Available online at www.sciencedirect.com

SCIENCE DIRECT®

Journal of Experimental Social Psychology 41 (2005) 48–60

Journal of Experimental Social Psychology

www.elsevier.com/locate/jesp

Interactive effects of life experience and situational cues on aggression: The weapons priming effect in hunters and nonhunters☆

Bruce D. Bartholow,[a,*] Craig A. Anderson,[b,*] Nicholas L. Carnagey,[b] and Arlin J. Benjamin Jr.[c]

[a] *Department of Psychology, University of North Carolina, CB# 3270, Davie Hall, Chapel Hill, NC 27599-3270, USA*
[b] *Department of Psychology, W112 Lagomarcino Hall, Iowa State University, Ames, IA 50011-3180, USA*
[c] *Department of Psychology, Oklahoma Panhandle State University, USA*

Received 16 October 2002; revised 30 June 2003
Available online 15 June 2004

Abstract

Recent research (Anderson, Benjamin, & Bartholow, 1998) indicates that the presence of guns increases the accessibility of aggressive thoughts via automatic priming. Our research examined whether this "weapons priming effect" differs depending on the structure of an individual's knowledge about guns, and if so, whether that difference results in corresponding differences in aggressive behavior. Experiment 1 revealed that individuals with prior gun experience (hunters) have more detailed and specific information about guns than do individuals with no direct gun experience (nonhunters), and that hunting experience interacts with gun type (hunting versus assault) in predicting affective and cognitive reactions to guns. Experiment 2 revealed that pictures of hunting guns were more likely to prime aggressive thoughts among nonhunters, whereas pictures of assault guns were more likely to prime aggressive thoughts among hunters. Experiment 3 showed differences in aggressive behavior following gun primes that correspond to differences in affective and cognitive responses to gun cues. Our findings are discussed in light of the General Aggression Model.

Introduction

"If we tend to think of guns...as instruments that are deliberately used to hurt others, rather than as objects of sport and enjoyment, the mere presence of a gun...may stimulate us to assault others more severely than we intend" (Berkowitz, 1993, p. 70).

Researchers have known for over 30 years that the mere presence of a weapon leads people to behave more aggressively than they do in situations where no weapon is present (e.g., Berkowitz & LePage, 1967; Carlson, Marcus-Newhall, & Miller, 1990). Berkowitz (1990, 1993) asserts that this "weapons effect" depends upon the meaning we attach to guns and other weapons (also see Geen, 1990). For most people in the Western world, guns are linked in memory to concepts involving aggression and hostility, because they tend to be viewed as instruments designed and used to hurt and/or kill people. However, guns can be associated with other, less aggressive constructs, depending on the meaning assigned to them. If so, then the weapons effect may depend upon individual differences in knowledge structures related to guns. Our research was designed to

☆ Portions of this research were presented at the 1999 meeting of the American Psychological Society, the 2000 annual meeting of the Society for Psychological Study of Social Issues, and the 2002 Social Cognition Preconference in conjunction with the annual meeting of the Society for Personality and Social Psychology. The authors wish to thank Krista Brown and Autumn Wilke for their assistance with data collection, Thomas E. Bartholow for his assistance in conceptualizing ideas for these studies, and Chet Insko for helpful comments on a previous draft of this paper.

* Corresponding authors. Present address: Department of Psychological Sciences, 210 McAlester Hall, University of Missouri, Columbia, MO 65211, USA. Fax: 1-573-882-7710 (B.D. Bartholow).
E-mail addresses: BartholowB@missouri.edu (B.D. Bartholow), caa@iastate.edu (C.A. Anderson).

0022-1031/$ - see front matter © 2004 Elsevier Inc. All rights reserved.
doi:10.1016/j.jesp.2004.05.005

explore this issue in the context of the General Aggression Model (GAM), recently developed by Anderson and colleagues (e.g., Anderson & Bushman, 2002; Anderson, Deuser, & DeNeve, 1995; Anderson & Huesmann, 2003; Lindsay & Anderson, 2000).

The weapons-as-primes hypothesis

Consideration of the weapons priming hypothesis involves an understanding of associative network models of human memory (e.g., Collins & Loftus, 1975). According to such models, weapon concepts become linked closely in semantic memory with aggression- and hostility-related concepts because of their similarity of meaning. Repeated exposure to the use of guns as instruments of aggression—a common experience for people who watch television and movies or who follow the national news—also leads these concepts to be closely linked in memory. When a weapon concept is activated (e.g., through the identification of a gun in the environment), closely linked concepts (e.g., ideas related to aggression and hostility) also become activated via spreading activation (e.g., Collins & Loftus, 1975; Neely, 1977) and are thus more accessible than they would be otherwise. Once these aggressive concepts become accessible, they can facilitate subsequent aggressive behavior in several ways. For example, highly accessible aggressive thoughts may color interpretations of ongoing social interactions, or they may make aggressive resolutions of a dispute seem more appropriate.

In previous work (Anderson, Benjamin, & Bartholow, 1998), we outlined in detail how the weapons effect may involve the priming process, and provided data from two experiments to support that hypothesis. In those experiments, a computer was used to prime participants with weapon words (Experiment 1) or weapon pictures (Experiment 2), as well as nonweapon stimuli (e.g., plants and animals). Each of these primes was followed by either an aggressive or nonaggressive target word. The participants' task was to read the word aloud as soon as they recognized it. In both experiments, the relative accessibility of aggressive thoughts was assessed by comparing participants' response times to aggressive and nonaggressive target words following both weapon and nonweapon primes. The findings showed that simply identifying a weapon generally increases the accessibility of aggressive thoughts.

Knowledge structure differences and priming effects

An important thesis in social, personality, and cognitive psychology is that different people can perceive the same objective stimulus differently depending on the subjective meanings they attach to it, and that these meanings often derive from idiosyncratic personal histories (e.g., Anderson & Bushman, 2002; Higgins, King, & Mavin, 1982; see also Cantor & Kihlstrom, 1981). That is, differences in past experience lead to different knowledge about the relationships among objects in the world, and this knowledge influences how information about such objects is processed. Many types of knowledge structures have been identified, but two are of particular relevance to our research: (a) *perceptual schemata*, which include information about phenomena as simple as nonsocial objects (e.g., chairs, desks), or as complex as social events (e.g., gun fights), and (b) *behavioral scripts*, which contain information about how people behave under varying circumstances (see Anderson & Huesmann, 2003; Schank & Abelson, 1977; Sedikides & Anderson, 1992).

Research shows that the more frequently the linkage between an object and a subjective evaluation of that object is activated, the more likely it is that the evaluation will be spontaneously activated in the presence of the object (e.g., Fazio, Chen, McDonel, & Sherman, 1982). Regarding the weapons priming effect, repeated exposure to the use of guns for aggressive purposes may lead people to form gun-related knowledge structures that include the idea that guns cause or enable aggressive behavior (perceptual schema), and information about how guns are used to threaten or harm people (behavioral script). The presence of a gun should thus activate these gun-related knowledge structures, and repeated activation of this link should increase the spontaneity with which evaluations or affect are associated with that knowledge (e.g., Berkowitz, 1993; Fazio et al., 1982).

Several theorists have discussed chronic differences in the accessibility of knowledge-related constructs in memory (e.g., Higgins, 1996; see also Kelly, 1955; Tajfel, 1969). In addition, several researchers have shown that knowledge structure differences produce differential responses to relevant stimuli. For example, Higgins et al. (1982) measured chronic accessibility in terms of the frequency or primacy with which participants listed knowledge-relevant attributes about a target. A construct was considered more chronically accessible if it was spontaneously used first or was used frequently when describing a relevant target stimulus. Higgins et al. found that individual differences in the accessibility of relevant knowledge are associated with differences in such information processing outcomes as recall and impressions.

A similar analysis can be made of individual differences in the weapons priming effect. In general, according to Berkowitz (1974), an object is capable of evoking aggressive actions to the extent that it has aggressive meaning. Guns often have aggressive meaning, but not always. Berkowitz (1993, 1974; see also Berkowitz & Alioto, 1973) has long proposed that weapons can have different meanings for different people, and that these meanings may determine whether a weapon will cue aggressive thoughts or lead to aggressive behavior. Specifically, Berkowitz (1993) speculated that hunters might associate guns with different constructs than nonhunters:

> I must emphasize that the effects of guns or weapons depends to a considerable extent on the meaning these objects possess for the person. Hunters might conceivably view guns as objects [that] they use only for sport (and not for hurting other people), so that they are reminded of the fun they have on autumn weekends when they hunt for wild game. For such people, seeing the weapons won't give rise to aggressive thoughts about people and shouldn't have aggressive consequences. However, a good many persons do assign aggressive meaning to weapons. As a result, these people are likely to have aggressive ideas when they see a gun (p. 83).

Stated another way, hunters may have knowledge structures about guns that are more differentiated and that differ in their affective tone and cognitive properties from the knowledge structures that nonhuners have about guns. If so, then the presence of a gun may make different thoughts and feelings accessible for hunters and nonhunters, and might elicit different behavioral tendencies as well.

Previous laboratory research shows that manipulations of the meaning assigned to aggressive stimuli can lead to differences in aggressive behavior. For example, Berkowitz and Alioto (1973) showed participants either a boxing match or a football game, and told half of them that the victors wanted to hurt the losers (aggressive meaning). The other participants were told that the contestants on both sides felt no anger (nonaggressive meaning). As predicted, participants in the aggressive meaning condition later reacted more aggressively to provocation than did participants in the nonaggressive meaning condition. In a similar experiment, Leyens, Cisneros, and Hossay (1976) exposed military recruits to slides containing either weapons or neutral images (e.g., animals). Half of the participants (the "decentration" condition) were told to focus on the aesthetic qualities of the slides (framing and focus), whereas the other participants (control condition) received no special instructions. Compared to participants in the control condition, those in the decentration condition later behaved less aggressively following exposure to weapon slides. This research suggests that experimental manipulations can change the meaning and therefore the effects of aggressive stimuli. Our research was designed to test whether pre-existing individual differences in knowledge structures about aggressive stimuli have similar effects on the interpretation of weapon stimuli and on the likelihood that such stimuli will evoke aggressive behavior.

The weapons priming effect according to the GAM

The GAM identifies knowledge structure differences as potentially important moderators of aggressive responses to many kinds of environmental events (e.g., Anderson & Bushman, 2002; Anderson & Huesmann, 2003). A version of the GAM is presented in Fig. 1. According to the GAM, variables that produce aggressive behavior do so by activating aggression-related cognitions, producing anger-related affect, and/or increasing arousal. Individual differences of several types (e.g., knowledge structures, levels of trait hostility) influence the interpretation of situational variables (e.g., the presence of guns) related to aggression. The combination of these factors influences one or more of three major routes to aggression, including the accessibility of aggressive thoughts, the experience of affect, or arousal. The interaction among these aspects of the internal state influences appraisal and decision processes (e.g., interpretations of intent to harm) that ultimately determine whether or to what extent an aggressive response will occur. In the context of our research, individual knowledge structure differences should influence the extent to which aggressive thoughts and/or negative affect become accessible in the presence of gun cues, which should determine the level of aggressive behavior that people display.

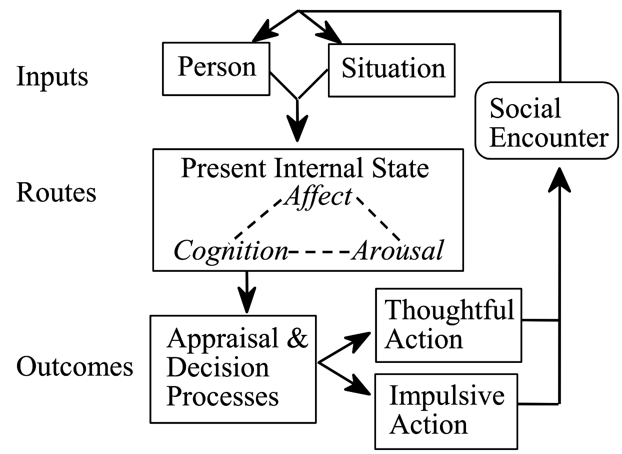

Fig. 1. The General Aggression Model (adapted from Anderson & Bushman, 2002).

Experiment 1

Overview and hypotheses

Our first experiment was designed to determine whether hunters have different knowledge structures than nonhunters about guns. Our primary hypothesis was that hunters would have greater and more specific knowledge about all types of guns. Specifically, hunters would be better able to distinguish guns intended for sport from those intended for human aggression. We also expected hunters to associate hunting guns with positively valenced constructs in memory, and to describe hunting guns more positively than nonhunters describe them. Support for these hypotheses would provide evidence that hunters and nonhunters have different knowledge structures about guns, suggesting that weapons priming effects could differ for hunters and nonhunters.

Method

Participants

Fifty-eight undergraduate men from introductory psychology classes at a large Midwestern university participated in partial fulfillment of course requirements. Because few female undergraduates (approximately 3% of those responding) had prior experience with hunting or target shooting, we were unable to recruit a sufficiently large sample of women for this experiment, or any of our experiments. Participants were recruited by telephone, based on their responses to an Activities Questionnaire completed during a mass testing session earlier in the semester. This questionnaire assessed the respondents' prior experience with several activities and hobbies (e.g., sports, clubs, etc.), including two involving guns (hunting and target shooting). Specifically, respondents were asked to circle any and all activities, among a list of approximately two dozen activities, in which they had ever taken part on a regular basis. From their responses, participants were classified as either hunters (who marked hunting or hunting and target shooting) or nonhunters (who marked neither hunting nor target shooting). Several weeks after completing this questionnaire, potential participants were telephoned by a research assistant (unaware of their hunter status) and asked to take part in an experiment related to photograph descriptions. We did not mention the specific reason (their hunter status) for their recruitment. Thirty-three participants were classified as hunters.

Materials

Color photographs of 6 hunting guns and 6 assault guns, along with 6 photographs of flowers, were prepared. Hunting guns included both shotguns and long-range rifles. These were classified according to characteristics typical of sport guns, such as wood-grain stocks, scopes and/or bolt action chambers, and long barrels. Assault guns included both handguns and assault rifles (semi-automatic and fully automatic "machine guns"). Assault guns differ in appearance from hunting guns in several ways, including black or gray coloration, short barrels, and large ammunition magazines or "clips." The photographs were printed (in color) on standard white paper and divided among 12 binders. Each 3-ring binder contained a photograph of an assault gun, a photograph of a hunting gun, and 2 flower photographs (to serve as fillers), each on separate pages. In each binder, a gun photograph (either an assault gun or a hunting gun) always appeared first and last. The flower photographs were in the middle, to minimize direct comparisons between the two gun photographs—such comparisons might have influenced participants' responses. Whether an assault gun photograph or hunting gun photograph appeared first was counterbalanced. On the binder page following each photograph was an open-ended questionnaire that asked participants to (a) write as much as they knew about the object on the preceding page, in as much detail as possible, and (b) list in descending order the ways in which that object is typically used. Participants were allowed to look back at the photograph when answering these questions, but they were asked not to return to previous photographs or questionnaires after completing each questionnaire. Questionnaire responses provided measures of the level and specificity of participants' knowledge about hunting guns and assault guns, as well as participants' affective reactions to such guns.

Procedure

Upon arrival, all participants read and signed an informed consent form. They were told that they would be taking part in research on picture recognition, and that they would be asked to describe several photographs. They were told that their responses would be used to select stimuli for future experiments. After their consent was obtained, participants were led to small cubicles, each containing one of the (randomly selected) photograph binders. Participants were instructed to look at the first photograph, then turn the page and respond to the questions, and then to repeat these steps for the remaining photographs. After completing these tasks, participants were debriefed and dismissed. None of the participants expressed any suspicion about our research, nor could they guess our hypotheses. Experimental sessions lasted approximately 30 min.

Results and discussion

Data coding

Two independent raters, both unaware of the hunter status of each participant (but not unaware of our hypotheses), coded the open-ended questionnaire responses to the gun photographs. Responses were coded for four dependent variables of interest. First, the affective tone (valence) of a participant's description of each photograph was judged using a 5-point scale ranging from -2 (extremely negative) to $+2$ (extremely positive), with a rating of "0" indicating neutral tone. Second, the number of details listed about each photograph was counted. This measure indicated the participant's general level of knowledge about guns. Third, the raters coded whether a participant correctly identified the type of gun (hunting or assault) shown in the photograph. A participant was given a score of "1" if he correctly identified the type of gun, or a score of "0" if he did not identify it or identified it incorrectly. Finally, a participant's rank-ordered list of potential uses for each gun was coded into 1 of 7 categories, according to the level of aggression those uses represented (1 = hunting, 2 = recreation, 3 = nonaggressive display, 4 = aggressive display, 5 = self-defense, 6 = assault not resulting in death, 7 = murder/war). We were interested in the aggressiveness of the use that was listed first. Inter-rater agreement was excellent (intraclass correlations of .90 and .93, *p*s < .01, were found for the first and second variables, respectively, and Cohen's κ values of 1.00 and .88, *p*s < .01, were found for the third and fourth variables, respectively). Discrepant ratings were changed following consultation between the raters.

Data analyses

For each dependent variable other than gun type identification, coded responses were analyzed in separate 2 (Hunter Status: hunters, nonhunters) × 2 (Order of Stimulus Presentation) × 2 (Type of Gun: hunting guns, assault guns) mixed ANOVAs, with the last factor varying within participants.[1] For analyzing whether or not participants accurately identified hunting and assault guns, a repeated measures modeling procedure for categorical data related coded responses to the participants' hunter status and the type of gun being classified. Specifically, the CATMOD procedure (SAS Institute, 1990) was used, with type of gun and order of stimulus presentation as repeated factors. Although there were 58 participants in the experiment, some analyses involved fewer cases because of missing data.

The ANOVA on the valence of participants' gun descriptions yielded a main effect for Hunter Status, $F(1, 54) = 9.39$, $p < .01$. Hunters viewed guns less negatively ($M = -.03$, $SD = .40$) than did nonhunters ($M = -.50$, $SD = .67$). This main effect was qualified by a Hunter Status × Type of Gun interaction, $F(1, 54) = 11.63$, $p < .01$. Hunters described hunting guns more favorably ($M = .15$, $SD = .44$) than did nonhunters ($M = -.68$, $SD = .85$), $t(56) = 4.82$, $p < .01$, whereas assault guns were described unfavorably by both hunters ($M = -.24$, $SD = .61$) and nonhunters ($M = -.32$, $SD = .85$), $t(56) = .40$, $p > .60$. Interestingly, nonhunters described hunting guns somewhat less favorably than assault guns, $t(24) = 1.80$, $p < .05$ (one-tailed), whereas hunters described hunting guns more favorably than assault guns, $t(32) = 3.25$, $p < .01$. None of the other main effects or interactions were significant.

The ANOVA on the number of details that participants listed about the guns also yielded a main effect for Hunter Status, $F(1, 51) = 5.28$, $p < .05$. Hunters listed more details about both assault guns ($M = 2.48$, $SD = 2.00$) and hunting guns ($M = 2.54$, $SD = 1.77$) than did nonhunters (*M*s = 1.58, 1.71, *SD*s = 1.64, 2.05 for assault and hunting guns, respectively). No other main effects or interactions were significant.

The repeated measures CATMOD on the identification of gun types produced a significant main effect of hunter status, $\chi^2(1) = 59.49$, $p < .001$. Hunters were much more accurate at identifying both hunting and assault guns. Hunters correctly identified both hunting and assault guns 96% of the time, whereas accurate classification by nonhunters was slightly below chance levels (44% for assault guns, 48% for hunting guns). No other effects were significant in this analysis (χ^2s < 1).

Finally, the ANOVA on the order of uses for guns showed a main effect for Hunter Status, $F(1, 54) = 4.44$, $p < .05$, a main effect for Type of Gun, $F(1, 54) = 174.10$, $p < .001$, and a Hunter Status × Type of Gun interaction, $F(1, 54) = 4.15$, $p < .05$. Hunters and nonhunters both tended to list aggressive purposes first for assault guns (*M*s = 5.70, 5.80, *SD*s = 1.93, 1.87, respectively), $t(56) = -.20$, $p > .80$, but nonhunters ($M = 2.36$, $SD = 2.19$) were more likely than hunters ($M = 1.06$, $SD = .24$) to list aggressive uses first for hunting guns, $t(56) = -3.38$, $p < .01$. These results suggest that hunters' behavioral scripts for hunting guns are less aggressive in nature than those of nonhunters. No other effects were significant.

Our findings showed that hunters have different, more differentiated, and more specific knowledge about guns than do nonhunters. Hunters are also more positively disposed toward hunting guns than are nonhunters, suggesting that among hunters, such guns are linked in memory with nonaggressive, positive experiences (Berkowitz, 1993). These links may form for several reasons. Images of hunting guns may evoke memories of pleasurable times spent with family and friends. And before they can obtain a hunting license, young hunters are required by law to undergo a structured educational program to learn gun safety. Thus, they may be more aware than other people that firearms can be used safely. Although hunters and nonhunters both described assault guns in negative terms, as we

[1] Some researchers argue that analyses of variance are inappropriate for rank data and that nonparametric analyses should be done instead (see Stevens, 1951). Computer simulations have shown, however, that these two kinds of analyses produce equivalent results for such data (e.g., Baker, Hardyck, & Petrinovich, 1966; Zimmerman & Zumbo, 1993). Nevertheless, we also analyzed the "uses" data using a Wilcoxon rank sum test, which tests for differences between groups in the location of scores. Specifically, we first computed the difference between the ranks of the uses listed for hunting guns and assault guns given by hunters and nonhunters, then summed those difference scores (within each group), and finally subjected these sums to a Wilcoxon test. The test of whether the summed ranks were significantly different is functionally equivalent to a test of the Hunter Status × Type of Gun Prime interaction. As predicted, the analysis produced a significant z score (t approximation = −2.60, $p < .01$, one-tailed), indicating that the difference in uses for hunting and assault guns was larger for hunters than for nonhunters.

expected, nonhunters described hunting guns even more negatively, suggesting that hunting guns are associated with negative affect for them. This suggests that nonhunters have negative attitudes toward hunting, perhaps because they object to the killing of animals. Although it was unexpected, this finding is consistent with the idea that nonhunters feel negatively about hunting guns because they have less knowledge about the social benefits of hunting (e.g., family time spent outdoors). Nonhunters thus have a less differentiated schema about guns. Experiments 2 and 3 provided more specific tests of how gun-related knowledge structures are activated in hunters and nonhunters.

Experiment 2

If the weapons priming effect is based on specific knowledge structures about weapons, then people with different knowledge structures should experience differential construct accessibility following weapon primes. To test this moderation hypothesis, we conducted an experiment using a priming, reaction time task similar to the one used in our previous research (Anderson et al., 1998). Participants were again classified as hunters or nonhunters based on their responses to an Activities Questionnaire completed several weeks prior to the experiment. Participants viewed color images of assault guns and hunting rifles, along with some neutral, filler stimuli, all followed by target words. Their task was to read each target word aloud as soon as they recognized it. Response times to aggressive and nonaggressive target words constituted the dependent variable.

Our primary prediction was a 2-way interaction involving the effects of hunter status and type of gun prime on the accessibility of aggressive thoughts. Experiment 1 showed that hunters were positively disposed towards hunting guns and negatively disposed towards assault guns, and that they associated assault guns with hurting others. Nonhunters, in contrast, were more negatively disposed towards hunting than assault guns, and although they associated assault guns with aggression to a greater extent than hunting guns, they also associated hunting guns more strongly with aggression than did hunters. Furthermore, both the affective valence and the primary use of guns measures in Experiment 1 yielded significant 2-way interactions. For Experiment 2, we thus predicted that assault guns would prime more aggressive thoughts than hunting guns for hunters, and that this pattern would be reversed for nonhunters.

Method

Participants

One hundred and eighty-eight male undergraduate students (102 hunters, 86 nonhunters), enrolled in introductory psychology courses at a large Midwestern university, participated in partial fulfillment of course requirements.

Materials and apparatus

The primes were six pictures of assault guns, six pictures of hunting guns, and six pictures of nature scenes. The target words, prepared in part from word lists used in previous experiments (e.g., Anderson et al., 1998), consisted of 18 aggressive words (e.g., attack, wound), 18 anti-aggressive words (e.g., comfort, heal), and 18 control words (e.g., bloom, suggest). For each participant, one hunting gun, one assault gun, and one nature scene were paired with each target word in a randomly determined order, resulting in 162 total trials. Stimuli were presented on an Apple Macintosh LCIII computer equipped with a color monitor using Superlab software. A MacRecorder (microphone) was used as a voice key to time the word reading task.

Procedure

The procedure closely resembled that used by Anderson et al. (1998). Participants were greeted by the experimenter and seated at computer terminals, where they first read and signed informed consent forms. Next, the experiment was described to participants as one involving the speed and accuracy of reading in the presence of various images. Each participant was tested individually in a separate room.

Each trial consisted of a picture prime (presented for 1250 ms), a blank screen (presented for 500 ms), and a target word. Participants were instructed to identify the picture's category (flower, gun, or mountain) by naming the category out loud when the picture appeared on the screen, and then to read the target word aloud as quickly as possible after it appeared. The target word remained on the screen until the voice key was triggered by the participant's response, after which a 500 ms delay preceded the next trial. The time between the presentation of a target word and the participant's vocal recognition of that word was the dependent variable. Participants completed 12 practice trials, followed by 3 blocks of 54 trials each. The computer automatically randomized the order of the trials within each block. Each testing session lasted approximately 30 min. After completing this task, participants were debriefed and then dismissed. A number of questions were asked during debriefing to probe for suspicion, yet none was found, nor could anyone guess our research hypotheses.

Results and discussion

Data preparation

The reaction time data were first examined for extreme outliers. As in previous research (e.g., Anderson et al., 1998), we applied upper and lower cut-off values to remove data points that were extremely short (less than 250 ms) or extremely long (longer than 1700 ms). This led to the exclusion of 4% of all data points. Because the distribution of reaction times remained positively skewed, a log transformation was applied (see Fazio, 1990; Kirk, 1968; Smith & Lerner, 1986). Finally, we computed two aggression accessibility scores for each participant, one for the assault gun prime condition and one for the hunting gun prime condition. Aggression accessibility was calculated by subtracting the average reaction time to aggressive target words from the average reaction time to anti-aggressive target words. Thus, higher scores indicate greater accessibility of aggressive thoughts.

Data analyses

We analyzed the aggression accessibility scores using a 2 (Hunter Status: hunters, nonhunters) × 2 (Type of Gun Prime: assault guns, hunting guns) mixed ANOVA, with repeated measures on the second factor.[2] We expected nonhunters to have larger aggression accessibility scores than hunters for hunting gun primes, and hunters to have larger aggression accessibility scores than nonhunters for assault gun primes (a Hunter Status × Type of Gun Prime interaction).

The main effects of Hunter Status and Type of Gun Prime were both nonsignificant (Fs < 1), but the predicted interaction was statistically significant, $F(1,185) = 7.20$, $p < .01$. Fig. 2 displays this interaction. Among hunters, aggressive thoughts were more accessible following assault gun primes than hunting gun primes, $t(104) = 1.76$, $p < .05$ (one-tailed). Among nonhunters, in contrast, aggressive thoughts were more accessible following hunting gun primes than assault gun primes, $t(81) = 2.35$, $p < .05$.

Experiment 2 demonstrated that people whose experiences with guns differed have different associations in memory to identical gun stimuli. Specifically, individual differences in life experiences with hunting create different knowledge structures involving guns, and these knowledge structures produce significant differences in the processing of identical visual images of guns. Hunters were less likely to associate aggressive concepts with hunting guns than with assault guns, perhaps because they link hunting guns with pleasurable times spent with family and friends. Nonhunters, however, were more likely to associate aggressive concepts with hunting guns than with assault guns. This pattern is consistent with the valence results from Experiment 1, where nonhunters described hunting guns more negatively than assault guns. Taken together, these findings suggest that hunting guns are associated with more negative affect than assault guns among nonhunters, which could tie hunting guns more closely to aggressive concepts in memory. However, this explanation is speculative and requires replication.

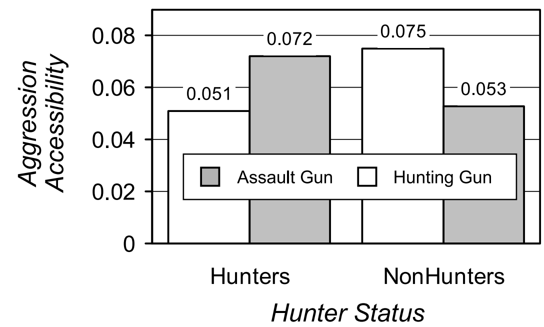

Fig. 2. Aggression accessibility scores as a function of hunter status and type of gun prime; Experiment 2. For each participant, aggression accessibility scores were calculated using log-transformed reaction time data by subtracting the average reaction time to aggressive target words from the average reaction time to anti-aggressive target words. Thus, higher scores indicate relatively greater accessibility of aggressive thoughts.

The 2-way interaction shown in Fig. 2 suggests that a similar interaction would occur if hunters and nonhunters were exposed to hunting or assault gun primes during a mildly provoking situation that enabled aggressive behavior. Of course, this assumes that other factors in the situation, such as strong anger or inhibition, would not overwhelm the priming effects of gun images. The General Aggression Model (e.g., Anderson & Bushman, 2002) suggests that many other variables and processes could interfere with automatic priming effects. Experiment 3 was designed to test our individual differences approach to weapons priming effects by creating a situation that would minimize the likelihood of other factors overwhelming those priming effects.

Experiment 3

Overview

In this experiment, participants completed an initial response time task whose main purpose was to expose them to one of two types of gun primes (assault guns or hunting guns). The participants then competed in a mock reaction time contest, ostensibly with one another, which provided an opportunity to behave aggressively. Based on our model and the results of Experiment 2, we predicted a 2-way interaction in the effects of hunting experience and type of gun on aggressive behavior. We expected hunters to behave more aggressively after seeing an image of an assault rather than a hunting rifle. We expected the reverse pattern for nonhunters, based on the results of the first two experiments.

[2] Note that using anti-aggressive and aggressive target word types as an additional repeated factor in the ANOVA would produce a 3-way Hunter Status × Type of Gun Prime × Word Type interaction, with an F value identical to that reported here using the difference score approach.

Method

Participants

One hundred sixty-nine male undergraduates enrolled in introductory psychology courses at a large Midwestern university participated in partial fulfillment of course requirements. Participants first completed a Sports Participation Inventory (SPI; a modification of the Activities Questionnaire used in Experiments 1 and 2) during a mass testing session early in the semester. Unlike the Activities Questionnaire, on which participants simply circled activities in which they had participated, participants were asked on the SPI how often they had participated in a variety of sporting activities, using 10-point scales (1 = *never*, 5 = *occasionally*, 10 = *very frequently*). Two of the activities listed were hunting and target shooting. Research assistants (unaware of the students' SPI scores) called potential participants several weeks later to schedule individual laboratory sessions. To ensure that nonhunters in the sample did not have significant gun experience due to involvement in target shooting, individuals who scored both less than 3 on the hunting item and more than 3 on the target-shooting item were excluded from the pool.

Design

The same 2 (Hunter Status: hunters versus nonhunters) × 2 (Type of Gun Prime: assault guns versus hunting guns) design used in Experiment 2 was used again. Participants who scored 3 or higher on the SPI hunting item were classified as hunters.[3]

Materials

Verbal reaction time task. Participants were shown eight object images (one at a time) on a color monitor. These images were: (1) light bulb, (2) baseball, (3) scissors, (4) wall clock, (5) globe, (6) phone, (7) paintbrush, and (8) gun. A MacRecorder microphone was used as a voice key to time verbal responses. It also triggered changes in the screen images. On each of the eight trials, participants first identified the object aloud as quickly as possible. Their voice triggered the computer to present a new screen containing the same object. They had to state aloud the main purpose of that object and then press the spacebar. A new image was then presented and the next trial began. On the first seven trials, all participants viewed identical images (as listed previously). On the eighth trial, participants were randomly assigned to view either an assault gun or a hunting gun (chosen from the pictures used in Experiment 2). After all eight trials ended, participants were told to contact the experimenter. The final, gun image stayed on the screen and served as a visual prime during the second part of the experiment.

Competitive reaction time task. Physical aggression was assessed using a variation of the Taylor (1967) competitive reaction time task. Previous research has established the construct validity of this task (e.g., Anderson & Bushman, 1997; Bernstein, Richardson, & Hammock, 1987; Bushman & Anderson, 1998; Carlson, Marcus-Newhall, & Miller, 1989; Giancola & Zeichner, 1995), and we have used it successfully in our own research with similar participants (Anderson & Dill, 2000; Anderson, Anderson, Dorr, DeNeve, & Flanagan, 2000; Bartholow & Anderson, 2002; Lindsay & Anderson, 2000). Each participant was told that he and his opponent would have to press a button as quickly as possible on each of 25 trials in response to tones played over headphones. Whoever was slower on each trial would receive a blast of punishing noise on that trial. Prior to each trial, the participant set the intensity of the noise that his opponent would receive if he lost the trial. Intensity could vary between 60 dB (Level 1) and 105 dB (Level 10). A nonaggressive, no-noise setting (Level 0) was also available. Participants also controlled the duration of the noise by clicking on a "Duration" button and holding it down for the desired time. A composite of these noise intensity and duration settings constituted our measure of physical aggression.

Actually, there was no opponent—a computer controlled wins and losses, as well as the noise intensities and durations a participant received on his "lose" trials. The participant lost the first trial and half of the remaining 24 trials, in a random pattern. As a suspicion safeguard, he also lost any trial in which his response was slower than 750 ms, even if that trial was originally designated as a "win" trial. The noise settings used by the "opponent" followed an ambiguous pattern used in previous research (e.g., Anderson et al., 2000)—three blasts each of noise intensity levels 2, 3, 4, 6, 7, 8, and 9, and four blasts of intensity level 5, randomly distributed across the 25 trials. The noise durations set by the "opponent" ranged from a low of 0.25 s to a high of 2.50 s. A Power Macintosh computer controlled the events in the competitive reaction time task and recorded the noise intensities and durations (in milliseconds) set by each participant.

Procedure

Upon arrival, the participants first read and signed consent forms. They were then told that our research examined how well people perform on reaction time tasks, and that they would complete one such task that focused on verbal skills and another that focused on motor/reflex skills. As part of the cover story, partici-

[3] Regression analyses, in which hunter status was treated as a continuous variable, produced a slightly larger F value for the predicted interaction. For simplicity, we have reported here only the analyses that treated hunter status as a dichotomous variable.

pants were told that, "Because the best way to accurately measure reflex/motor skills is through a competitive scenario, you will compete against a participant who is in another room down the hall." Each participant was then escorted to a cubicle that contained a desk with two computers and monitors placed side by side. Next to the computers was a tape recorder. The experimenter explained both the verbal reaction time task and the competitive reaction time task, and then left the participant alone for 5 min, supposedly so that the experimenter could give instructions to the participant's opponent. After 5 min, the experimenter spoke to the participant over an intercom and told him to begin the verbal reaction time task. When that task ended, the last picture (a hunting or assault rifle) remained on the computer screen for the remainder of the session. When the participant told the experimenter that he was ready for the second task, the experimenter said that his opponent was not yet ready. After a 30-s delay, the participant was told that his opponent was ready, and the competitive reaction time task began. Afterwards, the experimenter asked the participant several questions to probe for suspicion. Although some participants were suspicious (see below), no one could guess our research hypotheses. Each participant was then debriefed and dismissed. Experimental sessions lasted for approximately 30 min.

Results and discussion

Thirteen participants expressed suspicion—they either did not believe they were competing against another person or they realized the experiment concerned aggression. They were thus dropped from the sample, leaving 156 participants (74 hunters, 82 nonhunters). For each participant, we computed 25 aggression energy scores, multiplying the noise intensity setting by the duration setting for each trial on the competitive reaction time task. We then examined the overall distribution of these scores, identified the 80th percentile, and defined a "high-energy noise blast" as one that exceeded the 80th percentile. Each participant's final aggressive behavior score was the number of trials on which he delivered high-energy noise blasts to his opponent.[4]

The high-energy noise blast frequencies were analyzed using a 2 (Hunter Status: hunters, nonhunters) $\times$ 2 (Type of Gun Prime: hunting guns, assault guns) mixed ANOVA, with repeated measures on the second factor.

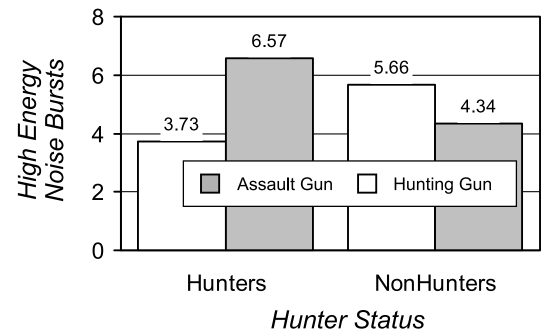

Fig. 3. Aggressive behavior (number of high-energy noise blasts) as a function of hunter status and type of gun prime; Experiment 3.

As predicted, the Hunter Status $\times$ Type of Gun Prime interaction was significant, $F(1, 152) = 4.77, p < .05$. As shown in Fig. 3, this interaction mirrored the aggression accessibility results from Experiment 2 (see Fig. 2). Hunters aggressed more in the assault gun prime condition than in the hunting gun prime condition, $t(152) = 2.06$, $p < .05$, consistent with our model and the findings of Experiment 2. Nonhunters were more aggressive in the hunting gun prime than in the assault gun prime condition, but this difference was not significant, $t(152) = -1.01, p > .20$. Neither the Type of Gun Prime nor the Hunter Status main effects were significant, $Fs(1, 152) = 0.64$ and 0.02, respectively, $ps > .40$.

These findings are highly consistent with the results from Experiment 2, and with our claim that the accessibility of aggressive thoughts is an important factor in producing aggressive behavior in the presence of guns. They lend further support to our predictions (derived from the GAM) that differential experiences with guns create different knowledge structures, that these knowledge structures are primed by gun images, and that this priming can produce aggressive behavior.

General discussion

Overview of main findings

Three experiments tested the hypothesis that differences in life experiences (hunting versus nonhunting background) would interact with a situational cue (pictures of hunting versus assault guns) to influence affective, cognitive, and behavioral responses related to aggression. This interaction was confirmed for all four relevant measures—the affective valence of open-ended descriptions of hunting and assault guns (Experiment 1), aggressive uses of hunting and assault guns (Experiment 1), the priming of aggressive thoughts (Experiment 2), and aggressive behavior in the presence of hunting versus assault gun cues (Experiment 3). The interaction itself was based on the assumptions that hunters have more detailed and accurate knowledge about guns, and

[4] This procedure is essentially the same as that used by Bartholow and Anderson (2002), except that only noise intensities were investigated in that experiment. Other researchers using similar paradigms (e.g., Giancola, 2003) also have adopted this approach, because it is a particularly sensitive measure of aggressive responding. Essentially the same results were found in our data even when more restrictive definitions of aggression (e.g., top 15% or top 10%) were used.

that hunting for them is associated with positively valenced concepts in memory (e.g., interactions with family and friends).

One unexpected finding emerged in Experiment 1, but it was consistent with the results of Experiments 2 and 3 and ultimately with our knowledge structure model. Specifically, we did not expect nonhunters to generate more negative descriptions of hunting guns than of assault guns. Whether this negative view of hunting guns was the result of nonhunters' negative attitudes towards hunting, their greater familiarity with hunting guns (e.g., via newspaper advertisements or their presence in sporting goods stores), or some other factor, is unknown and largely irrelevant to our main theoretical points. Of greater interest is that in the GAM, an object serves as a cue to aggression insofar as it is closely linked with aggression-related concepts in memory, regardless of how those links were established. The pattern of affective and cognitive results in Experiment 1 also successfully predicted the aggressive cognition results of Experiment 2 and the aggressive behavior results of Experiment 3, suggesting that the Experiment 1 pattern was not just an unusual aberration.

These experiments tested several specific elements of the GAM. Experiment 1 focused on GAM-related input variables, establishing that hunting experience affects knowledge structures relevant to guns. Hunters clearly understood the relations among key features of guns (e.g., wood-grain stock and long barrel) and the primary functions of guns (e.g., sport hunting versus killing people), much better than did nonhunters. Some evidence of different affective reactions to guns, as specified in the GAM, also was found in Experiment 1. Experiment 2 showed that the accessibility of hostile cognitions is jointly influenced by knowledge structure differences (developed through different personal histories) and different types of gun stimuli. The aggressive thoughts results fit well with the gun knowledge results from Experiment 1. Finally, Experiment 3 results linked the accessibility of hostile cognition differences to differences between hunters and nonhunters in aggressive behavior.

Previous work testing the GAM has been less inclusive, typically focusing on one or two aspects of the model. For example, Anderson et al. (1998) established that the presence of gun cues increases the accessibility of aggressive cognitions via automatic priming processes, but they did not examine any individual differences in this effect or its eventual influence on behavior (see also Anderson, 1997; Anderson et al., 1995; Anderson, Anderson, & Deuser, 1996). The experiments described here are among the first to test all three major components of the GAM (see also Lindsay & Anderson, 2000), and the first to link specific life experiences, individual differences in related knowledge structures, and cueing effects based on knowledge structures, all in the same context. Moreover, the similar patterns of findings displayed in Figs. 2 and 3 suggest that a similar mechanism produced the cognitive and behavioral responses of participants in these experiments.

In other words, our findings suggest the mediational process implied in the GAM, namely that the association between person- and situation-level input variables and aggressive behavior is driven by the relative accessibility of aggressive thoughts, and possibly by aggression-related affect. Unfortunately, our research design did not allow direct statistical tests of mediation (e.g., see Baron & Kenny, 1986). In any event, conducting such analyses would be problematic for us because they assume that all dependent variables are assessed independently (the measurement of more proximal variables, such as affective reactions to gun cues or aggressive thought accessibility, should not interfere with or influence more distal variables, such as aggressive behavior in the presence of gun cues). Previous research has shown that this assumption is often violated in research like ours. For example, Lindsay and Anderson (2000) used a response latency task similar to the one used in Experiment 2, and measured aggressive behaviors in the same participants. They found that the order in which aggressive cognitions and behaviors were measured significantly affected the results, indicating that the measurement of one variable influenced the measurement of the other. More recent research on the cognitive and emotional effects of violent song lyrics has revealed similar order effects (Anderson, Carnagey, & Eubanks, 2003). This "psychological uncertainty principle" (Lindsay & Anderson, 2000, p. 544) is akin to the Heisenberg uncertainty principle in quantum mechanics, which generally states that measuring one observable quantity increases the uncertainty with which other quantities can be known, because measurement of one variable disturbs (i.e., influences the values of) other related variables. Under these conditions, one must test for mediation using the alternative procedure of examining hypothesized mediating variables and the criterion in separate experiments.

Fortunately, the results of our three experiments provide a fairly clear picture of the cognitive and affective processes involved in producing aggressive behavior, as outlined in the GAM. The aggressive behavior interaction pattern fit the affective and aggressive cognition patterns well. The lowest level of aggression was displayed by hunters in the hunting gun cue condition, which is also the condition that produced the most positive affect and the lowest aggression as a primary use score (Experiment 1), and the lowest aggressive thoughts score (Experiment 2). Similarly, hunters responded more positively to hunting than to assault guns on all three affective and cognitive measures, and they aggressed significantly more in the presence of the assault gun cue than the hunting gun cue. In contrast, nonhunters responded very negatively to hunting guns (Experiment 1) and showed higher aggressive thought accessibility

(Tukey's HSD $p < .05$) and more aggressive behavior (Tukey's HSD $p < .10$) in the presence of the hunting gun than did hunters. Although some of the comparisons among cell means in Experiments 2 and 3 did not reach statistical significance, it is important to note that the interaction (not individual comparisons) constitutes the most meaningful test of our hypotheses (see Rosnow & Rosenthal, 1990). Furthermore, post hoc tests of the variance explained indicated that the predicted interaction accounted for over 96% of between-groups variability in the aggressive thought scores (Experiment 2), and over 90% of between-groups variability in aggressive behavior (Experiment 3). There was no meaningful residual between-groups variability in either experiment (Fs $< .30$, ps $> .80$).

Broader implications

Our findings have clear implications for social debates about how gun ownership and exposure to media violence affect aggressive behavior. In a recent newspaper interview, U.S. Senator Tom Daschle, who has voted for handgun purchasing restrictions (e.g., the Brady Bill), noted that, "Guns are a part of the culture here [in South Dakota]. A gun is a connection to nature, just like a fishing rod or running shoes. It's being out and enjoying nature in a way we can't fully appreciate when you live in a city, where firearms are associated only with crime" (Kotok, 2001, p. A4). Research like ours seems consistent with Senator Daschle's sentiments. For example, although several studies have shown that owning a gun is associated with a wide range of deviant and antisocial behaviors, particularly among young people (e.g., Callahan & Rivara, 1992), recent research indicates that such effects do not occur among individuals who own guns for sporting reasons. For example, in their study of over 6000 middle school students, Cunningham, Henggeler, Limber, Melton, and Nation (2000) found that owning a pistol or handgun to gain respect or frighten others was associated with extremely high levels of antisocial behavior (e.g., bullying, violence, delinquency). But students who owned hunting rifles and shotguns engaged in little antisocial behavior, at levels only slightly higher than students who did not own guns of any kind. Other research has shown that different socialization factors account for ownership of guns for sport compared to self-defense (Lizotte & Bordua, 1980). These studies, along with our own research, indicate that hunters have a different understanding of how guns are used than do other people. This understanding translates into different cognitive and behavioral responses in the presence of guns.

Research on how television and movie violence affects aggression is very clear in showing that such violence causes immediate increases in aggression and can lead to the development of aggressive personalities (see Bartholow, Dill, Anderson, & Lindsay, 2003; Bushman & Anderson, 2001; Huesmann & Miller, 1994). Similar findings are emerging from recent studies on the effects of exposure to violent video games (e.g., Anderson & Bushman, 2001; Anderson & Dill, 2000; Bartholow & Anderson, 2002). Such effects are often claimed to occur because media violence teaches and rewards aggressive behaviors. But our results suggest another way in which exposure to violent media can increase aggressive behavior—by creating accessible knowledge structures that link certain types of stimuli (e.g., guns) to aggression-related concepts, including retaliation scripts (Anderson et al., 1998).

Limitations and future directions

Some limitations of our research should be noted. First, although we believe our questionnaire method of recruiting individuals with different gun experiences was successful, it is possible that some individuals classified as nonhunters had significant social experience with hunting and guns through family or friends. Future measures could be modified to solicit information about the hunting activities of respondents' friends and family in order to ensure clearer group distinctions. Second, the fact that we were unable to recruit a sufficient number of women with hunting experience may limit the generalizability of our results. Third, the fact that the design of our experiments did not permit a statistical test of mediation could be viewed as limiting the strength of our claims concerning the causal links posited by the GAM. Future work should strive to find ways to examine these links in a single experiment. Finally, our speculations about the roles of affective versus cognitive variables in producing aggression in hunters and nonhunters remain to be directly tested. The knowledge structure differences that we examined suggest that somewhat different psychological processes may determine aggressive behavior in the presence of gun cues. Given that hunters' knowledge structures appear to contain more specific information about guns overall, and that hunters know more about the differences between hunting and assault guns, the behavior of hunters may be more determined by their cognition. Nonhunters lack specific information about guns, so they may be influenced more by affective reactions in the presence of gun cues. This issue should be examined further in future research.

References

Anderson, C. A. (1997). Effects of violent movies and trait hostility on hostile feelings and aggressive thoughts. *Aggressive Behavior, 23*, 161–178.

Anderson, C. A., Anderson, K. B., & Deuser, W. E. (1996). Examining an affective aggression framework: Weapon and temperature effects on aggressive thoughts, affect, and attitudes. *Personality and Social Psychology Bulletin, 22*, 366–376.

Anderson, C. A., Anderson, K. B., Dorr, N., DeNeve, K. M., & Flanagan, M. (2000). Temperature and aggression. In M. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 32, pp. 63–133). New York: Academic Press.

Anderson, C. A., Benjamin, A. J., Jr., & Bartholow, B. D. (1998). Does the gun pull the trigger? Automatic priming effects of weapon pictures and weapon names. *Psychological Science, 9*, 308–314.

Anderson, C. A., & Bushman, B. J. (1997). External validity of "trivial" experiments: The case of laboratory aggression. *Review of General Psychology, 1*, 19–41.

Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science, 12*, 353–359.

Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology, 53*, 27–51.

Anderson, C. A., Carnagey, N. L., & Eubanks, J. (2003). Exposure to violent media: The effects of songs with violent lyrics on aggressive thoughts and feelings. *Journal of Personality and Social Psychology, 84*, 960–971.

Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology, 78*, 772–790.

Anderson, C. A., Deuser, W. E., & DeNeve, K. (1995). Hot temperature, hostile affect, hostile cognition, and arousal: Tests of a general model of affective aggression. *Personality and Social Psychology Bulletin, 21*, 434–448.

Anderson, C. A., & Huesmann, L. R. (2003). Human aggression: A social-cognitive view. In M. A. Hogg & J. Cooper (Eds.), *Handbook of social psychology* (pp. 296–323). London: Sage Publications.

Baker, B. O., Hardyck, C. D., & Petrinovich, L. F. (1966). Weak measurements vs. strong statistics: An empirical critique of S.S. Stevens' proscriptions on statistics. *Educational and Psychological Measurement, 2*, 291–309.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.

Bartholow, B. D., & Anderson, C. A. (2002). Effects of violent video games on aggressive behavior: Potential sex differences. *Journal of Experimental Social Psychology, 38*, 283–290.

Bartholow, B. D., Dill, K. E., Anderson, K. B., & Lindsay, J. J. (2003). The proliferation of media violence and its economic underpinnings. In D. A. Gentile (Ed.), *Media violence and children* (pp. 1–18). Westport, CT: Praeger.

Berkowitz, L. (1974). Some determinants of impulsive aggression: Role of mediated associations with reinforcements for aggression. *Psychological Review, 81*, 165–176.

Berkowitz, L. (1990). On the formation and regulation of anger and aggression: A cognitive-neoassociationistic analysis. *American Psychologist, 45*, 494–503.

Berkowitz, L. (1993). *Aggression: Its causes, consequences, and control*. New York: McGraw-Hill.

Berkowitz, L., & Alioto, J. (1973). The meaning of an observed event as a determinant of its aggressive consequences. *Journal of Personality and Social Psychology, 28*, 206–217.

Berkowitz, L., & LePage, A. (1967). Weapons as aggression-eliciting stimuli. *Journal of Personality and Social Psychology, 7*, 202–207.

Bernstein, S., Richardson, D., & Hammock, G. (1987). Convergent and discriminant validity of the Taylor and Buss measures of physical aggression. *Aggressive Behavior, 13*, 15–24.

Bushman, B. J., & Anderson, C. A. (1998). Methodology in the study of aggression: Integrating experimental and nonexperimental findings. In R. Green & E. Donnerstein (Eds.), *Human aggression: Theories, research, and implications for social policy* (pp. 23–48). San Diego, CA: Academic Press.

Bushman, B. J., & Anderson, C. A. (2001). Media violence and the American public: Scientific facts versus media misinformation. *American Psychologist, 56*, 477–489.

Callahan, C. M., & Rivara, F. P. (1992). Urban high school youth and handguns. *Journal of the American Medical Association, 267*, 3038–3042.

Cantor, N.& Kihlstrom, J. F. (Eds.). (1981). *Personality, cognition, and social interaction*. Hillsdale, NJ: Erlbaum.

Carlson, M., Marcus-Newhall, A., & Miller, N. (1989). Evidence for a general construct of aggression. *Personality and Social Psychology Bulletin, 15*, 377–389.

Carlson, M., Marcus-Newhall, A., & Miller, N. (1990). Effects of situational aggressive cues: A quantitative review. *Journal of Personality and Social Psychology, 58*, 622–633.

Collins, A. M., & Loftus, E. F. (1975). A spreading activation theory of semantic processing. *Psychological Review, 82*, 407–428.

Cunningham, P. B., Henggeler, S. W., Limber, S. P., Melton, G. B., & Nation, M. A. (2000). Patterns and correlates of gun ownership among nonmetropolitan and rural middle school students. *Journal of Clinical Child Psychology, 29*, 432–442.

Fazio, R. H. (1990). A practical guide to the use of response latency in social psychological research. In C. Hendrick & M. S. Clark (Eds.), *Research methods in personality and social psychology* (pp. 74–97). Newbury Park, CA: Sage.

Fazio, R. H., Chen, J. M., McDonel, E. C., & Sherman, S. J. (1982). Attitude accessibility, attitude-behavior consistency, and the strength of the object-evaluation association. *Journal of Experimental Social Psychology, 18*, 339–357.

Geen, R. G. (1990). *Human aggression*. Pacific Grove, CA: Brooks/Cole.

Giancola, P. R. (2003). The moderating effects of dispositional empathy on alcohol-related aggression in men and women. *Journal of Abnormal Psychology, 112*, 275–281.

Giancola, P. R., & Zeichner, A. (1995). Construct validity of a competitive reaction-time aggression paradigm. *Aggressive Behavior, 21*, 199–204.

Higgins, E. T. (1996). Knowledge activation: Accessibility, applicability, and salience. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 133–168). New York, NY: Guilford Press.

Higgins, E. T., King, G. A., & Mavin, G. H. (1982). Individual construct accessibility and subjective impressions and recall. *Journal of Personality and Social Psychology, 43*, 35–47.

Huesmann, L. R., & Miller, L. S. (1994). Long-term effects of repeated exposure to media violence in childhood. In L. R. Huesmann (Ed.), *Aggressive behavior: Current perspectives* (pp. 153–186). New York: Plenum Press.

Kelly, G. A. (1955). *The psychology of personal constructs*. New York, NY: Norton.

Kirk, R. E. (1968). *Experimental design: Procedures for the behavioral sciences*. Belmont, CA: Brooks/Cole.

Kotok, D. (2001). Daschle aims to put Great Plains' concerns on national agenda. *Omaha World Herald*, p. 1A.

Leyens, J. P., Cisneros, T., & Hossay, J. F. (1976). Decentration as a means for reducing aggression after exposure to violent stimuli. *European Journal of Social Psychology, 6*, 459–473.

Lindsay, J. J., & Anderson, C. A. (2000). From antecedent conditions to violent actions: A general affective aggression model. *Personality and Social Psychology Bulletin, 26*, 533–547.

Lizotte, A. J., & Bordua, D. (1980). Firearms ownership for sport and protection: Two divergent models. *American Sociological Review, 45*, 229–244.

Neely, J. H. (1977). Semantic priming and retrieval from lexical memory: Roles of inhibitionless spreading activation and limited-capacity attention. *Journal of Experimental Psychology: General, 106*, 226–254.

Rosnow, R. L., & Rosenthal, R. (1990). "Some things you learn aren't so": Cohen's paradox, Asch's paradigm, and the interpretation of interaction. *Psychological Science, 6*, 3–9.

SAS Institute (1990). *SAS/STAT user's guide, Version 6* (4th ed.). Cary, NC: SAS Institute.

Schank, R. C., & Abelson, R. P. (1977). *Scripts, plans, goals, and understanding*. Hillsdale, NJ: Erlbaum.

Sedikides, C., & Anderson, C. A. (1992). Causal explanations of defection: A knowledge structure approach. *Personality and Social Psychology Bulletin, 18*, 420–429.

Smith, E. R., & Lerner, M. (1986). Development of automatism of social judgments. *Journal of Personality and Social Psychology, 50*, 246–259.

Stevens, S. S. (1951). Mathematics, measurements, and psychophysics. In S. S. Stevens (Ed.), *Handbook of experimental psychology* (pp. 1–49). New York: Wiley.

Tajfel, H. (1969). Social and cultural factors in perception. In G. Lindzey & E. Aronson (Eds.), *The handbook of social psychology* (Vol. 3, pp. 315–394). Reading, MA: Addison-Wesley.

Taylor, S. P. (1967). Aggressive behavior and physiological arousal as a function of provocation and the tendency to inhibit aggression. *Journal of Personality, 35*, 297–310.

Zimmerman, D. W., & Zumbo, B. D. (1993). Relative power of the Wilcoxon Test, Friedman Test, and repeated-measures ANOVA on ranks. *Journal of Experimental Education, 62*, 75–86.