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The Experience of Telepresence in Violent Video Games

Ron Tamborini, Michigan State University

Department of Communication

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Ron Tamborini (Ph.D., Indiana University, 1983) is an Associate Professor of Communication at Michigan State University.

Please send all correspondence to Ron Tamborini. He can be reached by mail at 570 Communication Arts and Sciences Bldg., Michigan State University, East Lansing, MI 48824-1212; by phone at (517) 355-0178; or by email at tamborin@msu.edu.

Abstract

This paper examines the role violent video games in the creation of dysfunctional aggression-related knowledge structures. It proposes that the strength of violent content's impact on knowledge structures and resulting behaviors will be determined by the video game's ability to create a sense of *telepresence*, the subjective experience of being present in an environment. Applied to violent video-game use, it suggests that features of the technology associated with *interactiveness* and *vividness* enhance the user's sense of *involvement* and *immersion*, two psychological states identified as the essence experiencing telepresence.

The position taken indicates that these features are inherent in most video game technology, and are likely to increase the impact of violent video games on user hostility. Discussion is centered on the General Affective Aggression Model and processes associated social learning, neoassociationistic networks, and arousal, leading to the belief that many violent video games should increase the user’s sense of telepresence and resulting hostile behavior.

The Experience of Telepresence in Violent Video Games

We will never know why Eric Harris and Dylan Klebold opened fire on students and teachers at Columbine High School. Undoubtedly there were many factors that contributed to their actions. Some point to the fact that both young men played a bloodthirsty game called Doom. And in Harris' customized version of the game, he and Klebold, both dressed in trench coats, shots and killed student athletes in manner frighteningly similar to what they would later do in real life (Pooley, 1999). Though it is impossible to know exactly how violent video games influenced the behavior of these two young men, we would be negligent if we failed to ask the question and investigate the possibility of this happening elsewhere.

The enormous controversy surrounding violent video games has been fueled by conflicting claims about the content of these games and the relationship between game use and hostility. Spurred by violent tragedies, social concern has led scholars, social critics, game manufacturers, and media professionals alike to look at issues related to the content of video games and to question the manner in which it might impact aggressive behavior.

The controversy is represented in a recent article (Time, May 10, 1999) suggesting that nine out of ten U.S. households with children have rented or owned a video or computer game, and that nearly a third of the Top 100 video-console games have at least some sort of violent content. In a poll of 409 American teenagers between 13 and 17, 87% play video games on a regular basis, and 60% of these have played some of the most violent games like Doom, Quake, and Duke Nukem. Based on indications of their

widespread use, concerns have developed over whether or not violent video games desensitize children to violence and facilitate aggression.

This paper examines the role of *telepresence* in determining the outcomes of violent video-game use. Telepresence can be thought of as the extent to which a user feels present in a mediated environment. We propose that the strength of a violent video game's impact is determined by the games' ability to enhance the two essential qualities of telepresence: the feelings of *involvement* and *immersion*. When taking the content of these games into consideration, it is suggested that technological features associated with *interactiveness* and *vividness* heighten the user's sense of involvement with and in immersion the violent actions of the game. Central to this discussion is the fact that these technological features are inherent in most video games, and are likely to increase dramatically the impact of violent video games on user hostility. Discussion is centered on the General Affective Aggression Model (Anderson & Dill, 2000) and processes associated with arousal, neoassociationistic networks, and social learning. These processes lead to the belief that many violent video games should increase the user's sense of telepresence and resulting hostile behavior.

Research on Violent Video Games

The emergence of each new communication medium has been greeted invariably with concern about its possible effect on children and other members of the public (Wartella & Reeves, 1985). The penny press, dime novels, comic books, film, radio drama, and television all have been questioned by social critics and scholars for the violent content they present, and the antisocial consequences alleged to result. Of course,

following every assault on content, counter attacks by supporters of the new medium have rebuked critics for a lack of evidence to support their claims of anti-social influence.

The most familiar of these controversies in recent years deals with violent television, where years of debate have impeded interpretation of evidence relating exposure to aggressive behavior. With effect sizes appearing to be so small that some academics question their practical significance (Freedman, 1988; McGwire, 1986), it is not surprising that defenders of televised violence could successfully ward off attacks by social critics. More recent interpretations of existing research, however, now provide convincing evidence that the effect is indeed considerable. Meta-analysis of 217 studies support the position that the relationship between exposure to television violence and aggressive behavior is substantial, with an effect size estimate of Cohen's d=.65 (Paik & Comstock, 1994). This finding is particularly important here in light of the fact that research on television violence is often considered relevant to understanding the impact of violent video games.

Video games dating back to the first *PacMan* were greeted with the same initial concerns about violent content that have been aimed at television for over 40 years. Demands to ban violent video games appeared as early as 1976 when *Death Wish* first appeared on the market (Walsh, 1999). Once again, however, these demands have been met by debate concerning the lack of convincing evidence.

Using conceptual arguments, Grodal (2000) suggests that video games are different enough from TV that we should expect very different outcomes from their use. He points out that most research on video games focuses only on possible negative effects, and criticizes this work for failing to consider the positive gratifications resulting

from playing violent video games. According to this view, "danger and violence in video games serve as part of a cognitive and emotional learning process" (p. 200). He maintains that this type of simulated aggression does not involve the actual physical abuse of other people, and that it can facilitate beneficial mechanisms like assertiveness and emotional control in aversive confrontations. Using statistical arguments, Sherry (1997) claims that existing meta-analytic evidence on video games shows its impact to be meager in comparison to televised violence. Though making no reference to positive outcomes of violent video games, he claims that the impact of violent video games on aggression is trivial, with an effect size estimate of Cohen's d=.12.

If these effect size estimates accurately represent the potential impact of violent video games' on aggressive behavior, even the game's most ardent critics would have difficulty making a case against manufacturers. However, many scholars argue that most research conducted in the 1980s and early 1990s is immaterial. They point out that games studied in early investigations are qualitatively different than recent games along dimensions that impact aggressive behavior (Walsh, 1999); a fact consistent with Sherry's (1997) research showing a chronological trend toward greater effect sizes for studies conducted between 1975 and 1996.

Theoretical Approaches to Studying the Effects of Violent Video Games

Much of the problem underlying debate on media violence, whether it concerns television, video games, or most other media, stems from the fact that research on aggressive behavior has failed to provide adequate theoretical models to direct the testing and interpretation of causal mechanisms leading to aggressive outcomes. Though most work in this area makes reference to several theories capable of explaining their findings,

no single theory has proven satisfactory. Studies on video-game violence have repeatedly applied theories associated with modeling and social learning (Alman, 1992; Brusa, 1988; Graybill, Kirsch, & Esselman, 1985; Griffiths, 1998), cognitive scripts and neo-associative networks (Anderson & Ford, 1986; Anderson & Marrow, 1995; Hoffman, 1996; Scott, 1995), and arousal (Ballard & West, 1996; Calvert & Tan, 1994; Winkel, Novack & Hopson, 1987). Making interpretive matters more difficult, many of these investigations identify several different theoretical models as relevant to interpretations of their findings (e.g., Calvert, 1997; Dill & Dill, 1998, Irwin & Gross, 1995; Schutte, Malouff, Post-Gorden & Rodasta, 1988; Sherry, 1997). Fortunately, recent attempts to address these theoretical inadequacies offer a clearer understanding of the processes governing aggressive behavior. Importantly, this work is useful for identifying not only the antecedents to aggression in general, but those specifically related to media use.

The General Affective Aggression Model. In their General Affective Aggression Model (GAAM), Anderson and Dill (2000) provide a framework that incorporates several bodies of research relevant to the study of media's impact on aggression, including each of the different perspectives that have been applied to video-game violence as well as several important others. It brings together not only Bandura's Social Learning Theory (Bandura, 1973), Berkowitz's Cognitive Neoassociationistic Model (1984; 1993), and Zillmann's (1983) arousal based Excitation Transfer Theory, but adds to these the social information processing model of Dodge and Crick (Dodge & Crick, 1990), Geen's (1990) affective aggression model, and Huesmann's social-cognitive model of media violence effects (Huesmann, 1986). As such it is well suited to interpreting all

currently available evidence on violent video games and directing future studies of relevant causal mechanisms and outcomes.

The GAAM presents a multi-stage process resulting in both a short-term and long-term impact on aggressive behavior. The short-term process begins with personal variables (e.g., aggressive personality) and situational variables (e.g., violent media, provocation) impacting the interaction among the internal states of cognition (e.g., chronic accessibility or priming of aggressive scripts), affect (e.g., trait or state hostility) and arousal (chronic or state induced). These internal state variables activate processes of automatic appraisal (e.g., threat and coping reactions of fight or flight) and controlled reappraisal (e.g., revenge) that govern behavior (e.g., immediate or delayed verbal or physical aggression). The model predicts that media violence primes aggressive scripts. These scripts activate affect and arousal, influence appraisal processes, and lead to aggressive behavior.

The long-term process is a simple extension of the short-term model showing how short-term experiences impact long-term personal and situational variables. The long-term personal variables are influenced developmentally by each short-term aggressive experience through the leaning, rehearsal and reinforcement of aggression-related knowledge structures. The long-term situational variables are influenced by the manner in which the environment (i.e., the people we come in contact with and the situations we find ourselves in) changes in response to the developed aggressive personality. The types of people willing to interact with aggressive personalities and the social situations in which these interactions occur become more conducive to hostility. As such, long-term situational variables take on chronic characteristics capable of activating aggressive scripts.

The GAAM framework explains the impact of video-game violence on aggressive behavior through theoretical processes related to video games' *first-person* point of view, the user's *active role* in decisions to aggress, and the *addictive reward structure* found in many games. The first-person point of view can be understood as a crucial influence on situational variables initiating short-term processes in GAAM. According to this rationale, first-person point of view increases identification with the aggressor, a factor known to increase postviewing aggression with television (Leyens & Picus, 1973). At the same time, an active role in decisions and the addictive nature of violent video games has great consequence for long-term processes. An active role in decisions to aggress strengthens the development of a more complete aggressive script than the passive role assumed watching film or video. The reward structure of these games should enhance addiction (Braun & Giroux, 1989; Dill & Dill, 1998) that facilitates the learning and performance of aggressive scripts.

GAAM and Video-Game Telepresence. If the logic behind these claims is correct, it can help us understand the importance of telepresence in determining a of violent video game's impact on aggression. In particular, factors associated with first-person point of view and an active role in decisions making are central to the experience of telepresence. As such, we expect telepresence to play a critical role in explaining how these attributes of violent video games influence aggressive behavior.

Evidence interpreted within this framework provides support for the claim that video-game violence increases aggressive behavior (Anderson & Dill, 2000). Though the paucity of research makes a conclusive causal link between video-game use and aggressive behavior difficult to establish, much like Paik and Comstock's (1994) work

helped validate claims that TV violence increases aggression, the GAAM framework promises to strengthen similar arguments concerning outcomes from violent video games. Some scholars are already convinced of the causal link. However, even these scholars realize that there are still many questions to answer. Understanding the role of telepresence can help us find some of the answers.

In a recent address the U.S. Senate Commerce Committee's hearing on "The Impact of Interactive Violence on Children," Professor Craig Anderson analyzed the problems associated with interactive violence in video games (Anderson, 2000). He concluded his testimony by stating that one critical issue yet to be addressed by the sparse research on video games deals with game features that increase the player's identification with an aggressive character. We address this issue here by considering the role of telepresence. We take the position that the telepresence created by media technology is a critical factor in governing the short-term situational variables initiating processes associated with the GAAM framework. To the extent that GAAM suggests that short-term processes can impact both long-term personal and situational variables, the impact of telepresence on these habitual states can also be expected.

Experiencing Presence in Media Environments

The manner in which people experience a media environment has been a central issue for communication researchers. The issue has been pivotal not only to those considering the technological characteristics of the media, but to those interested in how humans interact with these technologies. When McLuhan (1964) said the medium is the message, he focused on technology. He argued that the manner in which we experienced the form created by a medium was more important than the content it provided. He

suggested that our experience of the same message varies by medium, and this determines how we think about the message and what we interpret it to mean.

At the same time, early functional approaches to media-effects research focused on the individual. Horton and Wohl (1956), for example, talked about the sense of parasocial interaction that TV viewers experienced. From its earliest inception, uses and gratification researchers focused on the how the needs and motives of individuals impacted the psychological experience of receivers. Swanson (1979) was concerned with the manner in which our perception and interpretation of messages created meaning. Katz, Blumler and Gurevitch (1974) went as far as to suggest that all judgements about the cultural significance of media content should be suspended until we can understand the manner in which individual needs and motives determine an individual's media experience, for these needs govern the active or passive processing of content and can help explain the media's impact.

Until recently, communication researchers have done little more than to acknowledge the fact that the manner in which you experience media is important. No major attempts were made to describe or define the central features that distinguish different types of media experience. This has changed, however, since recent advances in "virtual reality" increased our need to distinguish the experiences of individuals in natural environments from those in artificial environments generated by the combination of these media and computer technologies. With technology's promise to blur the distinction between reality and virtual reality to a point where we can no longer take for granted our ability to separate the two, researchers have been forced to focus their attention on subtle differences in the complex process of media experience. Virtual reality is a term often

reserved for goggles and gloves technology. Head-mounted displays that create the illusion of three-dimensional worlds receding in all directions and changing naturally with head movements, combined with data gloves that allow us to control the movement of objects within that computer world are distinct in many ways. Yet there are many other media forms that create environments in which people interact. Chat rooms, CD-ROM novels, three-dimensional film, television, video games and other media all create what we might refer to as interactive virtual environments.

Many recent attempts have been made to define the manner in which people experience media environments, but finding consistency in the terms sued to label these experiences is impossible. In an attempt to distinguish the experience of individuals in natural environments and virtual environments, terms like presence, telepresence, subjective presence, subjective telepresence, virtual presence and others are used interchangeably by different authors to make reference to various types of experiences. Perhaps the greatest confusion among these comes from the varied use of the term presence and telepresence.

Since Reeves (1991) focussed our attention on the feeling of "being there" that can be created by media technologies, scholars have attempted to define this experience and identify its determinants. Though some use the term presence and others use telepresence to signify this feeling, there is general agreement about the concept they are trying to represent. The essence of the concept is that *to some degree* a person perceives that he or she is physically located in an environment that is spatially remote (Schloerb, 1995).

Witmer and Singer (1998) use the term presence to represent the subjective experience of being in one place even when you physically inhabit another. In a similar manner, Sheridan (1992) uses the term presence to denote the general perception of being in an artificial environment, but uses the term telepresence to designate those cases in which the artificial environment is accessed through a teleoperation system.

The terminology adopted for this paper comes from Steuer (1992). Steuer uses the term presence to refer to the manner in which we experience the natural world -- the perception of one's physical surroundings. In this manner, *presence* refers to our sense or experience of the natural surroundings, not our experience of a mediated environment to which we might be exposed. The term *telepresence* is used to describe the extent to which we perceive that we are actually present in a mediated environment (either a spatially remote real environment or an artificially created virtual environment) rather than being present in our natural physical environment. In this fashion, telepresence is the experience of presence in a mediated environment. It is the sense that we feel located in a mediated environment. The extent to which we experience telepresence can vary from high to low as a function of individual differences in one's susceptibility to these experiences in various mediated environments, as well as situational differences in particular attributes of the environments created by different media.

Determinants of Telepresence in Mediated Environments

If we limit our discussion to perception in natural environments, with no mediated component, the concept of presence and what creates the feeling of “being there” is generally taken for granted. I am here, in my environment, so I naturally feel present in this environment. The possibilities are limited to the experience of our physical

surroundings (Steuer, 1992). However, when we try to distinguish the experiences of individuals in natural environments from those in mediated environments, our understanding of what it means to feel present and what creates that feeling of presence becomes a more important issue. Characteristics of the individual as well as those of different media technology interact to determine the manner in which we experience presence in different environments.

Though there is no conclusive evidence to suggest that telepresence is related to outcomes resulting from experiences with mediated environments, many of the characteristics associated with the experience of telepresence are known to enhance outcomes from media exposure. Steuer (1992) claims that the *vividness* and *interactivity* found in a medium help to evoke telepresence, and that identifying these attributes in different media will allow us to predict the type of telepresence users will experience. Witmer and Singer (1998) identify *involvement* and *immersion* as necessary psychological states for the experience of telepresence, and indicate that they are important determinants of both the learning and performance outcomes stemming from media use. In substance, Witmer and Singer identify these two states as the essence of experiencing telepresence. As such, characteristics of a medium leading to *involvement* and *immersion* are central to creating telepresence. Combing the two bodies of work here, we can suggest that the *vividness* and *interactivity* of a medium will evoke *involvement* and *immersion*, and that understanding the determinants of these media properties will allow us to predict the outcomes we should expect from experiences in different media systems.

Vividness and Interactivity. Vividness and interactivity are identified as properties of media technology that determine the psychological experience of telepresence. According to Steuer (1992) vividness refers to the technology's ability to produce a rich sensory environment, and interactivity refers to the technology's capacity to enable the user to influence the form and content of an environment. The vividness of an environment is defined by the manner in which information is presented to the senses. A vivid medium is one that is high in breadth (the number of sensory channels simultaneously activated) and depth (the degree of resolution within each sensory channel). Conventional media like print, radio and television send signals to only the auditory and/or visual channels. As such, they have somewhat limited breadth. Newer media as well as some older alternative media try to supplement this by activating the haptic system and basic orienting systems (i.e., those controlling body equilibrium). Some even go so far as to engage taste and smell systems, though this is generally rare. A medium with great depth is one that delivers more information, or data, through each sensory channel. For example, the bandwidth and transmission capabilities of the telephone provide considerably less information to the auditory system than does a compact disc player heard through headphones. Steuer (1992) suggests that breadth and depth interact to create the sense of telepresence, but that simultaneous activation of multiple sensory systems can produce a strong feeling of presence even when signal depth is low.

An interactive medium is one that provides the user with the ability to alter the form and content of the environment. Streur suggests that interactivity is greatly influenced by three factors: *speed* (the time required for the environment to respond to

input), *range* (the number of environmental attributes that can be manipulated and the amount of alternatives available for each attribute changed), and *mapping* (how closely actions represented in the virtual environment match the natural actions used to change a real environment). Real-time interaction where the user performs natural actions that instantaneously alter a wide variety of characteristics in the mediated environment should create a heightened level of telepresence. The extent to which this is possible within a mediated environment is dependent on the technology; however, if telepresence is the extent to which an individual perceives presence within a mediated environment, then the essence of telepresence lies in the perceiver, not the technology.

Involvement and Immersion. Fountaine (1992) claims that presence is a matter of attentional focus. Central to this attentional focus is the coherence and connectedness of the information in an environment. When stimuli in an environment are coherent and connected, this allows us to focus our attention on one meaningful stimulus set (McGreevy, 1992). Witmer and Singer (1998) maintain that a medium's ability to focus the users' attention on a meaningful stimulus leads to *involvement* and *immersion*, two features central to experiencing telepresence.

Involvement and immersion are psychological states of individuals considered by some to represent the essence of experiencing presence. According to Witmer and Singer (1998) involvement results from focusing our attention and energy on a coherent or meaningful set of activities. The more people focus, the more involved they become. This type of involvement can occur in any type of natural or mediated environment. However, the extent to which the environment offers a set of coherent and meaningful

stimuli will determine the likelihood that it will attract and hold the individual's attention and create the sense of involvement.

While involvement depends on the meaningfulness of an environment, immersion is determined by the environment's ability to isolate the people from other stimuli available in their surroundings. Immersion is characterized by the sense of being enveloped by, and interacting with an environment. Environments create immersion to the extent that they can insulate individuals from their physical environment, create the sensation that they are is inside the environment instead of an outside observer, and generate a feeling that they are can interact and move within the environment in natural manner. Witmer and Singer suggest that while involvement can occur in almost any type of environment, immersion is much more likely to occur in some environments than others. Different mediated environments, for example, vary in the extent to which they isolate the user or create the perception of inclusion, natural interaction and control. An arcade racing-car game with a steering wheel that vibrates and gives the user a feeling of control might have more immersive qualities than watching the Indianapolis 500 on an IMAX screen, while the isolation produced by a head-mounted display used to create a virtual reality environment is likely to be more conducive to immersion than a playing a video game in the distracting environment of busy arcade.

Individual Differences in Experiencing Telepresence. Although most attempts to identify determinants of telepresence deal with characteristics of specific media, some attempts have been made to uncover the characteristics of individuals that impact this experience. Along with fitness, alertness, and ability to focus attention, Witmer and Singer (1998) considered a person's tendency to identify with characters in stories, sports

or video game as predictors of experienced telepresence. Howe and Sharkey (1998) looked at individual differences in terms of *competence* (mental ability to function effectively in virtual environments) and *temperament* (individual make-up permanently affecting our manner of acting, feeling, and thinking). They posit that characteristics of competence and temperament are likely to enhance a user's experience in mediated environments. At the same time, however, while expecting them to influence a user's experience in mediated environments, they note that these two traits predict only the individual's compatibility to the general concept of virtual worlds, and not what occurs within a particular world. Under these circumstances, we are forced to consider individual differences in preferences for what occurs in different mediated worlds and how this is represented. Within any particular setting, these preferences should govern a user's experience and the level of telepresence felt.

Identifying precisely the attributes of an environment that make it involving, immersive, vivid or interactive needs to take into account a complex set of variables. It is not easy to determine what a "meaningful" set of stimuli would be in terms of involvement, or what a natural action is in relation to mapping. A "meaningful" set of stimuli might need to be both comprehensible (i.e., familiar or easily understood) and relevant to the individual's present goals (e.g., stimulation, relaxation, information seeking). If this were the case, the ability of any environment to involve would not only vary from one person to another as a function of their comprehension skills, but also from one moment to another for all individuals as a function of their immediate goals. Similarly, the "natural" action taken to bring food to your mouth might vary from child to adult or from western to eastern culture. Nevertheless, if we can assume certain patterns

in the development of comprehension skills and the goal structures of humans, then we can assume there are predictable determinants of involvement, immersion, vividness and interaction associated with both natural and mediated environments.

If we can uncover the determinants of telepresence, we can look into the characteristics of individuals that create variations in our experience. At the same time, doing this could help us answer Anderson's call for research identifying media attributes increasing a user's identification with aggressive characters. Using language compatible with the GAAM framework, Laurel (1991) argues that a technology encouraging a "first-person" relationship will have a more effective interface with humans. She describes this type of relationship in terms of what is often called the "willing suspension of disbelief" that we experience in when we watch a play. Laurel says that when we pretend we invoke a state that allows us to experience emotions; emotions that we want the play to enhance. She points out that an identical phenomena occurs with computer games where we experience the same type of emotions by feeling for and feeling with the characters. Only here, the experience is heightened by the fact that in the context of the computer game, often we are one of those characters. According to Steuer (1992), the ability to experience a mediated environment in this manner results from a complex interaction between the motivations of the individual user and the characteristics of the media. These individual motives and media characteristics can be seen as examples of what we would consider personal and situational variables within the GAAM framework.

Telepresence in Violent Video Games

Many of the factors considered central to experiencing telepresence are evident in violent video games. The vividness and interactivity of these games can be expected to

influence the involvement and immersion experienced by users. If the ability to interact with a mediated environment and the first-person relationship with the medium are important determinants of telepresence, video games appear to be better suited to generating the experience than many other media. The important question becomes how this experience will impact the manner in which violent games effect their users.

Vividness and Interactivity in Violent Video Games. Some aspects of video game technology are superior to many other media in terms of the vividness and interactivity they provide in the mediated worlds they create. For example, though film and television are considered more vivid in terms of the greater depth provided though the resolution in their visual and audible bandwidth, the resolution of video games signals is rapidly approaching that of television. More importantly, the great superiority of video games in the breadth of their sensory stimulation may be an even bigger concern. Video games not only present information to visual and audible sensory systems, but they engage the sense of touch. Some arcade games even stimulate the basic orienting system associated with body equilibrium. If it is true that the simultaneous engagement of multiple perceptual systems creates a strong sense of telepresence even when low levels of depth are provided to some sensory of channels (Steuer, 1992), the breadth and vividness of today's video games should greatly contribute to is experience.

Attributes of video games associated with interactivity can also be seen as superior to most other media in terms of their ability to create the feeling of telepresence. The speed with which users can influence the form and content of an environment is almost instantaneous in games today. Newer games provide great range in terms of the number of environmental features that can be manipulated. And though many games use

the standard unnatural actions associated with toggle switches and buttons, some games, like racing games with steering wheels and shooter games with guns, provide a natural map of the motor skill associated with the behavior in real life.

Involvement and Immersion in Violent Video Games. If vividness and interactivity lead to involvement and immersion, both of these subsequent psychological experiences should be substantially higher with video games than they are with television and many other media environments. However, even beyond characteristics directly associated with vividness and interactivity, attributes of violent video games should increase involvement and immersion.

Grodal (2000) points to several critical differences between video-game play and other media activities. Though the resolution of the images and size of the screen make media like film engrossing, video games have other involving qualities. In order to control play in a video game, users are required to pay careful attention, to make mental maps of the game environment, to note its objects and landmarks for future reference, and to coordinate visual attention with motor behavior. The game proceeds only through the player's motivation to continue. Though both film and video games provide the coherent stimulus sets necessary for involvement (Fountaine, 1992), the video game's stimulus set is made more meaningful by the fact that the user must attend closely in order to satisfy immediate goals. Unlike more passive media, the need to attend closely and the meaningfulness of the stimulus set in video games work toward a strong sense of involvement.

The involving qualities of a video game are easy to observe, yet beyond those influences stemming from vividness and interaction, game characteristics leading to

immersion are more in question. Most games are unlikely insulate users from their physical surroundings and give them the feeling of being enveloped in the media environment. Intrusive sights and sounds in a room or video arcade can easily distract the attention of users not strongly involved in game play. Certainly, compared to the dark quiet setting of a movie theater, we should expect the isolation provided by video games to suffer. Nevertheless, the high cognitive demands placed on users, not only by the simultaneous stimulation of visual, auditory and haptic systems but by the attentional demands required to continue game play, can limit the user's capacity to process information from other environments, and thus enhance the immersive experience of the game.

Individual Differences Experiencing Telepresence in Violent Video Games. Although little is known about individual differences associated with determinants of telepresence, one important determinant can be identified. Howe and Sharkey (1998) suggest that even though differences in competence and temperament influence a user's general capacity to experience virtual environments, they do not predict preferences for what occurs within different mediated worlds. This reasoning compels us to consider how individual differences in preferences for a particular media environment's content and form will impact the experience of telepresence. If, as suggested earlier, the user's motivation to engage different environments and the meaningfulness of these environments increase involvement and the experience of telepresence, individuals with cognitive scripts best suited to processing violent video game content will experience heightened levels of telepresence. Since it is apparent that individuals with aggressive personalities have accessible knowledge structures for processing information associated

with aggression (Anderson, 1997), we can posit that violent video games will be more meaningful and engaging to these individuals. To the extent that this heightened meaningfulness impacts telepresence, we expect elevated telepresence to strengthen outcomes resulting from game use.

Video Game Violence, Telepresence, and the GAAM

Recall Witmer and Singer's (1998) claim that media attributes leading to *involvement* and *immersion* are also important determinants of learning and performance outcomes from media use. When considered with GAAM's indication that long-term outcomes are influenced by short-term aggressive experiences through the leaning, rehearsal, and the reinforcement of knowledge structures, the implications of immersion and involvement are easy to identify. Many of today's violent video games provide the type of first-person perspective that results in users identifying specifically with an aggressor. The active role they play in deciding to aggress and enacting chosen behaviors serves to develop more complete knowledge structures leading specifically to aggressive behaviors. The addictive reinforcement structure of the game is designed to reward aggressive acts in particular. And all this is ideal for the facilitating the rehearsal, learning and performance of aggressive scripts. The outcome we can expect is considerable. As Anderson and Dill (2000) suggest:

> Long-term media violence effects on aggression result from the development, overlearning, and reinforcement of aggression related knowledge structures.… Each time people play violent video games, they rehearse aggressive scripts that teach and reinforce vigilance for enemies (i.e., hostile perception bias), aggressive actions against others, expectations that others will behave aggressively, positive

> attitudes toward use of violence, and beliefs that violent solutions are effective and appropriate.…The creation and automatization of these aggression-related knowledge structures …change the individual's personality. Long-term video game players become more aggressive in outlook, perceptual biases, attitudes, beliefs, and behavior than they were before the repeated exposure or would have become without such exposure. (p. 775)

Though some would have us believe that few are affected by exposure to media environments, this claim is dubious. Few will enact the type of aggression resulting in the death of another human, but exposure will likely have important consequence on many if not all users. We can expect that video-game violence will result in an acrimonious frame of mind, that is will impact short-term social interaction, and, for some, that it will alter enduring dispositional traits.

The Future of Violent Video Games in Virtual Reality Environments

Though most video games not only fail to naturally map the actions of simulated aggressive behaviors but also fail to insulate users from the intrusive sights and sounds in their physical surroundings, goggles and gloves virtual reality games promise a different experience. Here, the heavy cognitive demands placed on users by simultaneous sensory stimulation, the attentional demands required to continue game play, the heightened vividness from increased depth in audio and video bandwidth, and the isolation from environmental distractions will combine to immerse the player in a world of virtual violence.

Among video games available today, few games actually have you punch in order to simulate the blow to your target, and though some arcade and home games provide

mock firearms, most simulate shooting with a mouse or a toggle instead of pointing a hand held gun. But this will change in the world of violent virtual reality. If immersion and multiple sensory stimulation facilitate the learning of more complete scripts, immersive environments where users shoot guns and punch enemies with well mapped natural actions will lead to fully developed aggressive scripts. And these scripts will be strengthened through the repeated enactment of decisions to aggress and the reproduction of motor behaviors.

Though we cannot determine the extent to which repeatedly playing Doom strengthened the aggressive scripts that led Eric Harris and Dylan Klebold to launch their deadly assault, our concern over this is heightened by sobering thoughts of a possible future. Imagine children like those in Columbine playing their violent games in virtual worlds dramatically more realistic and engaging than anything our children have experienced to date. Picture them immersed in an environment that not only impels them to rehearse aggressive thoughts in their play, but one that induces them to rehearse the decision to murder, the plan of attack, and the actual motor skills needed to kill their victim. Imagine that this environment rewards your children for a job well done, punishes them for failing to do it right, and encourages them to rehearse the killing again and again until they develop the internal cognitive, affective and physiological states that allow them to perfect their killing skills. Finally, understand that this realm promotes almost no thought of when or why they should withhold attack, or the horrid consequences that can follow in the aftermath. Realize that this is not like television, or film, or even the games of today that you already have trouble drawing your children away from, but a dramatic step forward into a world of virtual violence.

If this possible future follows the path guiding the content of violent video games today, the potential negative fallout is ominous. At the same time, the future does not have to follow the path of the recent past. The potential for virtual worlds or traditional video games to promote the learning and strengthening of scripts associated with non-violent conflict resolution strategies, academic achievement, or almost any widely accepted social value is as great as its potential for hostility. The key is to understand the processes leading to the development of these scripts, their association with the experience of mediated environments, and how we can use this knowledge to create environments promoting more beneficial scripts. The position taken here is that telepresence plays a vital role in determining the impact of mediated environments on the development of internal scripts. Further investigation on the predictors of telepresence is key. Only by understanding the forces governing the structure of these scripts can we learn how to create the type of involving and immersive environments that will captivate audiences without creating dysfunctional aggression-related structures.

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