (2002) found that young men were more aggressive after playing a violent video game than young women. Consider, too, that adolescent boys play video games with greater frequency and duration than their female counterparts (Roberts *et al.*, 2005) and enjoy violent games more than girls (Buchman & Funk, 1996). It stands to reason, then, that males may have more elaborated and easily activated mental models for video game play, especially of the aggressive variety, in part because mental models are built through experiences (Roskos-Ewoldsen *et al.*, 2002). Therefore, gender may affect the interpretations of identical depictions of violence because of differences in mental models. In addition, frequent play of violent “shooter” games might also lead to more elaborated mental models for aggression. As a result, we hypothesize

H1: There will be a main effect of gender on interpretations of the game, such that women will perceive the game as more graphic than men, even after controlling for frequency of violent game play.

H2: There will be an interaction between gender and game features such that there will be a stronger effect of the point of view and blood manipulations on perceptions of graphicness and presence, or sense of immersion, for women than there will be for men.

### **The effect of game manipulations and mental models on aggression**

As discussed earlier, evidence suggests that violent video game play can affect aggression (Anderson & Bushman, 2001). It is important to note that this result held up across experimental and correlational studies, among children and adults, and among males and females. In fact, playing a violent video game can also increase feelings of hostility in some situations (Anderson & Bushman, 2001). However, to understand the possible role of specific game features, we must look to the more established literature on television violence.

Many studies have demonstrated that contextual features moderate the effects of violence. For example, Wilson *et al.* (1997) found that violence that is shown as justified, without suffering for the victim or punishment for the perpetrator, is more likely to contribute to aggression than violence that is not glamorized or sanitized in these ways. Recent game technology has allowed for the manipulation of many of these contextual game features. For example, some games allow players to “turn off” the blood feature. When players aggress, they may not see the bloody consequences of their actions. This feature is appealing to many parents as it gives them some control over the graphicness of the game’s violence. However, it remains to be seen how the presence or absence of blood and gore will impact aggressive outcomes. Traditional television effects research would suggest that blood serves as a cue that aggression has harmful consequences, thus lessening the probability the player will imitate the behavior (Sanders & Baron, 1975). On the other hand, in the video game environment, the blood may cue the player that they have “won.” Blood may serve as reinforcement, thus strengthening the risk of aggressive thoughts and consequently, aggressive behavior by the player (Smith

et al., 2003). Therefore, it is possible that blood may act to either suppress or enhance aggressive effects.

In addition, it is known that identification with a media character enhances the potential for media effects (Leyens & Picus, 1973). Anderson and Dill (2000) suggest that identification with the hero of these games is likely to be enhanced when playing a game in the first-person point of view. Playing these games in the first-person point of view may also lead to an enhanced sense of telepresence, which may also increase identification with aggressive characters (Tamborini, 2000). When the viewer identifies with the perpetrator, aggressive outcomes increase (e.g., Wilson et al., 1997). However, no published research has examined point of view in a video game environment. It is equally plausible that third-person play may encourage identification because one can actually see the character.

However, the research described above is based on studies in which the violence is experimentally manipulated. That is, the researcher chooses the aggressive act, manipulates it in some way (to vary, say, the amount of gore shown), and then demonstrates whether the manipulation has an effect. In a solid study, the appropriate manipulation checks are measured and the stimulus material has been pretested. Indeed, these manipulations do appear to have an effect on aggression. However, consider the fact that interpretations of violence vary from viewer to viewer (Gunter, 1994; Potter et al., 2002) and that these mental models of violence differ, perhaps even due to the frequency of violent game play. What one individual perceives as very graphic, another may perceive as moderately so. If this is the case, isn't it also likely that the effects of the manipulation on outcome variables, such as aggression, would be moderated by these models? It seems likely then that both the contextual features, or game features in this case, and also the player's interpretation of these features would play a role in aggressive outcomes. Therefore, we predict

H3: There will be a main effect of game manipulations (point of view and blood) on emotional hostility, verbal aggression, and physically aggressive intentions, even after controlling for frequency of violent game play.

H4: The effect of the game manipulations on hostility, verbal aggression, and physically aggressive intentions will be moderated by interpretations of those manipulations, after controlling for violent game play.

## Method

### Design

This study employed a 2 (third [ $n = 90$ ] vs. first person [ $n = 94$ ])  $\times$  2 (blood on [ $n = 94$ ]/off [ $n = 90$ ])  $\times$  2 (sex [88 male, 96 female]) design. Participants were randomly assigned to one of the four game versions. Following the video game exposure, participants in all conditions were presented with a questionnaire measuring a variety of constructs including perceptions of the preceding game, video

game experiential items, demographics, and measures of aggressive cognitions, emotion, and intent.

### Participants

A total of 184 undergraduate students (88 male, 96 female) were recruited from lower-division communication classes at a major East coast university in the United States. Participants' mean age was 20.2 years ( $SD = 1.67$ ). Students received course credit for participating in the experiment.

### Stimulus materials

For the purposes of this research, violence is defined using the operational definition from the National Television Violence Study (NTVS), which is widely acknowledged as one of the most methodologically strong studies of television violence ever conducted: "any overt depiction of a credible threat of physical force or the actual use of such force intended to physically harm an animate being or group of beings" (Smith *et al.*, 1998, p. 30). So, in order to qualify as a violent game for this research, the game's protagonist had to demonstrate actual intent to physically harm others. The violent game used for this study was *Hitman II: Silent Assassin*. The purpose of the game is to maneuver the main character (a hit man recently out of retirement) through several missions, assassinating enemies, while attempting to rescue a friend. Clearly, the main character in this game demonstrates the intent to harm other game characters while he fulfills his mission, thus meeting our definition of violence. The game is marketed as a "completely open-ended game play experience that allows you to balance surgical precision with visceral violent outbursts." *Hitman*, with its emphasis on weapon-related violence used to complete missions and gain points, is very similar to several other currently popular shooter games such as *Halo* and *Doom*. Both third- and first-person shooter games like *Hitman* are currently quite popular and account for several of the most purchased video games (ESA, 2004). *Hitman* is considered to be one of the godfathers of the stealth/action genre of shooter games. Others include the very popular *Metal Gear* and *Splinter Cell* and *Rainbow Six* series, all of which have current titles.

This game was selected for its violent content and similarity to other shooter-type games. Like many other games in this genre, *Hitman* gives players the ability to manipulate within-game properties—including the ability to manipulate the player's point of view (first person vs. third person) and the level of blood and gore (on or off). In the first-person point of view, players literally look through the eyes of the character, experiencing the game environment from the hit man's perspective. They see nothing of their character other than his arm extended outward clutching a gun. The players can use the game controller to manipulate the hit man's gaze so they can glance down at their own legs, or left and right, as they explore the game environment as if they are turning their own head. In contrast, in the third-person point-of-view mode, the players see the entire body of the character on the screen, as if they were standing a few feet behind the character. With the blood activated, blood

splatters from the hit man's victim's body when shot or attacked. This game received an "M" rating for *Mature* according to the Entertainment Software Rating Board (ESRB). According to the ESRB, "Titles rated M (Mature) have content that may be suitable for persons ages 17 and older. Titles in this category may contain intense violence, blood and gore, sexual content, and/or strong language" (www.esrb.org). Content descriptors for *Hitman II* include blood, strong sexual content, and violence.

### Procedure

Prior to actually playing the assigned game, participants were provided with an instruction sheet detailing how to play the game. After reviewing the instructions, they were directed to play the game for 12 minutes.<sup>1</sup> Physical setting characteristics were carefully controlled. Participants played their game in individual cubicles, preventing players from seeing both the other players and the games the others were playing. Players were also instructed to wear headphones during game play so that they could not hear anything other than their own game. All games were played on a *Sony PlayStation II* gaming console connected to a 13-inch color television monitor. Although the size of the television screen was small, it is comparable to the size of many personal computers and laptops, which are commonly used to play games such as these. In order to ensure that all subjects playing the violent game would have the same experience regardless of their skill level, game play was set to "god mode" so that players could not be killed during play. All participants filled out a posttest immediately after playing.

### Measures

#### *Demographic variables*

Subjects indicated their gender, age, year in school, and race.

#### *Video game exposure*

Subjects were asked to first indicate whether they had ever played the video game they were assigned to for this study (13% of the subjects had played *Hitman* prior to exposure). Next, they were asked to indicate how often they play a range of different types of video games: action, adventure, three-dimensional shooter games, arcade-type games, role-playing or interactive fantasy games, simulation or strategic planning games, sports games, or massive multiplayer online, role-playing games. Each game type contains an example game title from that category, and participants indicated on a 7-point scale from *never* to *frequently* how often they played each type of game.

#### *Dependent variables*

Perceived *gore* was measured using three items. Participants responded on a 7-point scale ( $\alpha = .91$ ) to "The game I just played was bloody (or gory, or had violent graphics)." Overall, participants perceived the game as moderately gory ( $M = 5.51$ ,  $SD = 1.06$ ). Perceptions relating to *point of view* were measured by a 7-point

(*not at all to strongly*), multidimensional presence scale (Lombard & Ditton, 1997). Dimensions included involvement (e.g., "How involving was this video game?") comprising six items ( $\alpha = .92$ ); immersion (e.g., "How much did you feel like you were inside the video game and participating in events?") comprising five items ( $\alpha = .92$ ); and obtrusiveness of medium ("To what extent were you distracted by your immediate physical surroundings while you were playing the video game?") comprising four items ( $\alpha = .85$ ). Obtrusiveness questions were reverse coded so that higher numbers would indicate more focus on the game. Overall, participants felt moderately involved in the game ( $M = 3.85$ ,  $SD = 1.31$ ), immersed in the game ( $M = 2.63$ ,  $SD = 1.31$ ), and focused on the game ( $M = 5.35$ ,  $SD = 1.21$ ).

*Aggressive affect* was measured using the 15-item state hostility scale (Anderson, Deuser, & DeNeve, 1995). This 4-point scale ranges from *not at all* to *very much so*. The scale proved reliable ( $\alpha = .94$ ) and included items such as "I feel angry," "I am burned up," "I feel aggravated," and "I am annoyed." *Verbal aggression* and *physically aggressive* intentions were measured by using a modified version of the Buss-Perry aggression questionnaire (Buss & Perry, 1992). As originally conceived, this measure uses items that tap a more stable trait aggression. However, we were concerned that using a trait, rather than a state, measure of aggression might attenuate the effects we'd be likely to find from short-term exposure to video game violence. In order to address this issue, the items in the original scale were slightly reworded to reflect state rather than trait aggression. In doing so, we attempt to capture state aggression that might best be considered aggressive intention. This construct corresponds to the well-known construct of behavioral intention in the attitude literature (Ajzen & Fishbein, 1980). For example, "I tell my friends openly when I disagree with them" becomes "I would tell this person openly that I disagree with him or her." Before responding to these items, participants read an ambiguous story. They are asked to: "Imagine that you leave this building when you're done completing this survey. Someone bumps into you, spilling your drink and the contents of your backpack." They are then asked to indicate their response to each potential reaction by circling a number from 0 (*extremely uncharacteristic of me*) to 6 (*extremely characteristic of me*). This state measure has been found both to be statistically reliable and to have construct validity. In addition, it has better predictive validity in terms of its sensitivity as a short-term dependent variable (Farrar & Krcmar, in press).

A confirmatory factor analysis (CFA) was run on this modified version of the Buss-Perry aggression scale to verify the factor structure and determine the exact reliabilities of our measure. Items 8, 9, and 16 on the original Buss-Perry scale were dropped for having poor reliability. Item 5 on the Buss-Perry scale loaded on the anger (or temper) dimension rather than on the proposed physically aggressive intentions dimension. Following the CFA, the four dimensions of the scale—physically aggressive intentions (five items,  $\alpha = .88$ ), verbal aggression (five items,  $\alpha = .89$ ), anger/temper (eight items,  $\alpha = .87$ ), and hostility/resentment (eight items,  $\alpha = .89$ )—had high reliability. This reworded version of the Buss-Perry scale was tested in a previous study, and it was found that the new state version of the instrument was

equally reliable and valid and was able to more accurately tap participants' responses to an aggressive prime (Farrar & Krcmar, in press).

## Results

Research Questions 1 and 2 asked if the internal game manipulations affected the perceptions of the players. To test these, we ran two one-way analysis of covariance (ANCOVAs) to test first the effects of the blood-on/-off manipulation on perceptions of gore, and second, the effect of point of view on perceptions of game involvement. In each case, frequency of shooter game play was used as a covariate. With perceptions of gore as the dependent variable and frequency of shooter game play as the covariate, there was no effect for the covariate,  $F(1, 182) = .63, p > .10$ , but a significant effect for the gore manipulation,  $F(1, 182) = 9.15, p < .01, \eta^2 = .05$ . Specifically, participants in the blood-on condition perceived greater gore ( $M = 5.78, SD = 1.10$ ) than those in the blood-off condition ( $M = 5.31, SD = .98$ ).

With each of the three factors of the presence scale as the dependent variables, and with frequency of shooter game play as a covariate, the point-of-view manipulation had a significant effect only on one of the three dimensions. For immersion, there was no effect of the covariate,  $F(1, 182) = .17, p > .10, \eta^2 = .00$ , and no effect for the manipulation,  $F(1, 182) = .56, p > .10, \eta^2 = .00$ . For involvement, the covariate was significant,  $F(1, 182) = 11.31, p < .05, \eta^2 = .06$ ; however, there was no effect for the point-of-view manipulation,  $F(1, 182) = 1.90, p > .10, \eta^2 = .01$ . For perceived focus, the covariate had no significant effect,  $F(1, 182) = .13, p > .10, \eta^2 = .00$ ; however, the point-of-view manipulation had a significant effect,  $F(1, 182) = 5.50, p < .05, \eta^2 = .03$ , with players in the third-person condition experiencing significantly greater focus ( $M = 5.57, SD = 1.20$ ) than those playing in first person ( $M = 5.16, SD = 1.18$ ). Interestingly, for the nonsignificant findings, the means were in the same direction, with greater immersion and involvement in the third-person condition, although these differences were not significant. Therefore, the internal game manipulations do affect perceptions of players even after covarying out frequency of playing shooter games: For blood on, greater gore is perceived and in the third person, players feel more focused.

Next, we analyzed the role of gender in perceptions of the game, looking at both the main effects of gender on perceptions of gore and on presence variables and also the interaction between gender and the internal game manipulations on perceptions of gore and on the presence variables. In each case, we covaried out the effects of frequency of playing shooter games in order to look only at the remaining effects of the variables of interest. Hypothesis 1 predicted that there would be a main effect of gender on interpretations of the game after covarying out shooter game play, such that women will have higher levels of perceived gore than men. First, there was no effect for the covariate on perceived gore,  $F(1, 182) = .35, p > .10, \eta^2 = .00$ , and there was no effect of gender on perceived gore,  $F(1, 182) = .53, p > .10, \eta^2 = .00$ ,

indicating that women did not perceive the game as more gory ( $M = 5.53$ ,  $SD = 1.16$ ) than men ( $M = 5.57$ ,  $SD = .96$ ). Second, there was no effect of the covariate on perceptions of immersion nor was there a main effect of gender on perceptions of immersion. The same held true for focus, with neither the covariate nor gender significantly affecting focus; however, there was a significant effect for involvement for the covariate,  $F(1, 182) = 5.93$ ,  $p < .01$ , but not for gender,  $F(1, 182) = .93$ ,  $p > .10$ ,  $\eta^2 = .01$ . Therefore, there are generally no differences between males and females in their perceptions of the game; however, there is an effect of overall game play on involvement, with more frequent players feeling more involved in play.

Hypothesis 2 predicted that there would be an interaction between gender and internal game features such that there will be a stronger effect of the point-of-view and blood manipulations on perceived gore and feelings of presence for women than there will be for men, and that this effect would remain after covarying out the effects of frequency of shooter game play. First, we examined the effect of the blood manipulation on perceived gore, using shooter game play as the covariate. There was neither an effect of the covariate nor a significant interaction between gender and the blood-on/-off manipulation on perceptions of gore,  $F(2, 179) = .005$ ,  $p > .10$ . Next, we examined the interaction between gender and the point-of-view manipulation on the presence dimensions. After covarying out game play, there was no significant interaction on immersion,  $F(2, 179) = 1.02$ ,  $p > .10$ . However, after covarying out game play, there was a significant interaction between gender and point of view for focus,  $F(2, 179) = 3.82$ ,  $p = .05$ . Post hoc comparisons revealed that women felt significantly more focused when playing in third person ( $M = 5.71$ ,  $SD = 1.09$ ) than when playing in first person ( $M = 4.96$ ,  $SD = 1.31$ ). For men, there were no significant differences between third-person ( $M = 5.39$ ,  $SD = 1.32$ ) and first-person ( $M = 5.38$ ,  $SD = .99$ ) play. In addition, after covarying out shooter game play, there was a significant interaction between gender and point of view on involvement,  $F(2, 179) = 4.44$ ,  $p < .05$ . Post hoc comparisons revealed that women felt significantly more involved when playing in third person ( $M = 3.96$ ,  $SD = 1.42$ ) than when playing in first person ( $M = 3.33$ ,  $SD = 1.31$ ). For men, there were no significant differences between third-person ( $M = 4.01$ ,  $SD = 1.30$ ) and first-person ( $M = 4.19$ ,  $SD = 1.08$ ) play. Therefore, women appear to be more affected by the point-of-view manipulations than men.

Last, we considered the effects of both the game manipulations and individuals' perceptions of the game on hostile and aggressive outcomes. Specifically, Hypothesis 3 predicted that there would be a main effect of game manipulations (point of view and blood) on emotional hostility, and verbal aggression and physically aggressive intentions. Because previous research has found that gender also plays a significant role in aggressive outcomes, gender was used as a covariate in all ANCOVAs. In addition, the mental models approach would argue that frequent playing of shooter games might also help build more aggressive mental models; therefore, we used frequency of shooter games as a covariate in all analyses.

First, with hostility as the dependent variable and gender and frequency of shooter game play as covariates, there was no effect of the covariates, nor was there an effect for the blood manipulation,  $F(1, 178) = .24, p > .10$ , or point of view,  $F(1, 178) = .77, p > .10$ . There was no significant interaction between the two manipulations on participant hostility,  $F(1, 178) = 1.36, p > .10$ . Therefore, the internal game manipulations have no effect on hostility.

The same analysis was run with verbal aggression as the dependent variable and gender and shooter game play as the covariates. There was no main effect for the blood manipulation,  $F(1, 178) = .94, p > .10$ , or the point-of-view manipulation,  $F(1, 178) = .04, p > .10$ . Last, there was not a significant interaction between the two manipulations on participant verbal aggression,  $F(1, 178) = .11, p > .10$ . Therefore, the internal game manipulations have no effect on verbal aggression. Finally, with physical aggression as the dependent variable and gender and shooter game play as covariates, there was a main effect of the blood manipulation,  $F(1, 178) = 4.09, p < .05, \eta^2 = .02$ , on physically aggressive intentions. Those in the blood-on condition were significantly more physically aggressive ( $M = 3.18, SD = 1.67$ ) than those in the blood-off condition ( $M = 2.75, SD = 1.71$ ). For the point-of-view manipulation, there was neither a main effect on physically aggressive intentions,  $F(1, 178) = .35, p > .10$  nor a significant interaction between the two manipulations on participant physical aggression,  $F(1, 178) = .54, p > .10$ . Therefore, the internal game manipulation of blood did affect physically aggressive intentions, with those in the blood-on condition reporting significantly greater physical aggression.

In addition to testing the game manipulations, we were also interested in the role of player perceptions of the game in predicting hostile and aggressive outcomes, reasoning that perhaps perceptions may play a greater role than the manipulations themselves (Potter et al., 2002). Hypothesis 4 predicted that there would be an effect of player perceptions of gore and involvement, even when the game manipulations and overall shooter game play were controlled for. To test this, we conducted three hierarchical multiple regressions. In each case, gender and shooter game play were entered on the first step, the game manipulations were entered on second step, and last, the variables of interest—game perceptions of gore and involvement—were entered on the final step. The dependent variables were hostility, verbal aggression, and physically aggressive intentions. First, with hostility as a dependent variable, gender and shooter game play were not significant on the first step,  $R = .02, F(2, 179) = .11, p > .10$ , nor were the game manipulations significant on the second step ( $R^2$  change = .01,  $F(2, 177) = .46, p = ns$ ). However, perceptions of the game, entered on the third step, did yield a significant increase in  $R^2$ ,  $R^2$  change = .11,  $F(4, 173) = 5.36, p < .01$ . Specifically, those who perceived themselves as being more immersed ( $B = .45, p < .01$ ) and involved ( $B = .27, p < .01$ ) in the game were significantly more hostile. There was no significant effect for perceived focus ( $B = .04, p > .10$ ). In addition, there was no effect for perceived gore ( $B = .03, p > .10$ ).

Second, with verbal aggression as the dependent variable, the first step, was significant,  $R = .31, F(2, 179) = 9.28, p < .001$ ; however, only gender ( $B = -.26,$

$p < .05$ ) was significant, with males more verbally aggressive than females. On the second step, the addition of the game manipulations was not significant,  $R^2$  change = .00,  $F(2, 177) = .43$ ,  $p > .10$ . The perceptions of the game, entered on the third step, did not yield a significant increase in  $R^2$ ,  $R^2$  change = .03,  $F(4, 173) = 1.31$ ,  $p > .10$ . Third, with physically aggressive intentions as the dependent variable, gender and shooter game play were significant on the first step,  $R = .49$ ,  $F(1, 179) = 28.55$ ,  $p < .001$ . Specifically, males had higher physically aggressive intentions ( $B = -.41$ ,  $p < .05$ ), and those who played more shooter games had somewhat more physically aggressive intentions ( $B = .14$ ,  $p = .07$ ). On the second step, the game manipulations approached significance,  $R^2$  change = .02,  $F(2, 177) = 2.36$ ,  $p < .10$ . Specifically, with the blood manipulation on, players were somewhat more physically aggressive ( $B = .13$ ,  $p < .05$ ). Last, perceptions of the game, entered on the third step, did yield a significant increase in  $R^2$ ,  $R^2$  change = .05,  $F(4, 173) = 2.67$ ,  $p < .05$ . Specifically, those who perceived themselves as being more involved ( $B = .23$ ,  $p < .01$ ) and immersed ( $B = .20$ ,  $p < .05$ ) in the game were significantly more physically aggressive; however, there was no effect for perceived focus ( $B = .00$ ,  $p > .10$ ). There was no effect for perceived gore ( $B = .04$ ,  $p > .10$ ). In sum, even after controlling for the actual within-game manipulations, players' perceptions of the game had some effect on aggressive outcomes. Specifically, those who perceived themselves as more immersed and involved in the game were more hostile and physically aggressive. Perceptions of gore did not appear to be related to aggressive outcomes, although recall from the tests of Hypothesis 2 that the actual gore manipulation was related to physical aggression.

## Discussion

### Summary of findings

In this study, we examined the effects of two internal game manipulations: the presence of blood and point of view on participants' perceptions of the game, and any interactions between gender and the game manipulations on perceptions. Last, and perhaps most importantly, we wanted to see if internal game manipulations and/or perceptions of the game affected aggressive outcomes. Overall, when the blood manipulation was on, participants perceived greater gore. In addition, players were significantly more focused when they played in third person than when they played in first person. Interestingly, although males were more involved in the game overall, females were more focused and involved when they played in third—not first—person, as found in previous literature (Tamborini *et al.*, 2001). We also examined aggressive outcomes. Those who played the game in the blood-on condition had more physically aggressive intentions. In addition, perceptions of the game affected aggressive outcomes, even when the condition was controlled for. Specifically, when players were more involved and immersed in the game, they reported greater hostility and physical aggression. The effect sizes in this study were somewhat small. For example, the effect of the blood-on manipulation on physical aggression accounted for only 2% of the variance ( $\eta^2 = .02$ ), whereas the effect of game perceptions on

hostility, even after controlling for the game manipulations, was somewhat larger ( $R^2$  change = .11). These effects were smaller than the average effect size reported by Sherry (2001) in a meta-analysis of the effects of video game play on aggression. However, they still fall within the range of effect sizes found for experimental studies of violent video games and aggression. In addition, this study looked at differences in aggressive outcomes for, for example, point of view *within a game*, and not at the effects of video game violence overall. We might expect these effect sizes to be somewhat smaller than those in the studies that investigate the effect of playing a violent game when compared to a nonviolent or no-game control. It is also possible that the effect sizes may have been larger if participants had played the game on larger television screens. It has been argued that larger screen size can increase players' levels of presence, or feeling of immersion in a medium (Lombard & Ditton, 1997; Lombard et al., 2000) and that increased presence can strengthen effects.

### Theoretical and practical implications

Although much research has examined the influence of violent video games and found increases in aggressive cognitions (e.g., Anderson et al., 2004) and aggressive affect, leading to feelings of hostility (e.g., Tamborini et al., 2001), delinquent behavior (Anderson & Dill, 2000), and overall aggressive behavior (e.g., Anderson & Murphy, 2003), little published research has looked at internal game manipulations. As video games become more sophisticated with vivid graphics and elaborate game features, it is important to explore how these features affect player perceptions and how perceptions may then affect aggressive outcomes.

Earlier research suggests that participants who played a game in the first-person point of view felt more involved and immersed in the game (Tamborini et al., 2001). However, in our study, playing in third person, not in first person, resulted in increased involvement and focus. Why is this the case? It is possible that when players do not see the main character (as is the case in first-person play), it may appear to the gamer that there is no protagonist (antagonist?). This is an important finding to replicate precisely because it is counterintuitive. On the one hand, playing in first person may increase feelings of involvement. On the other hand, first-person play may simply feel to the gamer like "no-person" play. Interestingly, there was a gender interaction as well, suggesting that for women in particular, playing in first person reduced their sense of involvement. This difference may also be due to a novelty effect. As girls do not spend nearly as much time playing video games as boys (Kaiser Family Foundation, 2002), it is possible that the women in this study needed to see the physical presence of their character in order to feel more a part of the game. Men, due to their greater experience with video games may be more comfortable navigating the world of first-person shooter games such as *Hitman II*. This may partly explain the gender differences in point of view and involvement. This finding would also mesh with the mental models approach: with a more elaborated mental model for video game violence, males may not require the third-person visuals to feel involved. Their mental model may in fact "fill in" the needed information.

The blood manipulation also had an effect; those who played with the blood turned on perceived the game to be gorier. Although these results are intuitive, the findings become more compelling as we begin to explore the role of the blood manipulation itself. For example, when the blood manipulation was on, players reported increased intent to be physically aggressive. Once again, television research suggests that the presence of blood may serve to decrease aggression, not increase it (Wilson *et al.*, 1997). An alternate interpretation is that blood in video games may act as a reward, which in television research has been found to increase aggressive outcomes for the viewers themselves (Paik & Comstock, 1994). In a video game, blood itself is a kind of reward in that it reminds the player of success. In the mental models approach, then, blood is synonymous with reward—not consequence as it may be in film violence.

However, we have argued that using the game manipulations alone may not provide enough insight into the effects of video games. It seems reasonable, instead, to consider how the games are perceived. Often, when researchers conduct a manipulation check in an experiment, they simply ask viewers or players if they have noticed a particular manipulation: was this violent, was this gory, and so forth. If the participant agrees that the manipulation was violent or gory, the manipulation is said to have worked. However, it seems more plausible that a manipulation is not a dichotomy but a continuum. A stimulus may not be violent or nonviolent but may be *perceived* as more or less violent by the viewer. Similarly, the violence may cause some people to become more involved in the game play, while causing others to disengage. The violence itself (for example) may vary in degree. Certainly, the viewer may perceive it that way. If, in this case, we utilize our mental model of violence to interpret a violent stimulus, it may be meaningful to consider that interpretation in the analyses rather than using the dichotomized manipulation.

Potter *et al.* (2002) make such an argument, claiming that interpretation of the stimulus results from our schema or mental model (Roskos-Ewoldsen *et al.*, 2002) of that thing, or event. Past research on mental models has suggested that our cognitive representations of events or situations, what might be referred to as our mental abstractions, both guide new incoming information and in turn affect existing models to an extent. Therefore, mental models that have become activated through television viewing (Krcmar & Curtis, 2003), or game play, can then serve to influence subsequent attitudes and behaviors. Consistent with this line of reasoning, in the present study, we first controlled for the game manipulation and then examined player perceptions as they related to aggressive outcomes. The resulting findings, that perceptions of greater involvement and focus resulted in increased hostility and physical aggression, suggest that perceptions of the game can themselves be crucial. Recall that Tamborini found that greater involvement resulted from first-person game play (Tamborini *et al.*, 2001). However, without testing multiple games, it remains unclear if the result is generalizable to many video games, or specific to just a few. Certainly, in our case, the opposite held true. However, the point of such research is only to discover how point of view might factor into aggressive outcomes.

In that case, involvement in the game, and not the manipulation, becomes the important variable.

### Limitations and future research

Although the results of this study offer support for the notion that game features affect interpretations and that those interpretations, or mental models, can influence aggressive outcomes, there are several issues that should be taken into consideration in future research. First, the measures of aggressive outcomes may not have been sensitive enough to tap into all differences, especially in the absence of a provocation following play. Recall that there were few significant findings for physical aggressive intent. Zillmann (1983) argues that without provocation, potentially aggressive audiences (or players, in this case) may simply experience an increase in arousal, which then disappears over time. Future research should incorporate this important design feature.

Second, in our measures of perceptions, we attempted to assess how the players understood and ultimately responded to the internal game manipulations. For the blood manipulation, we measured perceptions of gore. This has face validity and seemed an appropriate way of determining perceptions of the manipulation. In the case of the point-of-view manipulation, it seemed appropriate to measure the degree to which players felt a part of the game—as they would if they were situated in the shooter's body. To measure this, we utilized the presence measure (Lombard & Ditton, 1997). The dimension of immersion, in particular, appears to assess the degree to which the player feels as if she or he is there, in the game. To the extent that immersion *is* a feeling of first-personness, immersion may be the correct measure to get at the role of perceptions of the manipulation in the outcome. However, why, then, did players feel greater first-personness when playing in third person? As we argued previously, first-person play may encourage a feeling of lack of body, rather than embodiedness. This finding is certainly worth exploring further.

Finally, as mentioned above, the effects found in this study may have been stronger had participants played the violent game on a bigger television screen. Much more research is needed here to understand the effects of screen size on game play outcomes.

Overall, this study attempted to explore the more practical question of the effects of internal game manipulations. In addition, we attempted to pursue the theoretical point that perceptions of media, either television or video games, and not the manipulations of those stimuli, must be considered primary when studying outcome variables. Further research should explore the role of mental models for violence and the activation of those models in the study of media violence. This point is ultimately one that should be considered theoretically and carried out in analysis of experimental data.

### Note

- 1 Previous video game research has typically used 10–15 minutes for game exposure, making the choice of 12 minutes both consistent with the literature and feasible in terms of design.

## References

- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Anderson, C. A. (1997). Effects of violent movies and trait hostility on hostile feelings and aggressive thoughts. *Aggressive Behavior*, *23*, 161–178.
- Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science*, *12*, 353–359.
- Anderson, C. A., Carnagey, N. L., Flanagan, M., Benjamin, A. J., Arlin, J., Eubanks, J, et al. (2004). Violent video games: Specific effects of violent content on aggressive thoughts and behavior. *Advances in Experimental Social Psychology*, *36*, 199–249.
- Anderson, C. A., Deuser, W. E., & DeNeve, K. (1995). Hot tempers, hostile affect, hostile cognition and arousal: Tests of a general model of affective aggression. *Personality and Social Psychology Bulletin*, *21*, 434–448.
- Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology*, *78*, 772–790.
- Anderson, C. A., & Murphy, C. R. (2003). Violent video games and aggressive behavior in young women. *Aggressive Behavior*, *29*, 423–429.
- Bartholow, B. D., & Anderson, C. A. (2002). Effects of violent video games on aggressive behavior: Potential sex differences. *Journal of Experimental Social Psychology*, *38*, 283–290.
- Bensley, L., & VanEenwyk, J. (2001). Video games and real-life aggression: Review of the literature. *Journal of Adolescent Health*, *29*, 244–257.
- Biocca, F. (1997). The cyborg's dilemma: Progressive embodiment in virtual environments. *Journal of Computer Mediated Communication*, *3*(2). Retrieved July 30, 2005, from <http://jcmc.indiana.edu/vol3/issue2/biocca2.html>
- Buchman, D. D., & Funk, J. B. (1996). Video and computer games in the '90s: Children's time commitment and game preference. *Children Today*, *24*(1), 12–16.
- Buss, A. H., & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology*, *63*, 452–459.
- Children Now (2001). *Fair Play? Violence, gender, and race in video games*. Oakland, CA: Author.
- Dill, K. E., & Dill, J. C. (1998). Video game violence: A review of the empirical literature. *Aggression and Violent Behavior*, *3*(4), 407–428.
- Dominick, J. R. (1984). Videogames, television violence and aggression in teenagers. *Journal of Communication*, *34*, 136–147.
- Entertainment Software Association (2003). *Key facts and research about video games and violence*. Retrieved August 29, 2003, from <http://theesa.com/keyfacts.html>
- Entertainment Software Association (2004). *Essential facts about the computer and video game industry*. Retrieved July 26, 2005, from <http://www.theesa.com/files/2005EssentialFacts.pdf>
- Farrar, K. M., & Krcmar, M. (in press). Measuring state and trait aggression: A short, cautionary tale. *Media Psychology*.

- Fling, S., Smith, L., Rodriguez, T., Thornton, D., Atkins, E., & Nixon, K. (1992). Videogames, aggression, and self-esteem: A survey. *Social Behavior and Personality*, 20(1), 39–46.
- Gunter, G. (1985). *Dimensions of television violence*. Aldershots, England: Gower.
- Gunter, G. (1994). The question of media violence. In J. Bryant & D. Zillman (Eds.), *Media effects* (pp. 163–211). Hillsdale, NJ: Erlbaum.
- Heeter, C. (1992). Being there: The subjective experience of presence. *Presence*, 1(2), 262–271.
- Kaiser Family Foundation (2002). *Key facts. Children and video games*. Menlo Park, CA: Author.
- Kim, T., & Biocca, F. (1997). Telepresence via television: Two dimensions of telepresence may have different connections to memory and persuasion. *Journal of Computer Mediated Communication*, 3(2). Retrieved July 30, 2005, from <http://jcmc.indiana.edu/vol3/issue2/kim.html>
- Kirsh, S. J. (1998). Seeing the world through mortal kombat-colored glasses. Violent video games and the development of a short-term hostile attribution bias. *Childhood*, 5(2), 177–184.
- Krcmar, M., & Curtis, S. (2003). Mental models: Understanding the impact of fantasy violence on children's moral reasoning. *Journal of Communication*, 53, 460–478.
- Leyens, J. P., & Picus, S. (1973). Identification with the winner of a fight and name mediation: Their differential effects upon subsequent aggressive behavior. *British Journal of Social and Clinical Psychology*, 12, 374–377.
- Lin, S., & Lepper, M. R. (1987). Correlates of children's usage of videogames and computers. *Journal of Applied Social Psychology*, 17, 72–93.
- Lombard, M., & Ditton, T. (1997). At the heart of it all: The concept of presence. *Journal of Computer Mediated Communication* [On-line], 3(2). Retrieved July 30, 2005, from <http://jcmc.indiana.edu/vol3/issue2/lombard.html>
- Lombard, M., Reich, R. D., Grabe, B. E., Bracken, C. C., & Ditton, T. B. (2000). Presence and television; The role of screen size. *Human Communication Research*, 26, 75–95.
- Paik, H., & Comstock, G. (1994). The effects of television violence on anti-social behavior: A meta-analysis. *Communication Research*, 21, 516–546.
- Potter, W. J., Pashupati, K., Pekurny, R. G., Hoffman, E., & Davis, K. (2002). Perceptions of television: A schema. *Media Psychology*, 4, 27–50.
- Roberts, D. F., Foehr, U. G., & Rideout, V. (2005, March). *Generation M: Media in the lives of 8-18 year olds*. Menlo Park, CA: Kaiser Family Foundation.
- Roskos-Ewoldsen, D. R., Roskos-Ewoldsen, B., & Killman Carpentier, F. (2002). Media priming: A synthesis. In J. B. Bryant & D. Zillmann (Eds.). *Media effects in theory and research* (2nd ed., pp. 97–120). Mahwah, NJ: Erlbaum.
- Sanders, G. S., & Baron, R. S. (1975). Pain cues and uncertainty as determinants of aggression in a situation involving repeated instigation. *Journal of Personality and Social Psychology*, 32, 495–502.
- Sherry, J. L. (2001). The effects of violent video games on aggression. A meta-analysis. *Human Communication Research*, 27, 409–431.
- Slater, M., & Usoh, M. (1993). Representations systems, perceptual position, and presence in immersive virtual environments. *Presence: Teleoperators and Virtual Environments*, 2(3), 221–233.
- Smith, S. L., Lachlan, K., & Tamborini, R. (2003). Popular video games: Quantifying the presentation of violence and its context. *Journal of Broadcasting & Electronic Media*, 47(1), 58–76.

- Smith, S. L., Wilson, B. J., Kunkel, D., Linz, D., Potter, W. J., Colvin, C. M., et al. (1998). Violence in television programming: University of California, Santa Barbara study. In *National Television Violence Study* (Vol. 3, pp. 5–220). Newbury Park, CA: Sage.
- Steuer, J. (1992). Defining virtual reality: Dimensions determining telepresence. *Journal of Communication*, *42*, 73–93.
- Surgeon General's Scientific Advisory Committee on Television and Social Behavior (1972). *Television and growing up: The impact of televised violence*. Washington, D.C.: Government Printing Office.
- Tamborini, R. (2000, November). *The experience of telepresence in violent video games*. Paper presented at the 86th annual convention of the National Communication Association, Seattle, WA.
- Tamborini, R., Eastin, M., Lachlan, K., Skalski, P., Fediuk, T., & Brady, R. (2001, May). *Hostile thoughts, presence and violent virtual video games*. Paper presented at the 51st annual convention of the International Communication Association, Washington, D.C.
- U.S. Department of Health and Human Services (1992). *Television and behavior: Ten years of scientific progress and implications for the eighties* (Vol. 1). Washington, D.C.: Government Printing Office.
- Wilson, B., Kunkel, D., Linz, D., Potter, W. J., Donnerstein, E., Smith, S, et al. (1997). Violence in television programming overall: University of California Santa Barbara study. In *National Television Violence Study, Volume 1*. Thousand Oaks, CA: Sage.
- Zillmann, D. (1983). Arousal and aggression. In R. Geen & E. Donnerstein (Eds.), *Aggression: Theoretical and empirical reviews* (pp. 75–101). New York: Academic Press.