

## Death with a Story

### How Story Impacts Emotional, Motivational, and Physiological Responses to First-Person Shooter Video Games

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*This study investigates how game playing experience changes when a story is added to a first-person shooter game. Dependent variables include identification, presence, emotional experiences and motivations. When story was present, game players felt greater identification, sense of presence, and physiological arousal. The presence of story did not affect self-reported arousal or dominance. This study clearly demonstrates that story is something that video game players enjoy; it helps involve them in the game play, makes them feel more immersed in the virtual environment, and keeps them aroused. The greater character identification may be especially worrisome, as past research has shown that justified media violence disinhibits actual aggression on the part of the audience*

The goal of this study is to investigate how the addition of a storyline to a first-person shooter video game changes the motivational, psychological, and physiological experience of the game player compared with the experiences of first-person shooter games with no storyline. For the last few decades, the effects of video game playing have been of great societal concern in the U. S. and in many other countries. A number of studies have investigated the effects of violent video games on children's

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and adolescents' aggressive behavior (Anderson & Ford, 1986; Cooper & Mackie, 1986; Graybill, 1985; Irwin & Gross, 1995; Schutte, Malouff, Postgorden, & Rodasta, 1988; Silvern & Williamson, 1987).

This research does not present a strong indictment of violent video games. Recently, Sherry (2001) conducted a meta-analysis of the video game literature and concluded that although there is an association between violent video games and aggressive behavior, it is not very strong (see also Anderson & Bushman, 2001). The effect size, however, varied with several factors—including game genre. Games containing human violence (human and fantasy characters engaging in violent acts) showed greater effects than games containing sports-related violence. This conclusion should be treated cautiously, however; as Sherry (2001) pointed out, little research has been done on human violence games, their growth being relatively recent. Thus, it is probably unwarranted to generalize the findings of video game research in the 80s and early 90s to the modern experience. The responses of teens playing Pac-Man in arcades for a quarter may not be applicable to those of teens playing first-person shooters at home or online against real people.

Why should adding a story or narrative to video game be relevant to the question of whether violent video games lead to increased aggression? Richardson (2000) stated that narrative is everywhere. A child grows up reading stories and watching stories on television and in movies. The role of narrative has been studied in many media and has been shown to have a significant impact on human cognition and affect. It seems likely that the addition of narrative to violent video games should have a similarly significant impact on the game playing experience. In the past, video games consisted of primarily two-dimensional, low-resolution images moving across a screen with little associated narrative.

More recently, a common but weak narrative structure found in violent video games consisted of multiple sequentially constructed stages. The game player was the protagonist beset by attackers who must be vanquished to proceed to the next level. At each level, the player met new, often stronger, opponents who must also be fought until the player has killed all the opponents or is killed. These games had a sequential structure; however, they did not contain a complete narrative. Filled with violent acts, they nevertheless did not supply a reason, other than that of advancing to the next level, to explain why the protagonist must fight and kill the opponents.

In the past few years, some games have begun to offer a more complete underlying narrative that provides a storyline and a justification for the actions taken during the game. The addition of a storyline provides a context for engaging in violent acts. The violent acts are made to seem reasonable, acceptable, and even necessary. In a story-based video game,

the player is not engaged in killing but rather is saving the world or the earth. This article asks whether the experience of killing to save the world is different from the experience of killing to get to the next level.

If the presence of narrative provides a justifying framework for the violence, there is reason to be especially concerned about children playing these games. When violence in traditional media (e.g., film and television) is justified, it has been shown to disinhibit actual aggressive behavior by the audience (Berkowitz, Parke, Leyens, & West, 1974; Tan, 1981). That is, justified violence has more impact than nonjustified or less-justified violence.

In addition, adding narrative to games makes them more interactive, immersive, and involving. Media researchers have predicted that immersive media increase arousal levels and aggression because users feel they are directly experiencing the violent events. Furthermore, researchers have theorized that such experiences may influence involuntary emotional responses (Shapiro & McDonald, 1992). As a result, playing a realistic violent video game with a narrative may elicit cognitive, emotional, and behavioral experiences that differ in both quality and quantity from those elicited by nonnarrative games. As a result, increased learning of aggressive behavior and increased desensitization to its outcomes possibly result from playing video games with compelling narratives.

#### Two Forms of Media Presentation: Narrative Versus Nonnarrative

A mediated message, whether to inform or to entertain, is carried in either narrative or nonnarrative format. Many definitions of (or approaches to) narrative exist. Labov (1974) defined a narrative as having at least two events presented in temporal and causal sequence. Similarly, Prince (1982) defined it as the representation of two or more either real or fictive events in temporal sequence, neither of which presupposes or entails the other. To Sarbin (1986), a story is a symbolized account of actions of human beings that has a temporal dimension. A story has a beginning, a middle, and an end (or sense of an ending). A story proceeds through these phases with coherence, and the events in a story are structured to demonstrate these phases (Sarbin, 1986). A nonnarrative, then, would be a message that lacks these components, although narrative structure is probably best conceptualized not as narrative or nonnarrative but along some continuum.

Narrative is a basic tenet of human communication (Ferrell, 1985; W. R. Fisher, 1985; A. Lang et al. 1995), and narrative thinking is a heuristic process (Robinson & Hawpe, 1986). Research has suggested that people automatically construct a storyline to connect pieces of information (Sarbin, 1986). Mandler and Johnson (1997) used the term *story schema* to

refer to an idealized internal representation of the parts of a typical story and the relationships among those parts. Telling (e.g., making up) a story or listening to one is a basic part of human nature. People like to tell and listen to stories, and they do so beginning in early childhood (e.g., bedtime storytelling).

In television and other media, the role and importance of story or story elements have already been established (Selnow, 1984). Lack of story has been found to make a television program less interesting, less memorable, and less compelling (Kaplan, 1981). When televised information is presented in a narrative format, messages have been shown to be easier to process and remember (see Graesser, 1981; A. Lang, 1989; A. Lang et al. 1994; Thorson, 1989). Many advertisers understand the advantages narrative brings and employ this format for their advertisements. A study found that narrative commercials compared to other types (e.g., informative and image commercials) were recalled better and rated as more likable (Shin et al., 2003).

No research, however, has investigated how the narrative structure of video games affects online game-playing experiences. In this study, we examine the effects of narrative in violent video games on identification, presence, arousal, emotion, and motivation. We selected these dependent variables in this study for both theoretical and practical reasons. First, a number of studies conducted on other media have found these variables to be significant in message processing (Biocca, Kim, & Levy, 1995; Hoffner, 1996; Lang, Dhillon, & Dong, 1995). Second, increasing identification and sense of presence, as well as eliciting positive emotional experiences, are major goals for many video game designers, because these variables lead to heightened enjoyment and increased sales. Third, if one is concerned about the effects of violent video games on the learning of aggressive behavior, the consistent pairing of violent actions with positive emotion, arousal, and sense of presence might create ideal conditions for desensitizing players to violent behavior and perhaps facilitating later violent actions.

#### Identification with Video Game Characters

The concept of identification has been a topic of interest for many scholars in various fields including communication. Erikson (1968) stated that the ability to identify with other people is a fundamental social ability that develops in early childhood. In discussing the importance of tales for children in terms of child development, Bettelheim (1976) argued that by identifying with the heroes in those stories, children psychologically experience their triumph and learn how being good is rewarded. Thus, identification offers a chance for vicarious experience.

Little research has been done to look at how players identify with video game characters; however, researchers have investigated how television effects are mediated by identification (Cohen, 2001; Hoffner, 1996; Livingstone, 1998; Maccoby & Wilson, 1957; Wilson, 1993). Features that have been shown to increase identification include specific text and character types (Hoffner, 1996), structural features (Wilson, 1993), fondness for a character (Cohen, 1999), similarity between a character and a viewer (Maccoby & Wilson, 1957), and narrative (Cohen, 2001). Oatley (1994) argued that when identifying with media characters, individuals adopt the media character's goals, comprehend the plot in reference to these goals, and experience the feelings induced when interacting with the events that take place. Thus, we hypothesized that:

H1: Video game players will identify with characters and their goals to a greater extent when a story is present than when a story is not present.

#### Narrative Video Games and Presence

Murray (1997) pointed out that game designers put a lot of effort into making video games more immersive. The underlying assumption is that the feeling of being immersed leads to greater enjoyment and thus more positive attitudes toward the game. This feeling of being there has been called the *sense of presence* (Biocca, Kim & Levy, 1995; Gibson, 1979; Lessiter et al., 2000; Lombard & Ditton, 1997; Steuer, 1992; Witmer & Singer, 1998).

It is a common belief that technological factors (e.g., virtual reality, screen size, image quality, sound fidelity) create a sense of presence and most research in this area has examined the effects of technological variables on the sense of presence. Studies on presence in video games are no exception, primarily examining presence in virtual reality games. Laurel (1993) argued that correct use of story should help to ease players into a game and make them feel more like they are actually part of the environment. We hypothesized that:

H2: Video game players will report greater presence when a story is present than when no story is present.

#### Emotional Experiences in Video Games

Needless to say, one of the major goals for game designers is to make game playing a more positive emotional experience. To examine how the addition of narrative affects emotional experience, this study takes a dimensional approach to emotion. The dimensional approach to

emotion posits that an emotion consists of two primary underlying dimensions, hedonic valence and arousal (P. J. Lang, 1995; P. J. Lang et al 1993; Russell, & Mehrabian, 1977). Valence ranges from very positive to very negative, whereas arousal indicates the intensity of an emotion ranging from calm, relaxed, and bored to excited and aroused.

Emotion can be expressed and thus observed in many ways: through language, behavior, and physiology. Emotion is not a single response but a collection of these responses (M. M. Bradley & P. J. Lang, 2001). When people experience emotions, their bodies act and react; heart rates change, palms sweat, faces frown or smile (M. M. Bradley, 2000). Emotion has been measured using self-report scales such as SAM (Self-Assessment Manikin, P. J. Lang 1980), physiological measures, and behavioral observation. Among the physiological measures, facial EMG (electromyography) has been used to index valence and electrodermal activity (EDA) has been used to measure physiological arousal.

The addition of narrative has been shown to increase some aspects of positive emotion. For example, narrative commercials were rated as more likable than informative and image-based commercials (Shin et al., 2003). In addition both identification (Cohen, 2001) and presence (Freeman & Avons, 2000) have also been shown to increase positive emotion. Adding narrative has also been shown to increase arousal (Lang, Sias, Chantrill, & Burek, 1995). Based on these arguments, we hypothesized that:

H3: Video game players will report feeling more positive and more aroused when playing story based games compared to nonstory based games.

H4: Video game players will show greater physiological arousal when playing story based games compared to nonstory based games.

## METHOD

### Design

The design of this study was a 2 (Story) X 2 (Game) within-subjects factorial design. The story factor had two levels, story-based and nonstory-based. Within each level of story, two different games were used to increase generalizability. Participants played four different games for 8 minutes apiece. Eight minutes was selected because it is long enough for experienced game players to make significant progress in these games but short enough to allow all four games to be played in one sitting. The games were presented in 24 randomized orders.

### *Stimulus Materials*

The four games used were *Doom 2* and *Quake 2* by Id Software, *Outlaws* by Lucasarts, and *Half-Life* by Valve software. *Doom 2* and *Quake 2* are traditional Id Software titles with little or no story line. Conversely, *Outlaws* and *Half-Life* were both hailed by critics for their compelling integration of story into game play (*Storytelling via Nintendo: Video games grow up*, 1998). All four games are first-person shooters, in which the player maneuvers through a three-dimensional world, using the computer screen to see through the eyes of their character and shoot opponents.

### *Participants*

Thirty undergraduate students attending Indiana University participated in the experiment for extra course credit. All participants were experienced game players enrolled in a video game course. There were 6 women and 24 men.

### *Procedure*

Once participants arrived, they read and signed an informed consent form. Next, they were taken to the computer and seated, and electrodes were applied to measure skin conductance responses. Participants were allowed to configure, name, and customize their character. After playing each game for eight minutes, participants were asked to exit the game and answer questions specific to that game. Participants then began the next game as indicated by the predetermined order. After they played all the games, participants were thanked and dismissed.

### *Dependent Variables*

#### *Identification*

We measured identification using three different scales. The first scale was designed to measure identification with the protagonist. The second scale measured identification with the goal of overcoming the opposition. The third scale measured identification with the general goals of the protagonist. Items were measured using multiple 10-point agreement scales immediately after each game was played. The first scale, identification with the character, was measured with four items: "I felt the characters in this game were interesting," "I identified with the character I was playing in this game," "I was interested in my character's goals in this game," and "I liked the character I was playing in this game." Reliability for the 4-item measure was  $\alpha = .74$ .

The second scale, overcoming the opposition, was assessed with two items: "I felt like I needed to defeat all the opponents I encountered" and "Overcoming the opponent is important." Correlation for the two items was  $r = .32$ .

The third scale measured the degree to which participants were acting on their character's behalf. The two questions posed were: "I had to overcome the other characters in the game in order to meet my character's goals" and "I had to overcome the other characters in the game in order to protect the health of my character." Correlation for the two items was  $r = .39$ .

#### *Presence*

Presence was measured using three semantic differential scales. Participants rated to what degree they felt like they were really there (there-not there), how much they felt they were in a real place (real-not real), and how they felt like the other characters in the game were real people (real-not real). Reliability for the verbal presence measure was  $\alpha = .88$ . In addition, a 9-point pictorial Self-Assessment Manikin (SAM) presence scale was developed for this study. The results of this study are intended to begin the process of validating this measure (see Appendix). The correlation between the verbal presence scale and SAM presence was  $r = .50$ . Thus, the pictorial scale was moderately correlated with the traditional verbal scale, suggesting it was tapping some aspect of presence.

#### *Emotional Experience*

Emotional responses were measured in two ways: self-reported and physiological. Participants were asked to rate their emotional experience after each game using SAM (P. J. Lang, Greenwald, Bradley, & Hamm, 1993).

In addition, participants' skin conductance was measured as an indicator of physiological activation in the sympathetic nervous system (Hopkins & Fletcher, 1994). Two Beckman standard AG/AGCL electrodes were placed on the participant's nondominant foot after washing the skin with distilled water to control hydration. The signal was passed to a Coulbourn module that provides a constant measurement voltage of .5 v skin conductance, and level was sampled and recorded 20 times per second. Due to data collection limitations, data were collected during minutes 1 and 2, 4 and 5, and 7 and 8 of each game. Thus, data were collected for 6 of the 8 minutes of game play. The frequency of spontaneous skin conductance responses for each two minute segment was coded. These three 2-minute segments make up the three levels of a within-subjects Time factor used to analyze the skin conductance data.



**TABLE 1**  
**Comparison of Self-Report Responses to Story and No-Story Games**

<i>Measure</i>	<i>Story</i>		<i>No-Story</i>	
	M	SD	M	SD
Character identification***	6.88	1.75	3.71	1.60
Overcoming opposition**	6.33	2.38	4.85	2.12
Achieve character goals*	7.51	1.90	5.88	2.08
SAM arousal	3.57	1.01	2.97	.67
SAM valence***	4.18	.59	3.22	.64
SAM presence***	6.77	1.25	3.80	1.13
Verbal presence***	6.97	1.58	3.91	1.60
Game liking***	7.92	1.64	5.12	2.22

NOTE: SAM measures are from 9-point pictorial scales. For arousal, 1 = *aroused*, 9 = *calm*. For valence, 1 = *sad*, 9 = *happy*. For dominance, 1 = *in control*, 9 = *out of control*. For presence, 1 = *present*, 9 = *distant*. The verbal presence measure was the average of three measures where 1 = *low presence*, and 10 = *high presence*. Game liking was a 10-point agreement scale for the statement "I liked this game" where 1 = *disagree* and 10 = *agree*.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

### Power Analysis

A statistical power analysis was conducted for the  $F$  tests that would accompany the analysis of variance. Assuming 1 and 28 degrees of freedom and  $\alpha = .05$ , power to detect a small effect ( $f = .10$ ) was .10, a medium effect ( $f = .25$ ) was .46, and a large effect ( $f = .40$ ) was .96. Thus, while it is likely that our study did not miss any large effects, we cannot say the same for small or medium effects. For the analyses involving 3 and 78 degrees of freedom, the corresponding power estimates were .28, .97, and .99 according to Cohen (1983).

## RESULTS

### H1

The first hypothesis predicted that game players would identify with their characters and their goals to a greater extent when a story was present. The data from the three identity scales (character, overcoming opposition, and character's goals) were submitted to a 2 (Story)  $\times$  2 (Game) repeated-measures ANOVA. As predicted, for all three items, identification was significantly greater when playing a story-based game than when

playing a nonstory-based game. The presence of story caused participants to like and identify more with characters,  $F = 39.73, p < .001, \epsilon^2 = .57$ ; increased their desire to overcome all opponents,  $F = 7.37, p = .01, \epsilon^2 = .18$ ; and affected the degree to which participants felt they had to achieve their character's goals and protect their character's health,  $F = 4.68, p = .04, \epsilon^2 = .33$ . See Table 1. Thus, H1 was supported.

## H2

This hypothesis predicted that participants would report a greater sense of presence when playing story-based games than when playing nonstory-based games. We measured presence using a verbal scale and a pictorial scale. Both measures revealed that the participants felt more present when playing story games than playing nonstory games. For the traditional verbal presence measure, story games resulted in greater presence compared to nonstory games,  $F(1,28) = 62.05, p < .001, \epsilon^2 = .68$ . See Table 1. For the SAM presence measure, story also resulted in significantly greater presence,  $F(1, 28) = 55.34, p < .001, \epsilon^2 = .64$ . The size and direction of the effect were similar for both measures. H2 was supported.

## H3

This hypothesis predicted that players would report feeling more positive, aroused, and dominant when a story was present. These data were submitted to one-way repeated-measures ANOVA. As predicted, the presence of story led to significantly more positive emotional valence:  $F(1, 28) = 25.37, p < .001, \epsilon^2 = .45$ . See Table 1. Self-reported arousal, however, was not higher for story games,  $F(1,28) = 1.55, p = .22$ . To examine whether the positive valence difference was associated with game liking, a post hoc one-way ANOVA was run on the item asking participants how much they liked the game. Games with a story were better liked ( $M = 7.92, SD = 1.64$ ) than games without a story:  $M = 5.12, SD = 2.22, F(1,28) = 20.39, p < .001, \epsilon^2 = .40$ . H3 was partially supported.

## H4

This hypothesis predicted that physiological arousal would be greater during games with stories compared to games without stories. These data were submitted to a 2 (Story)  $\times$  2 (Game)  $\times$  3 (Time) repeated-measures ANOVA. The Story  $\times$  Time interaction was significant:  $F(3, 87) = 2.73, p < .05, \epsilon^2 = .05$ . As can be seen in Figure 1, participants' level of arousal remained high longer when a story was present, whereas arousal declined sooner during games without a story. Story-based games, as predicted, did lead to a higher level of arousal throughout game play than did nonstory games. This hypothesis was supported.

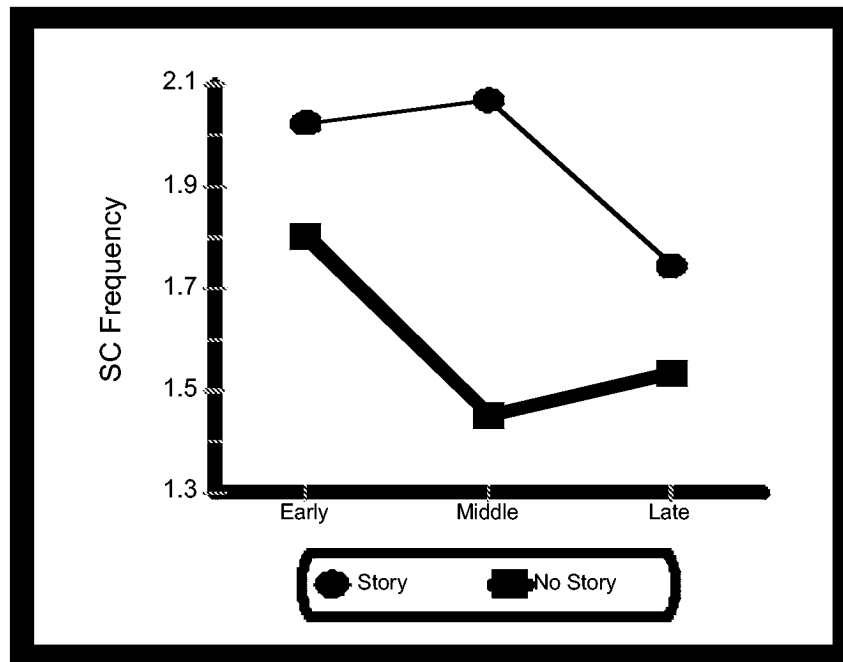


Figure 1. Physiological Arousal as a Function of Story Presence and Game Duration

## DISCUSSION

The video game industry has made astounding progress in the past decade, moving from twitch-oriented children's entertainment to the production of epic titles that have budgets and scales on par with those found in the film industry. Old violent video games that caused worries in the society are no longer comparable to modern video games in terms of immersion, graphics, and realism. A feature the video game industry has recently begun to embrace is narrative. By adding a story line, violent acts in the video game are justified. This study investigated how adding narrative changes identification, presence, emotion and motivations.

Results showed that game players identified significantly more with characters and felt more present when playing story-based video games compared to nonstory-based video games. This means that they felt more as though they were the game character in the game's world committing murder and mayhem. They felt more positive when playing a story-based game compared to a nonstory game, and they liked playing a story game more than nonstory game. There was no difference in self-reported arousal between the two types of games; however, physiological arousal was

significantly different. Players exhibited more physiological arousal for a longer period of time during story-based games than during nonstory-based games. This suggests that although the game players did not consciously perceive a difference in arousal when they were playing a story-based game, their bodies were more aroused. Given that arousing stimuli tend to be remembered better and processed more thoroughly, this may mean that violence in a story-based game is a more potent stimulus and might be more likely to affect subsequent behavior.

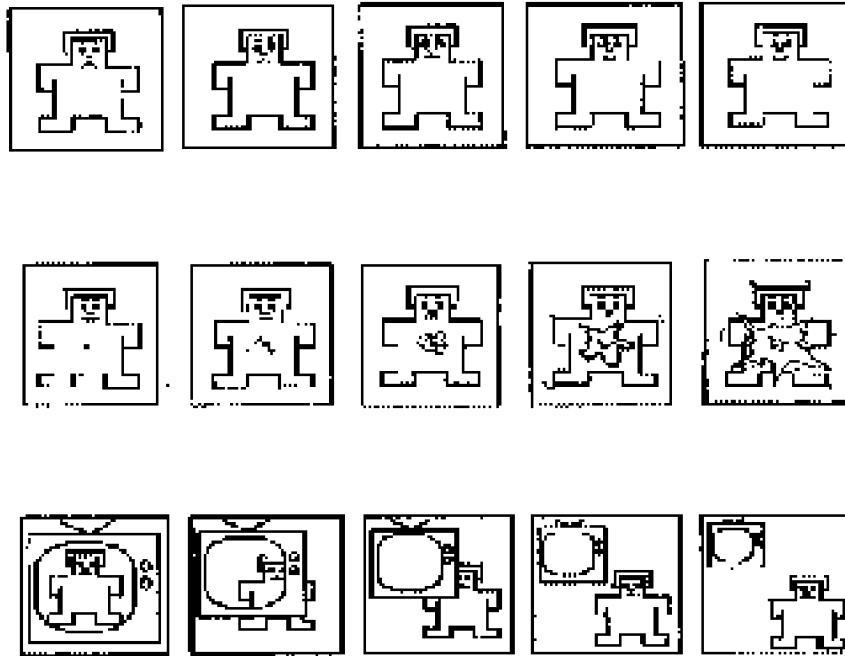
This study clearly demonstrates that story matters. Story is something that video game players enjoy; it helps involve them in the game play, makes them feel more immersed in the virtual environment, and keeps them aroused. As Laurel predicted in 1993, the inclusion of a story line helps players to feel that they are part of the game and adds to their overall experience.

Finally, what can this study tell us about acquisition of aggressive behavior? Adding a narrative story justifies the violence committed by the character. If a player is simply killing to advance to the next level, that violence is likely to feel less justified (e.g., Berkowitz, Parke, Leyens, & West, 1974) than violence that is justified as advancing a character's goals in a story-based game. Hence, one would expect narrative games to affect subsequent aggressive behavior to a greater extent than nonnarrative games. Secondly, adding a story increases physiological arousal, which has been shown to increase learning from media (Lang, 2000). This greater learning should make concepts more accessible, again facilitating aggressive behavior. In addition, adding a story provides frequent exposure to violent acts and acting out of violent acts that are of the type that have been shown to lead to facilitation and inhibition of aggression. Finally, the addition of a narrative story increases positive emotion among players, which is likely to lead to greater desensitization to violence.

For the video game marketer, these results suggest that the addition of a story could be a useful sales tool. For those concerned with children potentially modeling aggressive behavior, these results may be disconcerting. These results, coupled with theory on the link between media and aggression, suggest that the addition of narrative could act as a catalyst toward future aggressive behavior. Addition of a narrative functions to provide justification, increase arousal, and therefore increase learning. It provides frequent exposure to violent behavior committed under the direction of the game player by a character with whom the player closely identifies, which is likely to increase facilitation and thus inhibition. It increases the experience of positive emotion, which may further desensitize the viewer to violent behavior. The results reported here suggest that there is reason to be concerned about the possible effects of playing modern immersive narrative-based violent video games on the likelihood of aggressive behavior.

## APPENDIX

The Self-Assessment Manikin scales of Valence, Arousal, and Presence: These are nine-point scales, and participants are instructed that they can check on or between boxes.



## REFERENCES

- 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., & Ford, C. M. (1986). Affect of the game player: Short-term effects of highly and mildly aggressive video games. *Personality and Social Psychology Bulletin, 12*, 390–402.
- Berkowitz, L., Parke, R. D., Leyens, J., & West, S. G. (1974). Reactions of juvenile delinquents to "justified" and "less justified" movie violence. *Journal of Research in Crime and Delinquency, 11*, 16–24.
- Bettelheim, B. (1976). *The uses of enchantment: The meaning and importance of fairy tales*. New York: Knopf.
- Biocca, F., Kim, T., & Levy, M. R. (1995). The vision of virtual reality. *Lawrence Erlbaum Associates Communication Series* (pp. viii, 401). Hillsdale, NJ: Erlbaum.

- Bradley, M. M. (2000). Emotion and motivation. In J. T. Cacioppo, L. G. Tassinary, & G. G. Berntson (Eds.), *Handbook of psychophysiology* (pp. 602–642). New York: Cambridge University Press.
- Bradley, M. M., & Lang, P. J. (2001). Measuring emotion: Behavior, feeling and physiology. In R. D. Lane & L. Nadel (Eds.), *Cognitive neuroscience of emotion* (pp. 242–276). New York: Oxford University Press.
- Cohen, J. (1999). Favorite characters of teenage viewers of Israeli series. *Journal of Broadcasting & Electronic Media*, 43, 327–345.
- Cohen, J. (2001). Defining identification: A theoretical look at the identification of audiences with media characters. *Mass Communication & Society*, 4, 245–264.
- Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Cooper, J., & Mackie, D. (1986). Video games and aggression in children. *Journal of Applied Social Psychology*, 16, 726–744.
- Erikson, E. (1968). *Identity youth and crisis*. New York: Norton.
- Ferrell, T. B. (1985). Narrative in natural discourse: On conversation and rhetoric. *Journal of Communication*, 35, 109–127.
- Fisher, W. R. (1985). The narrative paradigm: In the beginning. *Journal of Communication*, 35(4), 74–89.
- Freeman, J., & Avons, S. E. (2000). Focus groups exploration of presence through advanced broadcast services. *Proceedings of the SPIE, Human Vision and Electronic Imaging*, V. Ref: 3959–3976.
- Graesser, A. (1981). *Prose comprehension beyond the word*. New York: Springer-Verlag.
- Graybill, D., Kirsch, J., & Esselman, E. (1985). Effects of playing violent versus nonviolent video games on the aggressive ideation of aggressive and nonaggressive children. *Child Study Journal*, 15, 199–205.
- Hoffner, C. (1996). Children's wishful identification and parasocial interaction with favorite television characters. *Journal of Broadcasting & Electronic Media*, 40, 389–402.
- Irwin, A. R., & Gross, A. M. (1995). Cognitive tempo, violent video games, and aggressive-behavior in young boys. *Journal of Family Violence*, 10, 337–350.
- Kaplan, S. K. (1981). A research note: Video games, sex and sex differences. *The Social Science Journal*, 18, 76–79.
- Labov, W. (1974). The transformation of experience in narrative syntax. *Language in the inner city* (pp. 354–396). Philadelphia: University of Pennsylvania Press.
- Lang, A. (1989). Effects of chronological presentation of information processing and memory for broadcast news. *Journal of Broadcasting & Electronic Media* 33, 441–452.
- Lang, A., Bradley, S. D., & Schneider, E. (2003). *Beyond total exposure: Violent video game character actions alter emotional and physiological responses to playing*. Manuscript submitted for publication.
- Lang, A., Dhillon, P., and Dong, Q. (1995). Arousal, emotion, and memory for television messages. *Journal of Broadcasting and Electronic Media*, 38, 1–15.
- Lang, A., Funabiki, R., & Dong, Q. (1994). *Message controlled capacity allocation: Audio complexity and narrative structure in political commercials*. Manuscript submitted for publication.
- Lang, A., Sias, P. M., Chantrell, P., & Burek, J. A. (1995). Tell me a story: Narrative elaboration and memory for television. *Communication Reports*, 8(2), 102–110.
- Lang, P. J. (1995). The emotion probe: Studies of motivation and attention. *American Psychologist*, 50, 371–85.
- Lang, P. J., Greenwald, M. K., Bradley, M. M., & Hamm, A. O. (1993). Looking at pictures: Evaluative, facial, visceral, and behavioral responses. *Psychophysiology*, 16, 495–512.
- Laurel, B. (1993). *Computers as theatre*. Reading, MA: Addison-Wesley.
- Lessiter, J., Freeman, J., Keogh, E., & Davidoff, J. (2000, March). *Development of a new cross-media presence questionnaire: The ITC sense of presence inventory*. Paper presented at the 3rd International Presence Workshop, Techniek Museum, Delft, The Netherlands.
- Livingstone, S. M. (1998). *Making sense of television: The psychology of audience interpretation*. New York: Routledge.

- Lombard, M., & Ditton, T. B. (1997). At the heart of it all: The concept of presence. *Journal of Computer-Mediated Communication*, 3(2). Retrieved from <http://www.ascusc.org/jcmc/vol13/issue2>
- Lombard, M., Reich, R.D., Grabe, M.E., Bracken, C., & Ditton, T. B. (2000). Presence and television: The role of screen size. *Human Communication Research*, 26, 75–98.
- Maccoby, E. E., & Wilson, W. C. (1957). Identification and observational learning from films. *Journal of Abnormal and Social Psychology*, 55, 76–87.
- Mandler, J.M., & Johnson, N.S. (1977). Remembrance of things parsed: Story structure and recall. *Cognitive Psychology*, 9, 111–151.
- Murray, J. (1997). *Hamlet on the holodeck: The future of narrative in cyberspace*. New York: Free Press.
- Oatley, K. (1994). A taxonomy of the emotions of literary response and a theory of identification in fictional narrative. *Poetics*, 23, 53–74.
- Prince, G. (1982). *Narratology: The form and functioning of narrative*. Amsterdam: Mouton.
- Richardson, B. (2000). Recent concepts of narrative and the narratives of narrative theory. *Style*, 34(2), 168–175.
- Robinson, J. A., & Hawpe, L. (1986). Narrative thinking as a heuristic process. In T. Sarbin (Ed.), *Narrative psychology: The storied nature of human conduct* (pp. 111–125). New York: Praeger.
- Sarbin, T. (1986). *Narrative psychology: The storied nature of human conduct*. New York: Praeger.
- Schutte, N. S., Malouff, J. M., Postgorden, J. C., & Rodasta, A. L. (1988). Effects of playing videogames on childrens aggressive and other behaviors. *Journal of Applied Social Psychology*, 18, 454–460.
- Selnow, G. W. (1984). Playing videogames: The electronic friend. *Journal of Communication*, 34(2), 148–156.
- Shapiro, M., & McDonald, D. (1992). I'm not a real doctor, but I play one in virtual reality: Implications of virtual reality for judgments about reality. *Journal of Communication*, 42, 94–114.
- Sherry, J. L. (2001). The effects of violent video games on aggression: A meta-analysis. *Human Communication Research*, 27, 309–331.
- Shin, M., Lee, S., & Lee, S. (2003). *Make it fast but easy: Narrative structure and production pacing in processing television commercials*. Paper presented at the the annual conference of the International Communication Association, San Diego, CA.
- Silvern, S. B., & Williamson, P. A. (1987). The effects of video game play on young children's aggression, fantasy, and prosocial behavior. *Journal of Applied Developmental Psychology*, 8, 453–462.
- Steuer, J. (1992). Defining virtual reality: Dimensions determining telepresence. *Journal of Communication*, 42(4), 73–93.
- Storytelling via Nintendo: Video games grow up*. [Cartographer]. (1998).
- Tan, A. (1981). *Mass communication theories and research*. Columbus, OH: Grid Publishing.
- Thorson, E. (1989). Television commercials as mass media messages. In J. Bradac (Ed.), *Message Effects in Communication Science* (pp. 195–230). Beverly Hills, CA: Sage.
- Wilson, T. (1993). *Watching television*. Cambridge, UK: Polity.
- Witmer, B. G., & Singer, M.J. (1998). Measuring presence in virtual environments: A presence questionnaire. *Presence-Teleoperators and Virtual Environments*, 7, 225–240.