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Effects of Violent Movies and Trait Hostility on Hostile Feelings and Aggressive Thoughts

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The General Affective Aggression Model [Anderson CA, Deuser WE, DeNeve KM (1995): *Personality and Social Psychology Bulletin* 21:434–448; Anderson CA, Anderson KB, Deuser WE (1996): *Personality and Social Psychology Bulletin* 22:366–376] suggests that violent movies may increase aggression by increasing hostile feelings and the accessibility of aggressive thoughts. It also suggests that trait hostility may similarly influence affect and cognition. Experiment 1 explored the effects of viewing violent movie clips on affect and cognition. Participants who viewed a violent movie clip later reported higher levels of state hostility than did those who viewed a nonviolent clip. Experiment 2 added trait hostility to the design as a potentially important individual difference variable. The state hostility results of Experiment 1 were replicated. In addition, the relative accessibility of aggressive thoughts was increased by the violent clip, but only for low irritable participants. Discussion focused on the relevance to aggressive behavior. *Aggr. Behav.* 23:161–178, 1997. © 1997 Wiley-Liss, Inc.

Key words: media violence; aggression; priming; hostility; affect

INTRODUCTION

Violent media increase aggression. Years of debate and research on the issue of whether or not exposure to television and movie violence cause increases in aggressive behavior have yielded an impressive array of support for this proposition [e.g., Bandura, 1973; Berkowitz, 1993; Carlson et al., 1990; Eron, 1982; Geen, 1990; Huesmann, 1986; Paik and Comstock, 1994; Wood et al., 1991]. Certainly, there have been occasional replication failures in the literature. Nonetheless, consensus is beginning to emerge among experts in this domain that observing violence in the media can significantly increase the violence of the observer [Berkowitz, 1993; Geen, 1990].

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Researchers have also identified some of the conditions under which watching violent video materials causes viewers to become more violent. For instance, story lines in which the violence of the protagonist is both justified and successful are more likely to produce increases in short term aggression by the viewer than is unjustified or unsuccessful violence [e.g., Berkowitz and Geen, 1966]. Similarly, it is now apparent that the context within which violent media are viewed also plays a role in the immediate effects. For instance, when violent episodes are discussed with children in a constructive way, such as by explaining the undesirability of violent solutions to problems and suggesting nonviolent alternatives, the media violence effect is reduced [e.g., Eron, 1982; Huesmann and Miller, 1994].

The psychological processes by which violent media increase aggression are less well understood. There is no dearth of theories on the media violence effect, but the empirical evidence is less clear than many assume. For instance, Berkowitz's cognitive neoassociation theory of aggression [CNA; Berkowitz, 1984, 1993] posits that viewing violent media can prime aggressive networks in semantic memory, increasing the accessibility of related aggressive thoughts. But only one study has specifically addressed this issue [Bushman and Geen, 1990], and though it provides some support there are interpretational ambiguities suggesting that further investigation would be helpful (see below).

THE GENERAL AFFECTIVE AGGRESSION MODEL

My students and I have integrated the major theories of aggression into a more general affective aggression model [GAAM; Anderson et al., 1995, 1996]. Our goal was to create a framework which: (a) accommodated existing findings; (b) included the major theoretical insights from varied research groups; and (c) could guide subsequent research into the psychological processes that operate on a wide range of independent variables as causes of aggressive behavior. Figure 1 illustrates the early part of our model.

The basic input variables can be categorized as belonging to one of two categories—either acute situational variables, such as receipt of an insult, or chronic individual difference variables, such as having an aggressive personality. Input variables must influence a variety of processes at several different levels before they increase or decrease aggressive behavior. GAAM postulates three routes that frequently appear in the aggression literature: affect, cognition, and arousal. Any given input variable may operate via one, two, or even all three routes. Furthermore, a sufficiently strong activation of one of these routes may well spill over to one of the others, as indicated by the dashed lines in Figure 1. For example, priming aggressive cognitions may lead to an increase in aggression-related affect even in the absence of provocation. However, such secondary activation is unlikely when the initial activation is weak. [For a similar dynamic model of how cognitive and affective systems mediate personality and social processes, see Mischel and Yuichi, 1995.]

More domain specific theories are needed to account for the effects of any specific variable. In recent work, for example, we have shown that the temperature effect on aggression may operate via the affective and the arousal routes, but does not appear to directly influence aggressive cognitions [Anderson et al., 1995, 1996]. Similarly, we found that viewing weapons (vs. nature scenes) increased the accessibility of aggressive cognitions, but had no impact on hostile feelings [Anderson et al., 1996].

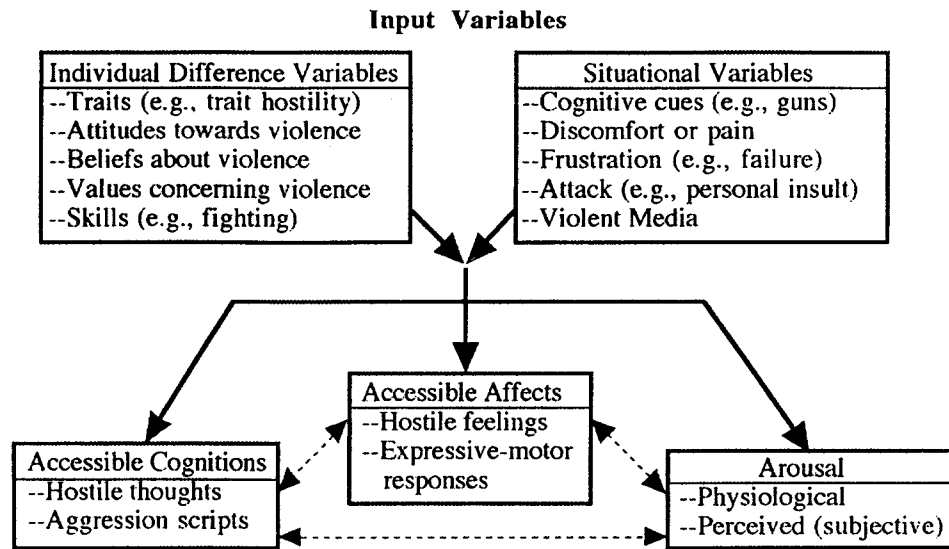


Fig. 1. Early stages of the affective aggression model. Adapted from Anderson et al. [1990].

COPYCAT AND PRIMING EFFECTS OF VIOLENT MEDIA

The present research focuses on the violent media effect. As noted at the outset, it is clear that under some circumstances exposure to violent films and television can increase the aggressive behaviors of the viewers. Occasionally this occurs in copycat fashion, as when a viewer “learns” some new way to harm others. For example, in 1974 three people were murdered by two armed men who forced them to drink liquid Drano. The two men had seen a similar killing in the movie *Magnum Force*, and had brought the Drano with them (“Selby Makes One Last Plea,” 1987). Though such copycat effects are undoubtedly real, there is little theoretical debate or interest in them because the vast literatures on observational learning can easily account for such effects; people learn much of their behavioral repertoire via such processes. In addition, although observational learning may influence the particular way that a viewer expresses aggressive intentions, it does not account for the instigation of those aggressive intentions. Furthermore, copycat crimes are relatively rare.

Of greater interest to the research community is a more subtle type of media violence effect, in which viewers become more aggressive without being aware of it, and without necessarily imitating the specific form of the observed aggression. For example, Bushman (Study 3, 1995) randomly assigned college student participants to view a 15 minute video clip of aggressive behavior from “The Karate Kid III” or an equally arousing but nonviolent clip from “Gorillas in the Mist.” After viewing the assigned clip, each participant competed in a 25-trial reaction time task, ostensibly against another person. Before each trial participants selected the intensity of the punishment to be delivered to their opponent if the participant “won” (and therefore the opponent “lost”) that reaction time trial. The punishment consisted of white noise, ranging from 65 to 105 decibels. Wins and losses were set by the computer, so that each participant received punishment

after about half of the trials. Punishment levels for the participant (supposedly set by the opponent) increased across trials, in a pattern of increasing provocation. Participants who had seen the violent behavior clip delivered higher levels of punishment (white noise) to a provoking confederate than did those who had seen the nonviolent clip. This violent media effect was especially large for high trait aggressive participants, as measured by the physical aggression subscale of the Aggression Questionnaire [Buss and Perry, 1992].

How are we to account for such violent media effects? One reaction is to dismiss this type of phenomenon by denigrating the external validity of most laboratory aggression paradigms. However, as we [Anderson and Bushman, 1997] and others [e.g., Carlson et al., 1989; Berkowitz and Donnerstein, 1982] have noted, there is considerable evidence that standard laboratory aggression paradigms capture the affective aggression construct quite well.

A more constructive approach is to refine and apply current theories of affective aggression. One especially plausible account is that viewing violent scenes primes related aggressive thoughts in semantic memory through a spreading activation process. This priming effect thus increases the probability of an aggressive response to some provocation, real or imagined, by increasing hostile affect, by promoting hostile interpretations of the provocation, or by instigating use of aggressive behavioral scripts [Anderson et al., 1995, 1996; Berkowitz, 1993; Geen, 1990]. A key link in this theoretical chain concerns whether or not viewing violent scenes increases the accessibility of semantically related aggressive concepts.

Bushman and Geen [1990] tested this priming hypothesis by showing participants violent or nonviolent video clips from popular movies, and later asking them to write down the thoughts that they had “as they watched the tape.” (p. 157). Not surprisingly, they found that participants who had watched a violent movie clip wrote down more aggressive thoughts than did those who watched a nonaggressive clip. This finding confirms one version of the priming hypothesis, but is not a particularly strong test of the most subtle version of it, for two reasons. First, the controlled nature of the thought listing task raises the possibility that experimenter demand and subject suspicions might have artifactually produced the higher aggressive thoughts in the violent condition. This seems unlikely, given the procedures and other results reported by Bushman and Geen, but this problem is not easily dismissed. Second, if participants were simply thinking about (and writing down) what they observed in the film then the violent clip would necessarily yield more aggressive thoughts than the nonviolent clip. An extreme version of this argument is that direct transcripts of the video clips would produce similar findings.

Bushman and Geen [1990] also reported that aggressive cognitions in their thought listing task were influenced by several individual difference variables including gender and trait hostility. These effects too can be handled without assuming a semantic priming process; people with different interpretative schemata perceived the films somewhat differently. Thus, the most basic version of the priming hypothesis—that watching violent behavior primes additional aggressive concepts in semantic memory—was only weakly supported. The Bushman and Geen findings are important and suggestive, but are also in need of theoretical elaboration and empirical confirmation.

The most basic and subtle version of the priming hypothesis derives from spreading activation models of semantic memory, incorporated into CNA as well as into GAAM.

Aggression-related thoughts and feelings are viewed as interconnected nodes in a network. Activation of one node tends to activate related nodes, which are connected. Thus, viewing a violent episode can activate a host of related nodes, and activation then spreads to other related nodes. The strength of this priming effect presumably depends upon the strength of the prime as well as the degree and strength of the connections to other nodes. Once these related nodes have been partially activated, they become more accessible, meaning that they need less additional activation "energy" to cross the threshold of consciousness. If such priming lasts for a meaningful length of time, it can influence subsequent events. Furthermore, this priming process is automatic, meaning that it can occur without intent, effort, or awareness.

To date, there are no published studies testing this most subtle and basic version of the priming hypothesis using violent media as the "prime" stimulus and a cognitive paradigm designed to assess the accessibility of aggressive thoughts (relative to nonaggressive thoughts) in semantic memory. Several cognitive paradigms have been used in the priming literature, including lexical decision making, word reading, and modified Stroop color naming paradigms. In all three of these paradigms, the participant's task is to respond as quickly as possible to each of a series of stimulus events. Some of the stimulus events are in the semantic category believed to have been primed by the priming manipulation; other stimulus events are in unprimed semantic categories. In word reading tasks like the one created for the present experiments, reaction times should be relatively faster for primed than for unprimed stimulus events. More specifically, aggression-related words should be relatively more accessible after exposure to media violence.

ACTIVATION OF HOSTILE THOUGHTS AND AFFECT

To test this spreading activation version of the media violence priming effect requires that some cognitive task be undertaken, one which indexes the "accessibility" of aggressive and nonaggressive content. I chose to use a "reading reaction time" paradigm (also known as "word pronunciation") in the present studies for two reasons. First, it is procedurally simple. Participants merely read words as quickly as possible as they appear on a computer screen. Second, it is a particularly sensitive paradigm for the type of priming being assessed (e.g., Balota and Lorch, 1986; Irwin and Lupker, 1983). If aggressive thoughts have been primed in a group of participants, they should be able to read the aggressive words faster than others who have not received aggressive primes, relative to their control word reading times.

Discussion so far has focused on media violence effects on cognition. But GAAM (as well as CNA and others) also specifies that input variables such as violent images may influence later aggression by temporarily increasing feelings of hostility. This priming of specific kinds of affect can be derived from network models simply by assuming that affective content is also stored and linked in the semantic network. Some purely cognitive primes, such as viewing pictures of guns, are likely to have relatively little impact on aggression-related emotions such as state hostility [Anderson et al., 1996]. However, it is possible that the involving and interpersonal nature of violent media episodes can increase aggressive feelings. In other words, media violence may also prime aggression-related affect.

In summary, an important gap in the research literature on the media violence effect

can be addressed with a research design containing the following features. First, the violent and nonviolent video clips need to be matched on numerous irrelevant dimensions and need to differ in amount of aggressive content. Second, the chosen clips need to have been shown (in prior research) to produce different levels of aggressive behavior. Third, the measure of accessibility needs to be one that actually tests for the automatic priming of key concepts, rather than one in which controlled cognitive processes operate. Fourth, a good measure of state hostility is needed. Both experiments reported in this article have all four features. The main hypothesis stimulating this research was that exposure to media violence increases the accessibility of aggressive thoughts and aggression-related affect.

EXPERIMENT 1

Methods

Design and overview. Male and female participants were randomly assigned to view one of two movie clips previously used by Bushman [1995]. One contains violent fight scenes; the other contains equally interesting nonviolent scenes. After viewing the assigned clip, participants completed a questionnaire about the clip, performed a reaction time task that involved four word types (aggressive, anxiety, escape, and control), and completed a self-report measure of state hostility. The experiment thus had a 2 (movie clip: violent versus nonviolent) \times 2 (gender) between subjects design, with state hostility as one dependent variable. The other main dependent variable, reaction time to the four different word types, constituted a within subjects factor.

Participants. Fifty-three university undergraduates participated in Experiment 1. Some received credit towards an introductory psychology class requirement. Others were volunteers recruited by members of an undergraduate research methodology class. English was the native language of all participants.

Stimulus materials. Movie clips. Bushman [1995] created and tested a number of clips from a variety of popular movies, and did so on numerous dimensions of relevance to the aggression literature. He selected a clip of scenes from the movie *Karate Kid III* and another from *Gorillas in the Mist* as best meeting the criteria of differing primarily in terms of violence of the content. The clips were equated on a number of important dimensions such as how interesting and exciting they were perceived by college undergraduates. Bushman [1995] also demonstrated that these two clips produce different levels of aggressive behavior in a competitive reaction time task when viewed prior to a provocation.

Background questionnaire. A background questionnaire was administered after participants had viewed the assigned movie clip. Questions were designed to help convince participants that the study was primarily concerned with the relation between their reaction to the movie clip (two questions) and their usual media viewing habits (four questions). In addition, they were asked whether they wore contact lenses or glasses. We had no theoretical interest in these questions, so they will not be discussed further.

State hostility. This 35-item Likert-type scale [Anderson et al., 1995, 1996] asks respondents to indicate the extent of their agreement with items of the form "I feel furious." The ratings are based on a 5-point scale anchored at 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree), and 5 (strongly agree). Eleven of the items contain positive adjectives (e.g., kindly), and are reverse scored. Past research

has shown three of the items to be a bit weak (vexed, tender, willful). The remaining items typically yield internal consistency estimates in the low to mid 90s [Anderson et al., 1995, 1996]. Recent studies in our lab have shown that pain, provocation, uncomfortably hot and cold temperatures increase State Hostility scores, and that measures of trait hostility are positively related to trait hostility [e.g., Anderson and Anderson, in press; Anderson et al., 1995; Dorr and Anderson, 1995].¹

Reading reaction time. After a brief instructional period, participants were presented with a series of 96 words, 24 from each of four categories: aggressive (e.g., attack), anxiety (e.g., embarrassed), escape (e.g., flight), and control (e.g., behold), via computer. Each word was presented in the center of the screen, in Times 12 font. The letters within each word were separated by periods to increase the difficulty of the reading task and thereby increase any priming effects that might occur. These words were taken from Deuser [1994], which included the words used in Anderson et al. [1996]. One of the "control" words was later discovered to belong to the escape category (resign), and was recategorized during the data analysis phase.

Each of these 96 words was presented twice for a total of 192 trials. Word order was randomized by the computer for each participant. When a word appeared on the screen, a timer started. The participant's task was to "read out loud" each word as quickly as possible. A digitizing microphone (MacRecorder) was used as a voice key to stop the timer. The computer automatically recorded the elapsed time between when the word appeared on the screen and when the subject began "reading" it out loud. After the voice key was triggered, there was a delay of approximately 1 sec before the next word appeared.

Procedure

Each participant was run through the experiment individually. Upon arrival at the lab, the participant read and signed a consent form describing the "Movie Clips" study. All participants were informed that they would be watching a movie clip, filling out a short questionnaire, doing a computer task, and filling out another short questionnaire. They were informed that the movie clip was about 15 min long.

After viewing the assigned movie clip, the participant was given the "Background Questionnaire." Upon completing this questionnaire, the participant was taken to an adjacent room which contained the computer. An expanded version of the following instructions was given:

"Have a seat in this chair. A word will appear on the screen. You are to read the word aloud in a normal tone of voice without hesitation. Once you have said the word aloud proceed to the following words. When you are finished, come into the room across the hall and you'll fill out the other questionnaire."

The Experimenter answered questions, reminded participants to speak the words loudly enough for the microphone to detect, and started the program. At the end of the 192 trials, the screen indicated that the computer task was over, and that the participant should contact the Experimenter for further instructions. The participant was then given the State Hostility scale (labelled "Current Mood"). Finally, each participant was de-

briefed by the Experimenter, who began the debriefing by probing for suspicion. No subjects indicated knowledge of or suspicions about the main hypotheses. A written debriefing, in which the hypotheses were described, was also given. This debriefing also asked the participant to refrain from discussing the study with others who might participate in it, at least until the end of the semester.

RESULTS

Preliminary Explorations

State hostility. Item analyses revealed that Items 2 (I feel willful) and 4 (I feel tender) were not well correlated with the remaining state hostility items. The remaining 33 items formed an internally reliable scale, coefficient alpha = .96. We averaged participants' ratings on these 33 items. We then examined the distribution of these state hostility scores, using Tukey's [1977] exploratory data analysis techniques. Specifically, we used the box plot procedure to identify scores falling outside the inner fences. This involves taking the interquartile range, multiplying by 1.5, adding this amount to the 75th percentile score and subtracting it from the 25th percentile score. Scores falling outside this range are considered outliers. In the present sample, two scores greater than 3.8 were identified as outliers. These participants were dropped from the final analyses. For the remaining 51 participants the mean state hostility score was 2.00; the standard deviation was .45.

Reading reaction time. Five participants had no RT data because of computer malfunctions. However, because they completed the study with no procedural problems, their state hostility data were kept. We next examined the distribution of all RTs to identify high and low cutoff points, again using Tukey's procedures. Trial RTs outside these boundaries are considered error trials. RTs longer than 1183ms or shorter than 333ms were judged to be errors, resulting from inattention or soft voice (for long RTs) or inadvertent noise (short RTs), or a computer malfunction (no RT recorded). These trials were discarded. Finally, we computed RT means for each word type for each subject, and subjected these averages to an outlier search. Aggression RT scores greater than 1067ms, Escape RT scores greater than 1133ms, and Control RT scores greater than 1000ms were deemed outliers. Only one additional participant was discovered to have any average RTs identified as outliers; this person was the outlier for aggressive, escape, and control words. Closer examination of this person's results revealed that the voice key was not set to a sensitive enough level; for example only three valid RTs were recorded for control words. Therefore, this person's RT averages were not included in the RT analyses.

In sum, 51 of the 53 participants had valid state hostility data. There were 16 females and 11 males in the violent movie clip condition, and 15 females and nine males in the nonviolent condition. An additional six participants had computer or voice key malfunctions (two females in each movie condition, and two males in the violent movie clip condition). Data from these participants were dropped from the RT analyses.²

² Other decision rules concerning outliers were examined. None changed the results in any substantial way for either the state hostility or the reading reaction time results.

¹ A copy of the State Hostility Scale may be obtained from the author.

Main Analyses

State hostility. The Movie \times Gender unweighted means analysis of variance (ANOVA) on the state hostility measure revealed a significant main effect of movie, $F(1, 47) = 7.52, P < .01, MSE = .188$. As expected, those who had watched the violent movie clip reported greater state hostility ($M = 2.16$) than did those who watched the equally exciting but less violent movie clip ($M = 1.82$).³ Neither the gender main effect nor the movie \times gender interaction approached significance, $F_s < 1$.

Reading reaction time. Three of the four types of words—*anxiety, escape, and control*—were not expected to be primed by the movie manipulation. A repeated measures analysis of variance on these three word types confirmed this; none of the word type interactions approached significance, all $F_s < 1$.

To test the hypothesis that observing violent movie clips would prime aggressive thoughts, I created an Aggression Accessibility score for each participant by subtracting average RT to aggressive words from average RT to the nonaggressive words (i.e., *anxiety, escape, and control*). Thus, larger scores indicate that aggressive words were relatively more accessible than the nonaggressive words. A 2 (movie) \times 2 (gender) ANOVA on aggression accessibility yielded no evidence of a movie effect either as a main effect or in interaction with gender, $F_s < 1$. However, a marginally significant main effect of gender did emerge, $F(1, 41) = 2.82, P = .10, MSE = 542$. Males had slightly greater aggression accessibility scores ($M = 13\text{ms}$) than did females ($M = 1\text{ms}$). That is, males were 13 ms faster at reading the aggressive words than the nonaggressive words, whereas females were only 1ms faster at aggressive than the nonaggressive words.

DISCUSSION

The effect of movie violence on feelings of anger and hostility suggests that one way in which violent media may increase aggression is through its effects on affect. Participants who watched the violent movie clip reported their state hostility level to be almost a quarter of a scale point higher on the 5 point rating scales. This media violence effect on emotion may well be large enough to color a person's judgments of another's intent in ambiguously aggressive situations, and may thus increase the likelihood of an aggressive response. This presumably would occur when one has been provoked in some way. The media violence effect on emotion may also produce its biggest behavioral effects on people who chronically behave in an aggressive fashion, as demonstrated by Bushman [1995].

The observed gender difference in RTs to aggressive vs. nonaggressive words fits the common view that males in our society are more exposed to and familiar with aggressive ideas and situations. Such exposure may well make aggressive words relatively more accessible to males than to females. In a sense, this finding (even though it was marginally significant) provides some evidence for the validity of the reading reaction time task as a measure of aggressive thought accessibility.

³ All means reported throughout this article are the appropriate unweighted means, adjusted (in Experiment 2 only) for the continuous independent variable of trait hostility.

What is puzzling, however, is the lack of effect of watching a violent or a nonviolent movie clip prior to the reading reaction time task. The means were in the predicted direction, with those who watched the violent movie clip having slightly higher aggression accessibility scores than those who watched the nonviolent movie clip. However, this effect did not approach significance. Three uninteresting possibilities for this result include: (a) Reading reaction times are insensitive to the type of priming effect created by watching violent versus nonviolent movies; (b) this version of the reading reaction time task is relatively insensitive; and (c) there was insufficient power in the study. A more interesting possibility is that movie manipulations do not prime aggressive thoughts in the automatic spreading activation process presumed by CNA, GAAM, and related models.

The most interesting possibility, however, is that watching a violent movie may increase the relative accessibility of aggressive thoughts in certain individuals but not in others. For instance, people who are habitually involved in aggressive encounters, e.g., those who are high in trait hostility, may be so chronically primed for aggressive words that watching a violent film has little or no impact on them. Nonaggressive people, e.g., those who are low in trait hostility, may be more cognitively affected by violent movie content. That is, people who typically do not think in aggressive terms may show the biggest impact of aggressive primes such as exposure to violent media. This type of individual difference variable in conjunction with the small sample size could mask a movie content effect on reading reaction times to aggressive and nonaggressive words. Experiment 2 was conducted to replicate the state hostility findings of Experiment 1 and to test this individual difference hypothesis about priming aggressive and nonaggressive words.

EXPERIMENT 2

Methods

Design and overview. Experiment 2 was identical to Experiment 1 with the following exception: All participants completed a Likert-type measure of trait hostility immediately after signing the consent form. We used a 30-item version of Caprara's Irritability scale [Caprara et al., 1985]. This scale consists of two types of items. Twenty reflect irritability with items such as: "When I am irritated, I need to vent my feelings immediately." The remaining 10 items indicate a lack of irritability (e.g., "I have never been touchy"), and were originally used by Caprara et al. [1985] as filler items. In our research [Anderson et al., 1996; Dill et al., in press] we have found that both types of items measure the same underlying construct, which we have labelled "Trait Hostility." Respondents indicated their level of agreement or disagreement to each item using 7-point scales anchored at 1 (Disagree Strongly) and 7 (Agree Strongly). The 10 "lack of irritability" items were reverse scored. The trait hostility index was then calculated as the average response to these 30 items. This index was converted to deviation score form to facilitate statistical analysis. Sixty-six male and female participants took part in the study in exchange for credit towards an introductory course requirement.

RESULTS

Preliminary Explorations

Trait hostility. Item analyses revealed no problematic items. Coefficient alpha for the scale was acceptable at .90. Tukey's [1977] exploratory data analysis techniques

revealed no outliers. The mean trait hostility score on the final sample was 3.60; the standard deviation was .83.

State hostility. As in Experiment 1, item analyses revealed that Items 2 and 4 were not well correlated with the remaining state hostility items. The remaining 33 items formed an internally reliable scale, coefficient alpha = .95. We averaged participants' ratings on these 33 items. We then examined the distribution of these state hostility scores, using Tukey's [1977] exploratory data analysis techniques. Data from the one participant whose score was greater than 3.8 was identified as an outlier and was dropped from the final analyses. For the final sample the mean state hostility score was 1.83; the standard deviation was .51.

Reading reaction time. As in Experiment 1, trials with RTs longer than 1183ms or shorter than 333ms were judged to be errors. These trials were discarded. Examination of the RT means for each word type for each subject revealed that Escape RT scores greater than 1000ms and Control RT scores greater than 900ms were statistical outliers. Five participants had such extreme scores. One of these had extreme RT scores because of problems with the voice key; his RT data were dropped from the final analyses, but his state hostility data were kept. All data from the other four participants with RT outliers were dropped from all analyses.

In sum, 60 participants had useable data on the reading reaction time task, 17 females and 14 males in the violent movie clip condition, and 14 females and 15 males in the nonviolent condition. One additional male (in the violent movie condition) had valid state hostility data.⁴

Main Analyses

State hostility. I expected state hostility scores to yield significant main effects of the movie manipulation and the trait hostility individual difference variable. The complete mixed model regression analysis, which included all main and interaction effects of movie, gender, and trait hostility, revealed exactly this pattern of results. Participants who viewed the violent movie clip reported somewhat higher levels of state hostility ($M = 1.95$) than did those who viewed the nonviolent clip ($M = 1.69$), $F(1, 53) = 4.02$, $P = .05$, $MSE = .220$. The trait hostility measure was positively related to state hostility, $F(1, 53) = 5.19$, $P < .03$. In addition, there was a marginal gender main effect, $F(1, 53) = 3.07$, $P < .09$. Males reported somewhat higher levels of state hostility than did females ($M_s = 1.94$ and 1.71 , respectively). None of the interactions approached significance, $F_s < 1$.

When the (nonsignificant) interactions involving trait hostility were dropped from the model, all three main effects became somewhat stronger. The F_s (with 1 and 56 d.f.) for the movie, trait hostility, and gender main effects became 4.91, 5.46, and 3.25, respectively, with corresponding P levels of .03, .02, and .08. Thus, the state hostility results replicated the movie effect found in Experiment 1, and demonstrated the predicted trait hostility effect. Figure 2 illustrates both of these effects via best fit regression lines for participants in the two movie conditions. The High and Low hostility levels in the figure represent ± 1 standard deviation from the sample mean. The figure

⁴ Other decision rules concerning outliers were examined. For example, using the control word cut-off scores for defining outliers in the average RTs resulted in the loss of an additional three participants. This produced minor changes in P -levels, but did not change any of the major findings or conclusions.

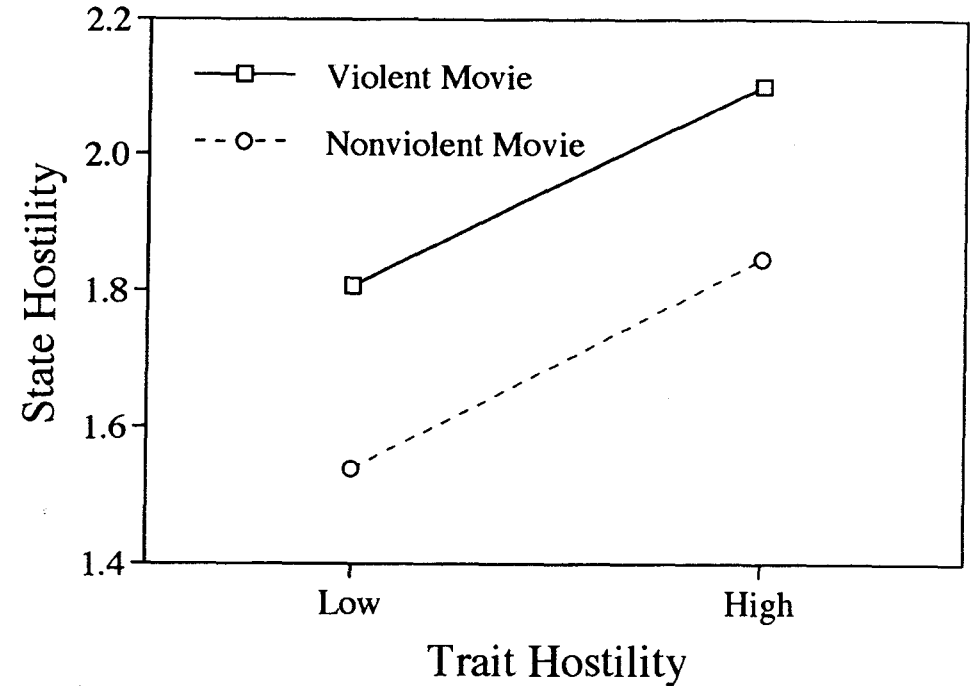


Fig. 2. Effects of movie violence and trait hostility on feelings of state hostility.

also illustrates the total lack of a trait hostility \times movie interaction. In other words, people who scored high on the trait hostility reported relatively higher state hostility scores regardless of which movie clip they had seen. Another way of viewing these results is to note that the violent movie clip increased state hostility regardless of the person's level of trait hostility.

Reading reaction time. As in Experiment 1, the movie manipulation was not expected to differentially affect RTs to the three nonaggressive word types. A repeated measures analysis of variance on these three word types confirmed this; none of the word type interactions approached significance, all $P_s > .12$. Thus, as in Experiment 1, I created an Aggression Accessibility score for each participant by subtracting average RT to aggressive words from average RT to nonaggressive words.

If observing a violent movie clip automatically primes aggressive thoughts, then we should see an increase in aggression accessibility for some participants. This would be revealed by a main effect of movie, by a movie \times trait hostility interaction, or by both. Results confirmed this prediction with both a significant movie main effect and a movie \times trait hostility interaction. Those who watched the violent movie clip had higher aggression accessibility scores ($M = 24$ ms) than those who watched the nonviolent movie clip ($M = 11$ ms), $F(1, 52) = 5.64$, $P < .03$, $MSE = 410$.

The movie \times trait hostility interaction revealed that watching the violent movie increased the aggression accessibility scores of low trait hostility participants, but had relatively little impact on high trait hostility participants, $F(1, 52) = 6.65$, $P < .02$. Specific contrasts revealed that the violent movie significantly increased (relative to the nonviolent movie) the aggression accessibility scores of participants low in trait hostility.

ity, $t(55) = 3.53$, $P < .001$, but had no impact on the aggression accessibility scores of participants high in trait hostility, $t(55) = 0.03$. Another way to think about this interaction is to note that the aggression accessibility scores of participants who saw the non-violent film were positively related to their trait hostility, $F(1, 28) = 8.30$, $P < .01$, whereas trait hostility had no impact on aggression accessibility for participants who saw the violent film, $F(1, 27) = 0.69$. Figure 3 illustrates both the movie main effect and its interaction with trait hostility.

There was also a marginal main effect of gender on aggression accessibility, $F(1, 52) = 3.76$, $P < .06$. Aggressive words were relatively more accessible to male than to female participants, $M_s = 23$ and 12ms, respectively. This replicates the gender effect found in Experiment 1.

DISCUSSION

Summary of Results

These two experiments yielded results that were generally consistent with each other and with theoretical models of media violence effects. Specifically, a movie manipulation known to produce significant differences in aggressive behavior [Bushman, 1995] was shown to produce significant changes in the affective and cognitive variables proposed to underlie the movie violence effect on aggressive behavior. Both studies showed that watching a brief clip of moderately violent scenes can increase feelings of hostility, and did so in an audience that had not been provoked in any way. Experiment 2 further

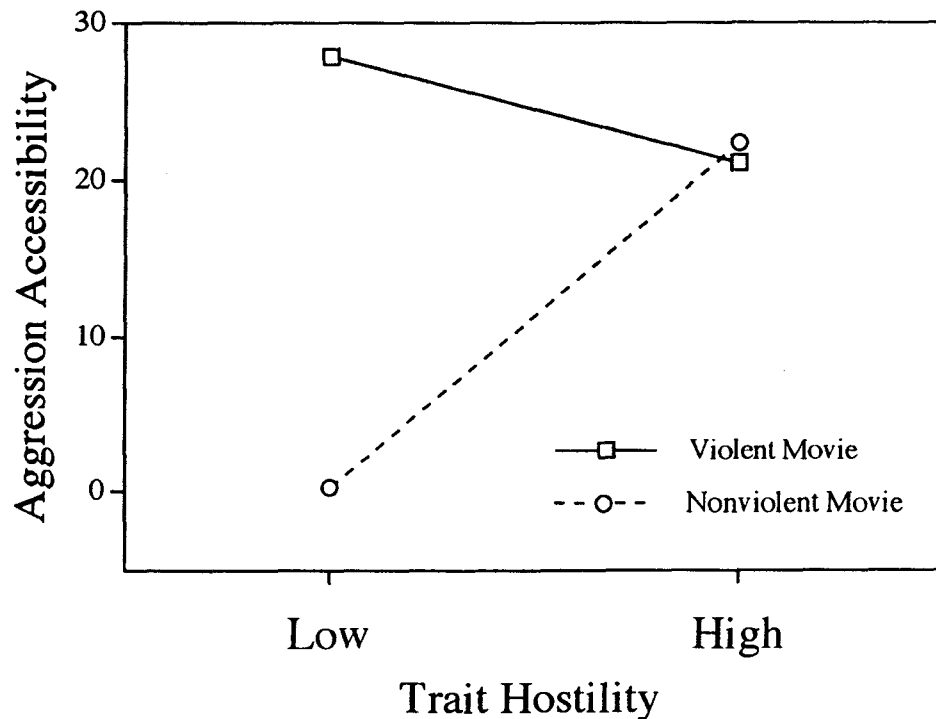


Fig. 3. Effects of movie violence and trait hostility on aggression accessibility.

showed that watching a violent movie clip can increase the relative accessibility of aggressive thoughts, but appears to do so only for people who are not chronically primed to think aggressively. Experiment 2 also showed that chronically irritable people feel more hostile (or less friendly) than people who score low on the trait hostility measure. Finally, both experiments demonstrated that on average aggressive thoughts are relatively more accessible to males than to females.

Relation to the General Affective Aggression Model

These results provide new support for GAAM [Anderson et al., 1995, 1996] as well as for earlier models on which GAAM was based [e.g., Berkowitz, 1993; Geen, 1990]. The state hostility results support the model in suggesting that both situational cues and personality traits can combine to produce heightened levels of anger. Furthermore, the situational cue (violent movie clip) and the personality measure (trait hostility) used in the present experiments have been shown to produce heightened aggressive behavior under certain conditions [Bushman, 1995; Caprara et al., 1985].

The aggression accessibility results are even more intriguing. Though several studies have shown that watching violent media can increase the number of self-reported aggressive thoughts [e.g., Bushman and Geen, 1990], the present results are the first to show that violent media can increase the accessibility of aggressive thoughts in a task designed to assess automatic priming and spreading activation processes. In other words, these results confirm and extend the Bushman and Geen claim that violent media prime aggressive thoughts. Unlike the thought listing procedures used in previous research, which are susceptible to several uninteresting alternative explanations, the reading reaction time task used in the present experiments directly assesses the accessibility of specific kinds of thoughts by measuring how quickly people can respond to words from different semantic categories. This technique also reduces the likelihood that experimenter demands and participant suspicions bias the priming results. The small but consistent gender effects on aggression accessibility also supports the validity of this reaction time paradigm by showing that aggressive thoughts are relatively more accessible to males than to females. Bushman [in press] has recently replicated both the gender effect and a movie violence effect on aggression accessibility using a lexical decision task to measure aggression accessibility. In his study, trait hostility was not assessed so it was not possible to examine the trait hostility by movie violence interaction found in the present Experiment 2.

Relation to Aggressive Behavior: A Paradox

The overall pattern of results in the present experiments might be construed to mean that exposure to violent movies will disproportionately increase the aggressive behavior of people who are not normally easily irritated. Whereas low and high irritable participants showed evidence of equivalent increases in hostile feelings as a result of viewing the violent clip, only the low irritable participants showed a relative increase in the accessibility of hostile cognitions. This construal does not necessarily follow from these results, however, and there are both theoretical and empirical reasons to doubt its accuracy. At an empirical level, Bushman [1995] has shown that aggression prone individuals display the largest increase in aggressive behavior after viewing violent films.

At a theoretical level there are several interesting possibilities suggested by GAAM and by similar models such as those proposed by Berkowitz [1993] and Geen [1990]. One set of possibilities emerges from the fact that hostile thoughts and hostile feelings arise early in the aggressive behavior sequence. Many other factors come into play before an aggressive behavior is actually emitted. Typically, there must be some sort of provocation by someone else. This provocation itself is interpreted as reflecting either hostile or nonhostile intent [e.g., Dodge and Crick, 1990]. In addition, the relative accessibility of aggressive behavior programs or scripts [e.g., Huesmann, 1986] will influence the likelihood that aggressive thoughts and affect will prime specific aggressive intentions to act. Finally, personal values and other related beliefs about how to deal with conflict may well differ between those who are highly irritable versus those who are not easily irritated. Specifically, the priming of aggressive thoughts and feelings in low irritable people may in turn prime counter-aggressive thoughts, values (e.g., peace, kindness) and strategies, whereas priming aggressive thoughts and feelings in highly irritable people may lead directly to aggressive values (e.g., revenge, honor) and plans.

A second set of possibilities concerns efficacy beliefs [Bandura, 1977]. Viewing violent movies may well disproportionately increase the hostile thoughts of typically non-irritable people, but they may not display a correspondingly disproportionate increase in aggressive behavior because they have lower expectations concerning their ability to successfully carry out an aggressive behavior, and because they have lower expectations about the likelihood that the aggressive behavior would produce the desired outcome.

A third set of possible resolutions to the paradox concerns the fact that participants in the present research were not provoked. It may be that in a provocation context, hostile feelings or aggressive thoughts may be especially pronounced in highly irritable people who have just viewed a violent movie. That is, the "trigger" for highly irritable people may require both provocation and viewing of violent material.

A final set of possibilities emerges if we speculate that aggressive behavior in this context may be largely controlled by hostile affect rather than accessibility of aggressive thoughts. Viewing the violent movie clip increased the hostile feelings of all participants fairly equally, but because highly irritable people start out with a relatively high level of state hostility, the increase in such feelings due to violent movie content may be sufficient to push them over the edge. That is, as can be seen in Figure 2, it was the highly irritable participants in the violent movie condition who reported the highest level of state hostility. This may be the key factor in determining behavioral responses to ambiguous provocation. A related possibility is that highly irritable people may have a lower threshold for behaving aggressively, and viewing a violent movie may be sufficient, in some situations, to push them above that threshold. People who are not easily irritated may have such a (relatively) high threshold for aggression that viewing a violent movie may typically push them only a fraction of the distance closer to that threshold, rather than over it.

Long Term Consequences⁵

The present research examined only short term consequences of exposure to violent vs. nonviolent materials. However, these short term consequences are serious enough to warrant speculation about possible long term consequences. Research in the long history of learning (including network models of cognition and emotion) and more recent work on the development of expertise and on the development of "chronic" accessibility of particular thoughts and affects suggests that one key to producing long term changes in one's structure of thought and affect is repetition. That is, the more often one thinks a particular way, or experiences a particular emotion, the more connected those thoughts and emotions become to other ideas and states. In other words, one route to becoming a chronically irritable or impulsively aggressive person may well be through repeated experiences that prime aggressive thoughts and feelings. Thus, repeated exposure to violent media may well increase a person's chronic hostility level. When the viewing of violence increases in a whole society, the general level of hostility in that society may undergo a significant upward shift. In turn, this upward shift in hostility could produce increases in aggressive behavior throughout society, which may be expressed in increased blaming of others for undesired events, increased litigation, and increased violent crime. Although changes in U.S. society undoubtedly have many origins, it is probably not a coincidence that dramatic increases in exposure to violent media within the U.S. has been paralleled by an increase in the willingness to blame others for our individual problems and to pursue forceful resolution strategies for these problems, in both legal and illegal ways (i.e., lawsuits and assaults). Demonstrating a causal relation between a society's increased exposure to media violence and a concomitant increase in violent crime rates is a daunting task, perhaps an impossible one. However, longitudinal research on the effects of exposure to television violence as children on adult aggression problems [e.g., Huesmann and Miller, 1994] as well as the present laboratory research on the psychological processes activated by exposure to violent media suggest that such a societal-level effect is theoretically plausible. This body of work thus also suggests that research into such societal-level issues is important despite the apparent difficulty.

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⁵ Various political interest groups sometimes misunderstand, misquote, or misrepresent social science research and the opinions of the researchers working on politically volatile issues. This article may suggest to some readers that steps should be taken to reduce the extent to which people are exposed to violent media, or to reduce the negative impact of such exposures. I would agree with such a broad statement, but with the following caveat. The most obvious solution—governmental censorship—is not one that I am willing to support. Instead, I believe that a more appropriate course of action is to educate the general public on the negative effects of repeated exposure to violent material, and to provide parents with the knowledge and tools to effectively provide children with a more healthy electronic diet.

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