Behavioral Psychology:
Playing With Violence: Interactivity, Videogame Violence, and Potential Impacts on Players

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In 1962 a handful of graduate students got their hands on MIT’s new PDP-1, one of the first computers that used a screen and keyboard instead of paper punch cards. Spurred by what Atari founder Nolan Bushnell calls a natural desire to “make computers do fun things,” the grad students created Spacewar, the first recognizable videogame (1, 2). Spacewar allowed two players to pilot spaceships (i.e. white dots) across a starry background (white dots) while shooting missiles (more white dots) at each other.

Videogames grew up in the decades after Spacewar. Now games are an $18 billion global business. In the United States, games gross more than movie box office receipts: in 1999 alone, 215 million games were sold in the U.S.—the equivalent of two for each household (3). Eighty percent of adolescent boys have a videogame at home, and gaming has gone from “an embarrassing, ‘geeky’ pastime to a stylish, perhaps even chic, lifestyle choice” (4). The technological capabilities of videogames increased along with their popularity. Microsoft’s Xbox game console runs on a 733-MHz Intel processor—a decade ago, the Xbox would have qualified as a supercomputer (5). Today’s videogames achieve unprecedented levels of graphical and aural detail. New games “outclass early video games much as computer word-processing programs outclass stone tablets and chisels as writing tools” (6).

Videogame violence ‘matured’ along with the medium. Grand Theft Auto III, the best-selling videogame of 2001, puts players in a gangland setting where they sell drugs, kill police, and sleep with prostitutes (7). The growing popularity of games, coupled with this graphic content, has spawned mounting concern about the effect that violent videogames might have on children playing them. In 1999 the Senate held hearings on whether violent games encouraged school shootings (8). In 2000, Indianapolis attempted to ban children from playing violent videogames without supervision (9). This year, Washington became the first state to legally restrict the sale of violent videogames to minors (10).

Critics of media violence now decry videogames along with violent TV and movies. Some advocates claim that research demonstrating that TV and movie violence stimulates aggressive behavior can be cross-applied to videogames, proving that games cause violence as well: “The television and movie violence literatures suggest that exposure to video-game violence should increase aggression. There are also theoretical reasons to believe that video-game effects should be stronger than movie and television violence effects” (6). But the existing scientific research on videogame violence is contradictory and incomplete, and future research will need to address the differences between interactive game play and passive media consumption.

PLAY, PARTICIPATION, AND “FLOW”
Videogames are emerging as a new art, one that borrows techniques from cinema, storytelling, music, and traditional games. For this reason, it is tempting to assume that games affect players the same way TV and movies affect viewers. But videogames are distinguished by their interactive nature: “Videogames are powerful, but they are nothing without humans to play them. So the inner life of videogames — how they work — is bound up with the inner life of the player” (2). Though videogames share many of their audiovisual qualities with TV and movies, interactivity is the dominant aspect of videogame play, and shapes the game’s participatory experience.

At the heart of interactivity is the constant exchange of inputs and outputs between the game and the player. The player must react to the changing conditions of the game, and the game’s conditions change in response to the player’s choices. This gives the player a control over the events that transpire within the game that TV viewers do not have over the events they see on the screen. One reason that “children prefer games over television [is] because there is greater control” (11). But the relationship between player and game is not one of dominance between the ‘controlling’ player and ‘controlled’ game. “Videogames represent more than a remotely controlled, vicariously viewed activity within the bounded structure of a ‘game’; they are participatory experiences. In recollection of their encounters, players talk not of playing or controlling but ‘being’” (4). Interactive play is immersive — when playing a good videogame, players don’t perceive themselves as detached observers of the game world, but active participants in it. Even non-playing spectators are drawn into the game world. These “co-pilots” read maps, solve puzzles, and assist the primary player by providing “additional sets of vigilant senses primed to spot danger. While these players cannot be seen as having any interactive control
they nonetheless demonstrate a level of interest and experiential engagement with the game that, while mediated through the primary player, exceeds that of bystander or observer” (4).

Poole, Holbrook et. al., and VanDeventer and White describe interactive game play as what psychologist Mihaly Csikszentmihalyi termed a “flow” experience (2, 12, 13). During a flow experience, “action follows upon action according to an internal logic that seems to need no conscious intervention by the actor. […] There is little distinction between self and environment, between stimulus and response, or between past, present and future” (2). Csikszentmihalyi used flow to describe the feelings of musicians and athletes who report experiencing a state of selflessness and bliss when engaged in their activities; flow translates well to the immersive, selfless feeling that accompanies skillful videogame play.

Flow is characterized by a sense of deep, unthinking control. For example, piano players can produce an infinite variety of sounds by pressing different key combinations. When learning a piece of music, the piano player first learns the controls necessary to produce it – the fingering. That fingering is committed to muscle memory, so the pianist can play the music without consciously thinking about the movements involved. Flow takes over and the pianist can concentrate on the whole performance rather than the basic mechanics of playing; the player experiences a sense of effortless control and selflessness. A similar analogy can be made with videogame play (2). By pressing a button or buttons on the controller, the videogame player can produce many different actions in the game world. Once the game’s controls are committed to memory – like a pianist’s fingering, a baseball player’s swing, or a chess player’s opening moves – flow can take over. If a skilled Grand Theft Auto player wants to shoot a weapon, that player doesn’t think “press ‘circle’ button to shoot.” The player thinks “shoot,” and knows from muscle memory what button to push – the physical action is largely unconscious. The result is the immersion that characterizes a well-designed videogame. In this way, the flow of an interactive game experience is more similar to other engaged activities, like athletics or performance art, than to the passive experience of watching TV.

MIND AND BODY AT PLAY

Videogame players show heightened cognitive activity compared to TV viewers. While TV viewing is largely a passive experience, videogame players regularly use higher-order thinking skills during play (13). Interactive play engages the player in a constant cycle of observation, evaluation, and decision making: observing what happens in-game, evaluating what it means for ensuing play, and determining how to respond to the game – often in split-second intervals. One medical study found game playing helped brain injury patients regain their cognitive functioning (6). Another study found children as young as 10 exhibit “expert behavior” while playing videogames – they engage in critical thinking, problem solving, pattern recognition, and risk-benefit analysis; “the number of potential interactions that children simply discover is staggering” (13). While players are immersed in the flow of an interactive game, they show higher levels of cognitive activity than passive media observers.

Videogame players also show signs of a physiological ‘rush’: increased blood pressure and accelerated heart rate, and adrenaline secretion (2, 14). Players react physically to action in the game world: they grip the controller like a vice, they duck and sway (4). Racing game players lean into turns. Action games players flinch if ambushed. Author J. C. Herz quotes one player of Doom, a first-person shooter game, as realizing that “when I’m looking out a window [in the game], I’ll sit up as high as I can in my chair and peer down at the bottom of my monitor so I can see as much as the ground as possible” (1). Players are usually oblivious to these physical motions, but their actions reveal how immersed in the game world they are. This moving and shaking is not just a reflex response, such as when movie viewers flinch at explosions. Instead, it is “pro-active, unavoidable, and believed [by the player] to be beneficial. Field research noted that once a player is made aware of these behaviors, they consciously attempt to stifle them, but the resultant experience is substantially weakened” (4). With the introduction of force-feedback devices (which make game controllers shake at appropriate times) and special controllers (like light-guns and steering wheels) into more and more videogames, this corporeal interaction will become just as real as its audiovisual counterpart.

POTENTIAL EFFECTS OF INTERACTIVE VIOLENCE

Interactive videogame play differs from passive media consumption on perceptual, cognitive, and physiological levels. So it should be assumed that videogame violence will affect videogame players in a different way (whether or not with a different result) than TV violence affects its viewers. Even within the videogame realm, “the realization that the experiences of watching and playing [emphasis original] videogames are significantly different is fundamental to any successful investigation of videogames” (4). Research on TV and movie violence can help to inform the videogame debate, but separate research on games is needed and must take into account interactivity as well as violent content.

This basic understanding of the videogame experience suggests that videogame violence might impact players in four different ways. First is social learning theory, which posits that “behavior is learned through imitation
of attractive, rewarded role models,” and may become relatively permanent if practiced enough times (9). Social learning theory may be especially applicable to videogames because the player is absorbed in play and identifies strongly with and perceptually ‘becomes’ the violent character; in first-person shooting games, the player literally assumes the character’s point-of-view and thus is directly rewarded for committing violence in many games (6).

Second, the “general arousal model” holds that arousal is a “heightened, nonspecific drive state” and that arousal from violent media will “heighten the already present response an individual has” to any given situation (9). Under this model, the intense arousal generated by videogame play, especially violent play, does not cause the player to act violently, but simply energizes any aggressive responses the player already has.

Third is the idea of “priming” and the creation of violent cognitive scripts—this theory can be based on the General Aggression Model (14). Here, exposure to violence is assumed to “prime” the brain’s informational nodes for violence and to cause the brain to associate more and more events and situations with a violent context. The brain stores away aggressive scripts, potential aggressive actions that, while not ‘learned’ or acted out, are noted as possible responses to conflict situations and are made available for future use. “In the case of video games, priming effects theory would suggest that exposure to violent video games will prime a series of nodes associated with violence and aggression. The priming of these violence-related nodes presents the opportunity for transfer of aggressive thoughts into action” (9).

Fourth is an idea largely rejected in the literature on TV and movie violence, but which may be uniquely relevant for videogames because of their interactive nature: catharsis and drive-reduction. This theory holds that players can use vicarious videogame violence to discharge their aggressive feelings, thus reducing their need to act aggressively in real life. It may be that “the interactive nature of games allows players to act out aggression that is not allowable in the real world” rather than to just vicariously visualize that aggression, such as by watching violent TV (9). It is also possible that simply having a flow activity, like game playing, allows the player to channel generalized attention and energy into a safe activity – energy that might otherwise be used to commit real-life violence.

INCOMPLETE RESEARCH

How the combination of violent content with interactive videogame play affects those who experience it is not yet clear. The amount of research that exists on videogame violence is limited compared to the substantial body of work on TV violence. This probably stems from the videogame’s recent emergence as a distinct medium, though the assumption that existing media violence literature could also cover videogames may play a role. What research does exist on videogames is incomplete – even reviews and meta-analyses of videogame violence literature draw vastly different conclusions about the relationship between game violence and aggression.

This disagreement is evident in five recent analyses of videogame violence research listed on the PsycInfo and Ingentia journal databases: Dill and Dill, Griffiths, Sherry, Anderson and Bushman, and Bensley and Van Ewryk (1, 6, 9, 14, 15). All five overlap significantly in the studies they review, but arrive at widely varying conclusions. One finds a strong link between violent videogames and aggressive behavior (14); two suggest a weaker link between violent games and real-world aggression (6, 9); two conclude that present research doesn’t support a general causal link, but express separate concern about young children (11, 15).

Anderson and Bushman’s review is the only one of the five to reach an assertive conclusion: “High videogame violence was definitely associated with heightened aggression (14). Indeed, this effect of violent video games on aggression is as strong as the effect of condom use on risk of HIV infection. [...] Violent video games increased aggression in males and females, in children and adults, and in experimental and non-experimental settings.” Based on statistical meta-analysis of data from 35 research reports, Anderson and Bushman report correlation coefficients (with 95 percent confidence intervals) of $r = (.15, .22)$ for increased aggressive behavior, $r = (.22, .31)$ for increased aggressive thoughts, and $r = (-.22, -.09)$ for decreased prosocial behavior (14). They explain this aggressive behavior in terms of cognitive priming and violent script learning and relate it to the General Aggression Model (GAM): “These results clearly support the hypothesis that exposure to violent video games poses a public-health threat [...] In brief, every theoretical prediction derived from prior research and the GAM was supported.”

Sherry also performs statistical meta-analysis, also calculates a correlation, $r = (.13, .16)$, between videogame violence and real-world aggression, but interprets this conclusion much differently than Anderson and Bushman (9). Where Anderson and Bushman highlight the positive correlation, Sherry describes it as relatively small, and notes that the correlation between TV violence and aggression is about twice as large. Sherry also found that playing games with realistic, graphic violence increased the correlation with aggressive behavior, but that aggression was inversely correlated with playing time – the longer test subjects played Mortal Kombat, the less likely they were to exhibit hostile behavior afterwards.
Sherry concludes that this evidence is supportive of general arousal theory, or potentially catharsis theory: “If arousal does drop after long periods of game play, arousal theory would predict that the aggressive reaction would also be reduced. […] Finally, it is also possible that players may be using the games to equilibrate their arousal levels. This suggests a drive-reduction or catharsis hypothesis.” Sherry notes that “parents’ intuitive response to limit playing time may be counterproductive, pulling the child away from the game at a time when the largest aggressive effects are likely.”

Dill and Dill perform a narrative review rather than statistical meta-analysis, but arrive at a conclusion similar to Sherry’s (6). They state that the literature tends to support a link between violent videogames and real-life aggression, but express concern about the strength of existing literature: “The preponderance of the evidence from the higher quality experimental studies suggests that short-term exposure to video game and virtual reality violence engenders increases in aggressive behavior, affect, and cognitions and decreases in prosocial behavior.” But, “precious few true experiments have been done to assess the effects of playing violent video games on aggression-related outcomes; there is no real ‘programmatic’ line of research yet in this area.”

Griffiths’s narrative review of the literature appeared one year later in the same journal as Dill and Dill’s (11). He shared their concern about methodology: “All the published studies on video game violence have methodological problems and they only include possible short-term measures of aggressive consequences.” Griffiths finds problems with a common experimental technique: measuring subjects’ aggression in fantasy scenarios, such as seeing if subjects in a “teacher/learner” scenario reprimand the learners more after playing violent videogames. He points out that “increased aggression in fantasy and role-play measures, far from confirming the hypothesis that games cause aggression, is entirely consistent with the catharsis hypothesis; that is, it might be precisely the fantasy aggression that releases the aggression that would otherwise be expressed as aggressive behavior.” Or, fantasy aggression might be a release for arousal built up during game play, which would be consistent with Sherry’s general arousal explanation. Griffiths states that “the one consistent finding is that the majority of the studies on very young children – as opposed to those in their teens upwards – tend to show that children do become more aggressive after playing or watching a violent video game.” However: “It could well be the case that violent video games have a more pronounced effect in young children but less of an effect (if any) once they have reached their teenage years.” He concludes that “whether video games promote aggressiveness cannot be answered at present because the available literature is relatively sparse and conflicting, and there are many different types of video games which probably have different effects.”

Bensley and Van Eenwyk echo Griffiths’ skeptical findings (15). They also make a distinction between violent videogames’ effects on young children and other subjects: “Among young children (about aged 4-8 years), playing an aggressive video game caused increased aggression or aggressive play during free-play immediately after the video game in 3 of the 4 studies. For teenagers, because of the non-experimental designs and mixed results of these studies, it was not possible to determine whether video game violence affects aggressive behavior.” In direct contrast to Anderson and Bushman’s depiction of videogame violence as a “public-health threat,” Bensley and Van Eenwyk state: “At present, it may be concluded that the research evidence is not supportive of a major public health concern that violent video games lead to real-life violence.”

**Conclusion and recommendation**

One consistent finding is that videogame violence, whether or not it stimulates real-life violence in general, does seem to increase short-term aggressive behavior in very young players (11, 15). This magnification of any aggressive effects probably stems from the inability of young children to differentiate interactive play from real life, which increases the likelihood of their incorporating game violence into real-world behavior. Young children live in a world where fantasy and reality intermingle: “The boundaries between reality and unreality are especially permeable for small children. They are unable, through at least the age of three or four, to distinguish fact from fantasy” (16). Videogames may be especially problematic in this regard, because a good game is designed to blur the distinction between game and reality, so that “gameworlds gel with an experiential coherence that renders them both believable and perhaps even ‘real’” (4). Furthermore, because young children have weak impulse control, they are unlikely to distinguish between game behaviors that may be enacted in real life (like running and jumping) and those that should not be (like kicking and punching). Whether or not mature players face similar problems is not clear based upon existing studies, and this ambiguity highlights the need for more direct research on videogames.

Specifically, there is a clear need for longitudinal research about the effects of regular, long-term violent game play. The lack of a longitudinal videogame research program is not surprising – videogames only attracted serious academic attention within the last two decades. But now longitudinal studies are needed to confirm or refute the currently tenuous link between in-game violence and real-life aggression; they can also clarify
its nature: if aggression is a result of the interactive videogame experience, is it a short-term phenomenon only (caused by general arousal) or a long-term result of social learning and cognitive priming processes? Or does videogame violence lead to catharsis and drive-reduction? With this knowledge, videogame makers and players may be able to “make computers do fun things” while being safe as well.

REFERENCES


5. D. Takahashi, Opening the Xbox: Inside Microsoft’s Plan to Unleash an Entertainment Revolution (Prima, Roseville, CA, 2002).


