

# Affect of the Game Player: Short-Term Effects of Highly and Mildly Aggressive Video Games



Craig A. Anderson  
Catherine M. Ford  
*Rice University*

*Two experiments were conducted to examine the effects of playing different types of video games on players' short-term affective states. In the first experiment, college student subjects played 11 different video games and rated them on a number of characteristics. From these ratings, two games were selected for use in Experiment 2. These games differed only in the level of aggression displayed. One was highly aggressive; the other was only mildly aggressive. In Experiment 2, each subject played one of the games or was assigned to a no-game control condition. Hostility, anxiety, and depression subsequently were assessed by the Multiple Affect Adjective Checklist. Hostility was increased in both game conditions, relative to the control group. The high-aggression game led to higher hostility than the mild-aggression game, but the difference was not significant. However, those who had played the high-aggression game were significantly more anxious than either those who played the mild-aggression game or those who played no game (control). As expected, the experimental manipulation of game playing did not yield a main effect on depressive affect. Finally, there was a marginally significant sex by game interaction effect on the depression scores.*

The meteoric rise in popularity of video games among our youth has led to a corresponding rise in the heat of the debate on the consequences of playing such games. Opponents of the games have generated a lengthy list of potential problems. One set concerns the aggressive content of most games and their effects on behavior, thoughts, and problem-solving styles. Opponents believe that playing these aggressive games will lead to more aggressive behavior and less concern for the welfare of others.

A second set of potential problems centers on the types of play and thinking prevented by the games. Opponents claim that imaginative, creative, or fantasy

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play, as well as development of social skills, cannot take place while blasting away at the enemy.

A third set concerns money. Some players spend their school lunch money on the games, steal money from their parents, or engage in petty theft for the quarters needed to play the arcade games. There are even reports of youth gangs committing major thefts to support their video habits (Cory, 1983).

Finally, the addictive behavior of some players concerns many opponents. Indeed, it is this addictive nature of the games that exacerbates whatever social skill development and monetary problems that do exist.

Proponents of the games point to potential positive benefits. For some players, the games may provide a sense of mastery, control, and accomplishment that was previously lacking in their lives. In addition, the addictive interest in the games may lead to a reduction in other youth problems, such as drug abuse and vandalism.

Unfortunately, the claims and counterclaims have generated considerably more heat than light. A quick perusal of popular magazines and newspapers reveals that everyone is talking about the video game "weather" (storms versus sunny skies), but no one is doing anything about it, such as gathering the relevant data. (For a sampling of these views, see Cory, 1983; Gutman, 1983; Herbert & Greenberg, 1983; Hong & Wallace, 1983; Leerhsen, Zabarsky, & McDonald, 1983; Meer, 1983; Needham, 1983.) Extreme positions have been taken by public figures with little or no knowledge of the psychological mechanisms likely to play a role in determining the effects of video games. Unfortunately, statements by public officials are frequently both influential and naive. For instance, it seems unlikely that arcade and home video games are among the top three causes of family violence, as claimed by U.S. Surgeon General C. Everett Koop (Meinel; 1983). It is also unlikely that the pool of highly skilled fighter pilots will increase because of practice effects from video games, as proposed by President Reagan (from the transcript of remarks by the president at Epcot Center on March 3, 1983). What is needed at this point is less speculation and more data. But, there has been little effort to discover just what are the effects of the video game revolution.

The literature on the relation between viewing aggression on television and subsequent aggressive behavior would seem to have some bearing. Recent longitudinal work in this area suggests that exposure to violent television programs may lead to belief in a more hostile world and to increases in aggressive behavior (Huesmann, Lagerspetz, & Eron, 1984; Singer, Singer, & Rapaczynski, 1984). (See Freedman, 1984, for an opposing view based on earlier work.) The short-term effects of media violence are particularly impressive and suggest that some type of semantic priming may be involved (Berkowitz, 1984).

The one major study of video game effects on aggression yielded somewhat mixed results (Dominick, 1984). Playing video games was correlated with aggression, but when the effects of other factors were partialled out, the video

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game-aggression relation became nonsignificant. On the other hand, playing video games was correlated with lower self-esteem, even when the effects of other factors were partialled out. Other studies also suggest that those who play video games the most are generally low in self-esteem and that these people are using the games as "electronic friends" (Selnow, 1984). Whether these people benefit from their new "friends" or are hindered in their social development cannot at this time be answered.

Clearly, there are numerous questions concerning the effects of video games that need empirical examination. Our goal in this article is to address one such question, regarding the short-term effects of video games on affective states. In particular, we are interested in feelings of hostility, anxiety, and depression. Numerous laboratory studies, dating back to the original Bandura, Ross, and Ross (1961) study of modeling of aggression in children, have shown that exposure to aggressive models can lead to an increase in subsequent aggression (see Bandura, 1977; Flanders, 1968; Lott & Lott, 1985, for discussions of modeling processes). One obvious difference between the stimuli used in most modeling studies and video games is that in video games the aggression is largely symbolic, whereas in modeling studies aggression usually involves human or humanlike characters. However, Berkowitz's recent cognitive-neoassociation analysis (1984) suggests that many media effects on aggression are due to priming of semantic categories (e.g., aggression) and spreading activation along associative networks to related categories. These other categories could very well include particular affects. Thus, because hostility is semantically related to aggression, we expect that playing aggressive video games will put the players into a more hostile mood. Other cognitive models could be applied here as well. For example, script theories (e.g., Abelson, 1981; Anderson, 1983), associative networks models of memory (e.g., Bower, 1981), and schema theories (e.g., Fiske, 1981) can incorporate affective elements. All would appear to make the same basic predictions concerning video games and affect. Thus, it should be made clear that our studies were designed to assess short-term effects of video games on affect, but not to test the script, schema, or various associationist models of cognitive activity. In all cases, the aggression inherent in the games may cue certain cognitions that are linked, in memory, to the aggression-related effects. Thus, when the cognitions are accessed we expect the associated affects to be activated.

In addition to examining the effects of video games in general, we wanted to see if there are differences in reactions to games that differ in the level of their aggressive content. Games that are highly aggressive in nature may lead to higher levels of hostility than mildly aggressive games. Of course, if the same aggressive cognitions are accessed in both cases, then the level of hostility should not differ.

Anxiety may also be directly linked to the aggressive cognitions cued by the games. If this is the case, then the anxiety effects should parallel the hostility

effects. However, the association between anxiety and aggressive cognitions seems less likely than the hostility-aggression link. Anxiety, in this context, may arise primarily from a (temporary) change in world view brought about by the aggressiveness level of the game. Alternatively, anxiety may arise from the observation of the level of symbolic aggression enacted by oneself in the game. In either case, anxiety would be more likely to emerge when playing the highly aggressive game than when playing the mildly aggressive one.

To the extent that the cognitions activated by the video games are specifically linked to particular affects, we should expect only those affects to be influenced by the games. More specifically, we expect that other negative affects such as depression will not be cued by the aggressive cognitions and will not be influenced by playing the games. To test this specificity notion, we assessed depression.

To compare accurately the effects of two video games that differ in their level of aggression, we must equate the games on other dimensions, such as rate of action, frustration, and enjoyment. Experiment 1 was designed to gather information on a set of video games, so that a properly matched pair of games could be selected. Experiment 2 examined the effects of mildly and highly aggressive video games, relative to a no-game control condition, on feelings of hostility, anxiety, and depression.

## EXPERIMENT 1

### Method

*Subjects and design.* A total of 55 undergraduates at Rice University participated in the experiment for extra credit. Each subject played 2 games (from a set of 11), and completed a questionnaire on each game.

*Apparatus.* A Radio Shack Color Computer was connected to a 19-in. television screen and to a cassette player. The 11 games differ in many ways. One was simply a version of the card game solitaire. Another consisted of trying to land a ship without crashing. Others were versions of the typical defend-and-attack games. Most required use of a joystick, although a few used only the keyboard. The particular games used are listed in Table 1.

*Procedure.* Games and orders of playing them were randomly assigned to subjects with the following restrictions: (1) Each game was to be played by 10 people; (2) each game would be the first played half of the time; (3) no 2 subjects would play the same pair of games. Each game was played for 20 minutes and was followed by a questionnaire on the game.

*Dependent Variables.* Subjects rated the games on seven dimensions, using 7-point rating scales. Ratings of 1 indicated that the games were easy, were not enjoyable, were not frustrating, had no violent content, had no violent graphics, had slow action, and had long pauses. Ratings of 7 indicated that the games were difficult, were enjoyable, were frustrating, had very violent content, had very violent graphics, had hectic action, and had no pauses.

TABLE 1 Mean Ratings of Games on Seven Dimensions

<i>Game</i>	<i>Rating Dimensions</i>						
	<i>Violence Content</i>	<i>Graphics</i>	<i>Action</i>	<i>Lack of Pauses</i>	<i>Difficulty</i>	<i>Enjoyment</i>	<i>Frustration</i>
Castle Guard	2.6	1.7	4.2	5.6	4.8	3.4	5.0
Canyon Climber	3.3	2.8	4.4	5.2	4.0	4.1	4.6
Venturer	2.7	2.6	3.6	4.2	3.5	4.7	3.0
Centipede*	3.0	2.3	4.7	5.2	3.3	4.9	3.0
PacTac	2.4	2.2	3.8	4.9	4.2	4.4	4.5
Zaxxon*	5.2	4.5	5.1	4.8	4.0	4.6	4.2
Robotack	4.3	3.4	5.7	5.9	4.0	4.7	3.5
Starfire	4.1	3.3	4.6	4.2	4.8	4.1	4.7
Icelander	2.5	2.4	3.0	2.3	4.9	3.1	4.8
Berserk	4.1	2.8	3.3	3.8	4.8	2.5	5.5
Solitaire	1.0	1.0	1.9	2.2	4.4	4.2	4.3

*Note:* Each mean is based on ratings by 10 subjects: 7-point rating scales were used, with 7s indicating high levels of violence and action, a lack of pauses, high difficulty, high enjoyment, and high frustration.

\*Denotes games selected for use in Experiment 2, because they differ only on the violence ratings.

## Results and Discussion

We initially examined separately the results of the first game played and the second game played. The results of these two between-groups analyses were essentially identical, with one exception. It appeared that the games were rated as being more difficult when they were played second ( $M = 4.47$ ) than when they were played first ( $M = 3.85$ ). A combined analysis confirmed this finding,  $F(1, 88) = 7.13, p < .01$ . However, because each game was played an equal number of times in the first and second position and because the game by order interaction was nonsignificant ( $p > .15$ ), this main effect of order posed no problem for the selection purposes of the experiment.

The mean ratings for all the games, ignoring the order factor, are presented in Table 1. Our goal in examining these data was to select two games that differed only on the violence measures (content and graphics). Based on a series of analyses of variance, we selected Centipede and Zaxxon as games to study further. Zaxxon was perceived as more violent than Centipede on both violence ratings (content and graphics),  $F_s(1, 99) > 12, p_s < .001$ . The two games did not differ on any other dimension, all  $F_s < 2.75^1$

These two games thus allow a test of the effect of different levels of violent content on subsequent affect. However, both games were somewhat violent in nature. Centipede mean ratings for violent content and violent graphics were significantly ( $p_s < .01$ ) larger than 1, the scale point corresponding to nonviolent ratings. We therefore conceive of Centipede as being a *mildly* aggressive game and of Zaxxon as a *highly* aggressive game.

A question of secondary interest may also be addressed with these data. How are the various dimensions of games interrelated? For instance, does rate of action correlate with enjoyment of game? There are several ways of analyzing these data to examine such questions. The most straightforward is to treat the mean ratings for each game and dimension as raw data points that describe the games. A simple correlation matrix can then be constructed from these data. The results of such a correlation analysis are presented in Table 2.

Several interesting findings should be noted. Violence of content and of graphics were highly related to each other and to rate of action. But violence was unrelated to any of the other dimensions, including enjoyment. This calls into question the frequently voiced assumption that only violent games are "fun." Enjoyment was negatively related to difficulty and frustration. The more difficult and frustrating games were enjoyed less. Finally, note that difficulty and frustration ratings were positively related.

## EXPERIMENT 2

### Method

*Subjects and Design.* In all, 60 Rice University undergraduates participated in the experiment for extra credit. Subjects were randomly assigned to one of three experimental conditions. They played a highly aggressive game (Zaxxon),

TABLE 2 Correlations of the Rating Dimensions across Games

	<i>Violent Graphics</i>	<i>Action</i>	<i>Lack of Pauses</i>	<i>Difficulty</i>	<i>Enjoyment</i>	<i>Frustration</i>
Violent content	.94**	.77**	.49	-.05	.05	.04
Violent graphics		.72*	.38	-.16	.21	-.09
Action			.85**	-.35	.45	-.32
Lack of pauses				-.41	.40	-.27
Difficulty					-.82**	.89**
Enjoyment						-.85**

Note: N = 11 games.

\*p < .05; \*\*p < .01.

a mildly aggressive game (Centipede), or no video game prior to completing dependent measures of affect.

*Apparatus.* A Radio Shack Color Computer was connected to a 13-in. television screen. Both Centipede and Zaxxon are played with a joystick. In Centipede the player is at the bottom of the screen avoiding and shooting at various insects that descend from above. In Zaxxon the player flies a ship that can move forward, from side to side, and up and down. The object is to avoid missiles, shoot as many planes, tanks, and other enemies as possible, and reach and kill the robot at the end of the scenario.

*Dependent Variables.* Affect was assessed by having subjects complete the Multiple Affect Adjective Checklist with instructions to note how they feel "right now." This checklist, developed by Zuckerman and colleagues (Zuckerman, 1960; Zuckerman, Lubin, Vogel, & Valerius, 1964), measures hostility, anxiety, and depression. Each of the three scales consists of a set of positive words (e.g., peaceful) and a set of negative words (e.g., angry). Subjects simply circle the words that describe how they currently feel.

*Procedure.* Upon arrival at the lab, subjects were given general instructions indicating that the study concerned playing video games. Then, subjects were randomly assigned to one of the three conditions, with 20 subjects in each condition. Those in one of the two video game conditions were given specific instructions for playing their game. They were allowed to play the game for 20 minutes, at which time they completed the dependent measures. Those in the no-game control condition first completed the dependent measures, with the implication that they would be playing the video game later.

Subjects also completed a confidential "Departmental Questionnaire" that assessed their reactions to this experiment and to psychology experiments in general. Several questions asked about the experimenter's conduct in the

experiment. These measures allowed us to assess any negative feelings directed toward the experimenter, arising perhaps from being interrupted while playing the games, from not being allowed to play a game (no-game condition), or from projected hostility induced by the aggressive nature of the games. There were no reliable effects on these measures, so they will not be discussed further.

Finally, all subjects received a thorough verbal and written debriefing concerning the goals of the research. None of the subjects indicated any suspicion about or awareness of the true goals of the experiment.

### Results and Discussion

A series of 3 (highly aggressive versus mildly aggressive versus no game)  $\times$  2 (male versus female subjects) analyses of variance were conducted on the affect scores.

*Hostility.* Our major hypothesis was that playing either mildly or highly aggressive video games would increase hostility. The results, presented in Figure 1, confirmed this prediction. The main effect of the game manipulation was highly significant,  $F(2, 54) = 8.45, p < .001$ . The sex main effect and the game by sex interaction were not significant ( $F_s < 1$ ). Specific contrasts revealed that subjects in either of the video game conditions were reliably more hostile than those in the no-game condition,  $t_s(54) > 2.8, p_s < .01$ . The highly aggressive game led to slightly more hostility than did the mildly aggressive game, but not significantly so,  $t = 1.1$ .

*Anxiety.* We expected the highly aggressive game to yield significantly elevated levels of anxiety. As shown in Figure 2, the results confirmed this prediction. There was a main effect of the game manipulation,  $F(2, 54) = 4.13, p < .05$ . The sex main effect and the sex by game interaction were not significant,  $F_s < 1.6$ . Specific contrasts revealed that the highly aggressive game produced higher levels of anxiety than either the mildly aggressive game or the no-game control condition,  $t_s(54) > 2.4, p_s < .02$ . The latter two conditions did not differ from each other,  $t < 1$ . The finding that anxiety was not elevated by the mildly aggressive game suggests that anxiety is not directly tied to aggressive cognitions. Rather, the anxiety effect in the highly aggressive condition may have been mediated by temporary world view changes or by self-observation of highly aggressive symbolic actions.

*Depression.* We expected no effects of the manipulation on depressive affect. The results, presented in Table 3, yielded no main effect of the game manipulation or of sex,  $F_s < 1$ . However, there was a significant sex by game interaction,  $F(2, 54) = 3.59, p < .05$ . Males were more depressed than females in the mildly aggressive game condition, whereas females were slightly more depressed than males in the other two experimental conditions. We have chosen not to interpret this interaction, because it was small, because the overall between-groups test was not significant— $F(5, 54) < 2$ , and because there is no obvious interpretation available.

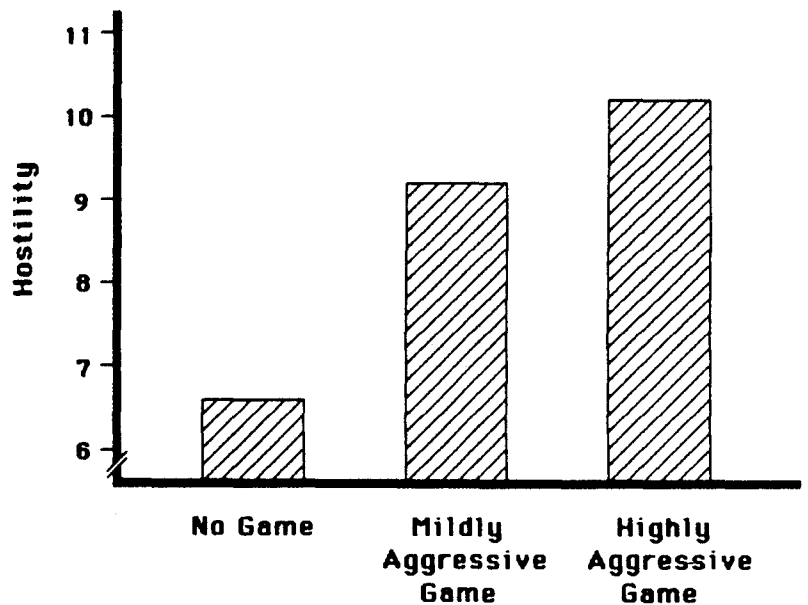


FIGURE 1 Hostility as a function of game condition.

### CONCLUSIONS

The results indicate that playing aggressive video games can have short-term negative effects on the game-player's emotional state. Furthermore, the affective changes depended upon the type of game played. The highly aggressive game led to increased hostility and anxiety, relative to the no-game control. The mildly aggressive game increased only the hostility of the game players. These findings support some type of semantic priming theory, although—as noted earlier—they do not distinguish among script, schema, or associationist theories.

There are a number of interpretational problems with studies of this type. Were the observed effects due to the level of aggression in the games or to other differences in the experimental situations? For example, did the greater anxiety occur in the highly aggressive game condition than in the mildly aggressive game condition because of differences in specific content in the games or because of the overall perception of higher aggression? As shown in Experiment 1, the games are equivalent on a number of dimensions, but we cannot rule out the possibility that they differ on some other unmeasured dimension. One such dimension that may prove important is the similarity of the game targets to the human game

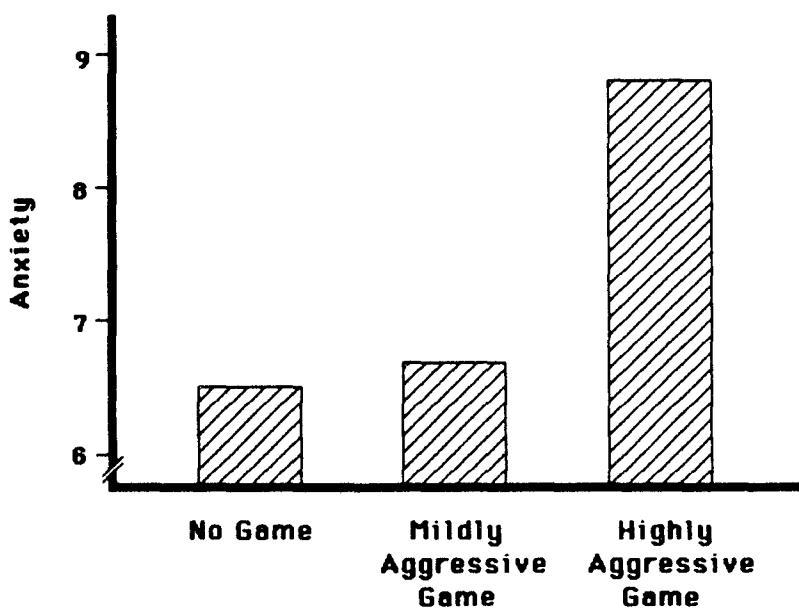


FIGURE 2 Anxiety as a function of game condition.

TABLE 3 Mean Depression Levels by Game Condition and Sex

Sex of Subject	Game Condition		
	No Game	Mildly Aggressive Game	Highly Aggressive Game
Male	13.5	17.8	15.1
Female	14.5	12.0	16.0

Note: Higher scores indicate higher levels of depression.

player. For instance, shooting humans (in Zaxxon) may be more anxiety provoking than shooting insects (in Centipede).

The possibility of demand artifacts is a second interpretational difficulty in studies of this type. Perhaps subjects guessed that we were studying affective consequences of playing video games and responded accordingly. Several features of our results make this alternative untenable. First, during the verbal debriefing none of the subjects spontaneously reproduced our goals or hypotheses. Second, the complexity of the overall pattern precludes the possibility of subjects figuring out the experiment. Those in the highly aggressive game condition had to guess that they were supposed to feel hostile and anxious,

but not depressed. Those in the mildly aggressive game condition had to guess that they were supposed to feel hostile but not anxious or depressed. All subjects then had to figure out how to display such affects by guessing which adjectives on the MAACL measured which affects. Third, subjects in both game conditions had to guess that their increased hostility (on the MAACL) was not supposed to transfer to evaluations of the experimenter on the Departmental Questionnaire. But any subject who believed that we were studying hostility reactions (on the MAACL) also would display the "demanded" level of hostility on the more easily faked Departmental Questionnaire. Thus, although one must be wary of demand possibilities in this type of research in general, it does not pose an interpretational problem for the present results.

From a broader perspective, one must ask about the direct long-term effects of different types of video games on the game players. The negative affect discovered in the present studies may be very short-lived and may have no ill effects in the long run. (Of course, many of the short-term effects in the media literature are quite important; see Philips, 1980, 1982.) Indeed, one could argue that experiencing mild levels of anxiety and hostility might be beneficial for some game players, providing them with an opportunity to learn how to deal with these emotions. Conversely, these effects may accumulate, leading to negative changes in world view that produce generally hostile and anxious individuals. Evidence of such significant consequences from playing video games is not currently available in our work or that of others, but attention to these possibilities is clearly warranted.

Finally, *indirect* long-term effects of the whole video arcade experience—effects on the social, emotional, and intellectual development of youths—deserve much more attention. Dominick's (1984) work cited earlier makes some nice progress in that direction

In sum, the present studies are best viewed as a first step toward understanding the short-term effects of playing aggressive video games. We encourage others to address these important theoretical and practical problems from the short-term, the direct long-term, and the indirect long-term perspectives.

#### NOTE

<sup>1</sup>The analyses that combined data across the two order levels (first versus second) assume that the two games played by each subject were independent. The fact that games played second were rated as more difficult contradicts this assumption. However, the design of the study makes this main effect unimportant. In addition, the separate analyses on the first and second game data yielded essentially the same results as presented above. Therefore, we present the combined analyses for the sake of simplicity.

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Craig A. Anderson is Associate Professor of Psychology at Rice University. His research interests include attribution models of motivation and performance, theory perseverance, aggression, covariation detection, and judgmental processes.

Catherine M. Ford is currently a student in the clinical psychology doctoral program at the University of Texas at Austin. Her research interests are primarily in the area of gender role and gender identity, particularly in relation to psychological dysfunction.

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