Social and Personality Psychology Compass 7/10 (2013): 762–774, 10.1111/spc3.12067

Effects of Situational Cues on Aggressive Behavior

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Abstract

Numerous situational factors are known to increase the likelihood that a person will behave aggressively. The current review addresses what is currently understood about the relationship between three theoretically relevant situational variables (the presence of weapons, alcohol cues, and exposure to media violence) and aggressive behavior. Theoretical models of aggression generally propose heightened accessibility of aggressive cognitions (i.e., priming) as a common mechanism to explain effects of these variables on aggression but differ in terms of factors that modulate whether and how activated mental content will influence behavior. Here, we discuss these factors and suggest ways in which models of priming might be integrated. We also underscore that, although aggression has been the focus of considerable research for decades, much more research is needed to better understand the psychological and biological processes that mediate effects of situational cues on aggression in humans.

Human aggression is at once a very basic and very complex social behavior. Aggression is basic in that it occurs in virtually everyone at one time or another and tendencies toward aggression might be present at birth (e.g., Freud, 1961; Lorenz, 1966). However, aggression is much more complicated than such characterizations would suggest, in terms of both the biological processes that support it and the psychological processes that determine when and how it will be expressed.

The purpose of this article is to review evidence indicating that the presence of weapons, exposure to alcohol cues, and exposure to violent media can increase the likelihood and/or intensity of aggressive behavior (see also Carlson, Marcus-Newhall, & Miller, 1990[1]) and to discuss the theoretical processes by which these effects likely occur. Much of the previous research and theorizing on this topic suggest that environmental cues can increase aggression through a mechanism called priming, a process whereby an environmental stimulus (i.e., a prime or cue) activates aggression-related feelings, thoughts, and behaviors (see Anderson & Huesmann, 2003; Bushman & Huesmann, 2006). However, heightened accessibility of such mental constructs by no means guarantees that aggressive behavior will occur. For example, the General Aggression Model (GAM; see Anderson & Bushman, 2002) suggests that individuals can consider the potential consequences of their behavior and abstain from aggressing. More recently, Loersch and Payne (2011) proposed the Situated Inference Model (SIM), which suggests that primes are especially likely to influence downstream behavior (e.g., aggression) when the mental content made accessible by the prime is *misattributed* to one's natural response to some aspect of the situation (see also Loersch & Payne, 2012). Mental content perceived to be caused by the cue itself (i.e., not self-generated) should have no effect on aggressive behavior, according to the SIM. We draw heavily from the GAM and the SIM when explaining how and under what conditions exposure to guns, alcohol, and media violence increases aggressive responding.

Following previous psychological treatments of this topic (e.g., Anderson & Bushman, 2002), we consider aggression to be any action that is intended to cause harm to another individual who is motivated to avoid being harmed. The harm in question can be either

physical or psychological/emotional (including verbal) and can range from extreme acts of violence (e.g., murder or emotional abuse) to relatively mild slights (e.g., an angry glare or nasty remark). The motivational component is very important, in that it allows exclusion of certain acts that cause pain but are not intended to harm (e.g., dental procedures) or in which the target is a willing participant (e.g., sadomasochism). This review is by no means comprehensive in its coverage of this topic and is intentionally silent on other causes and correlates of aggression, such as individual differences in aggression-related traits (e.g., trait anger) and childhood environments and experiences.

Measuring Aggression in the Lab

Measuring aggressive behavior in the psychological laboratory presents a number of challenges, primarily related to ethical constraints (e.g., researchers must avoid allowing participants to seriously harm others) and social proscriptions against aggression (i.e., participants are likely to modify their responses if they are aware that a researcher is measuring aggression). Thus, researchers have devised clever paradigms to permit assessment of responses that meet the psychological definition of aggression but that will not result in serious harm and that will not elicit reactivity from participants. Addressing the first of these concerns often means the use of paradigms involving confederates or otherwise trying to convince participants that their responses will be directed at another person, when in fact they will not. The issue of reactivity has led researchers to adopt measures that participants can recognize as producing discomfort in the ostensible recipient but that are not so obviously harmful as to cause participants to restrain themselves.

For example, a commonly used task involves participants setting levels of noise blasts for an opponent in an ostensible reaction-time game (the competitive reaction-time task [CRT]; see Giancola & Zeichner, 1995). Another task involves participants determining the length of time an opponent must immerse her/his hand in a bucket of ice water (i.e., the cold pressor task; Quartana & Burns, 2007; Vasquez, Denson, Pedersen, Strensom, & Miller, 2005). Perhaps the most commonly used method involves having participants evaluate another person, often the experimenter herself or himself, which could have potentially harmful implications for that person (Baron & Richardson, 1994; Bushman, Bonacci, Pedersen, Vasquez, & Miller, 2005; Bushman, Bonacci, Van Dijk, & Baumeister, 2003; Chen & Bargh, 1997).

Situational Cues and Aggression

Weapons

Weapons have been implicated in violent deaths for thousands of years. Recent estimates suggest that one-quarter of violent incidents and a large proportion of violent deaths in both the US and UK involve weapons (Kershaw, Nicholas, & Walker, 2008; Povey, Coleman, Kaiza, & Roe, 2009; Rand & Catalano, 2007). However, perhaps more interesting than the use of weapons as tools for aggression is the possibility that the mere presence of weapons can trigger aggressive behavior.

The earliest empirical evidence suggesting such a possibility was reported by Berkowitz and LePage (1967). Participants in this study were first angered or not (received seven electric shocks or one shock, respectively, from a confederate) and then given an opportunity to administer retaliatory shocks to the confederate. The variable of interest was whether a gun, a badminton racquet, or nothing was lying on an adjacent table. The researchers found

that angered participants behaved more aggressively (i.e., administered more shocks to the confederate) in the presence of the gun relative to the badminton racquet.

This initial study was followed by others in which the so-called "weapons effect" proved elusive, with some researchers replicating Berkowitz and LePage's (1967) results (e.g., Frodi, 1975; Philippe-Leyens & Parke, 1975; Simons & Turner, 1976; Turner & Simons, 1974) and others failing to do so (e.g., Buss, Booker, & Buss, 1972; Ellis, Weiner, & Miller, 1971). One meta-analysis showed that the weapons effect is basically zero at a mean level (Carlson et al., 1990) but that the presence of weapons has a strong effect on aggression when participants are nonapprehensive or unsuspicious about experimental procedures. This finding also suggests that the effect might be the result of relatively automatic priming processes, which could be overridden by self-regulatory control when participants become aware of the possibility that weapon primes might influence their behavior.

Direct evidence for an automatic priming explanation of the weapons effect was provided by Anderson, Benjamin, and Bartholow (1998). In two experiments, participants completed priming tasks in which their goal was to read a series of target words aloud as quickly as possible. Anderson et al. manipulated both the contents of prime stimuli preceding the target words (weapon names versus animal names in Experiment 1; weapon pictures versus pictures of plants in Experiment 2) and the types of words participants had to read (aggressive and nonaggressive). In both experiments, participants were faster to read aggressive than nonaggressive words preceded by weapon-related primes but not nonweapon primes.

A series of follow-up studies by this group (Bartholow, Anderson, Carnagey, & Benjamin, 2005) provided further support for the automatic priming explanation and also showed that previous experience with guns moderates the weapons priming effect. Bartholow et al. recruited participants who either had experience in sport shooting (i.e., hunting or target shooting) or not and in a series of three experiments exposed them to both hunting guns (i.e., guns intended for sport) and assault guns (i.e., guns intended for human violence). As predicted, hunters showed less activation of aggressive thoughts and were less aggressive behaviorally when primed with images of hunting guns compared with assault guns; nonhunters largely did not differentiate between hunting and assault guns (see Berkowitz, 1993, p. 83).

Alcohol cues

It is widely understood that alcohol consumption contributes to aggression and antisocial behavior, as evinced by archival accounts (see Critchlow, 1983), popular expressions such as the "mean drunk" (see Collins, 1988; Felson, Teasdale, & Burchfield, 2008; Pernanen, 1991), and considerable empirical evidence (see Bushman & Cooper, 1990; Chermack & Giancola, 1997; Giancola, 2000; Ito, Miller, & Pollock, 1996). Research also shows that even the belief that one has consumed alcohol can engender increased aggression (i.e., placebo effects; see Bègue et al., 2009; Lang, Goeckner, Adesso, & Marlatt, 1975; Marlatt & Rohsenow, 1980; Rohsenow & Bachorowski, 1984). However, it is less well known that alcohol's effects on aggressive responding can be observed even when no beverage is consumed. That is, the mere presence of alcohol-related cues can elicit increased aggression.

Several studies have now demonstrated this effect using a variety of approaches (e.g., Bartholow & Heinz, 2006; Friedman, McCarty, Bartholow, & Hicks, 2007; Subra, Muller, Bègue, Bushman, & Delmas, 2010). For example, Friedman et al. (2007) randomly assigned participants to complete one of two versions of a primed lexical decision task in which they were instructed to indicate whether or not various letter strings (e.g., *irony* or *nogzp*) formed proper English words. Prior to onset of the letter string on each trial, a prime word was

presented briefly and then hidden with a visual mask (e.g., XXXXXX). Depending upon the condition, these prime words were either alcohol-related (e.g., *beer* or *vodka*) or non-alcohol-related (e.g., *water* or *juice*). After 110 trials of this task, the computer appeared to crash, displaying an error message regarding failure to save the data (see Chen & Bargh, 1997). At this point, the participant was informed by the experimenter (who was unaware of condition assignment) that she or he would have to re-do the task but first would need to complete an "incident report", essentially an evaluation of the experimenter's performance, aptitude, and courteousness. As in prior work using similar measures (see Baron & Richardson, 1994), lower average ratings indicated relative hostility toward the experimenter. Friedman et al. (2007) found a significant interaction between priming condition and participants' aggression-related expectancies, such that stronger beliefs that consuming alcohol increases aggression predicted more negative ratings of the experimenter, but only in the alcohol-priming condition (see also Bartholow & Heinz, 2006). Moreover, this effect was specific to aggression expectancies, as there were no significant associations with other expectancy domains (e.g., sociability). These data support the idea that fleeting exposure to alcohol-related cues activates alcohol outcome expectancies in long-term memory, thereby giving rise to expectancy-consistent behavior, despite no beverage having been consumed (also see Freeman, Friedman, Bartholow, & Wulfert, 2010; Friedman, McCarthy, Förster, & Denzler, 2005).

Although the studies just reviewed indicate that alcohol cue exposure can increase hostile thoughts and negative evaluations of others, only one study to date has demonstrated alcohol cue exposure effects on physical aggression. Pedersen, Vasquez, Bartholow, Grosvenor, and Truong (2013) briefly exposed participants to alcohol or nonalcohol words in a lexical decision task (see Friedman et al., 2007) and then provided them with bogus feedback (ostensibly from another participant) on an essay they had written; the feedback was either overtly negative/hostile ("This is the worst essay I've ever read") or was ambiguous ("I don't even know where to begin…"). Participants then had an opportunity to determine the length of time the essay evaluator should submerge his or her hand in painfully cold ice water (i.e., the cold pressor task). Participants exposed to alcohol words during the lexical decision task recommended longer ice-water submersion for their evaluator, but only when the feedback they received was ambiguous. When feedback was clearly negative and there was little room for interpretation, all participants chose a relatively aggressive response. This finding was replicated in a second experiment, which also showed that the alcohol cue exposure effect diminishes rapidly over the course of 15 minutes, consistent with a priming account of the effect (see Higgins, 1996).

Media violence

One of the first motion pictures to see wide distribution, *The Great Train Robbery* (Edison & Porter, 1903), depicted a gang of bandits robbing a passenger train and the posse of vigilantes dispatched to hunt them down. The film is short, lasting only 12 minutes, but involves a striking amount of violence: fully half of the 14 scenes depict threats of violence or actual physical assaults (e.g., the telegraph operator is bound at gunpoint and an escaping passenger is gunned down). This film set the stage for violence as a central theme in entertainment media, a trend still evident today.

Consuming media is an extremely popular activity. For example, Nielsen Corporation data indicate that the average American watches around 28 hours of television per week, or roughly 9 years of television viewing over 65 years. Additionally, recent data suggest that approximately 60% of all children are playing a video game at any given time of day or night

(Rideout, Foehr, & Roberts, 2010). Of concern for current purposes, the fact that much media programming contains violent themes suggests that people are exposing themselves to aggression-eliciting cues while indulging their media habit. Consistent with this idea, hundreds of empirical studies have shown exposure to media violence (chronically or acutely) to be a risk factor for increased aggression (see Anderson et al., 2010; Bushman & Huesmann, 2006; Hearold, 1986; Huston et al., 1992; Paik & Comstock, 1994; Wood, Wong, & Chachere, 1991).

Most recently, researchers have studied the effects of violence in video games. For example, Anderson and Dill (2000) had participants play Wolfenstein 3D (violent game) or Myst (nonviolent game) prior to engaging in the CRT. As predicted, participants who had played the violent game issued longer noise blasts to their opponents than did participants who had played the nonviolent game. Similar results have been reported in numerous other studies using a variety of games and measures of aggression (e.g., Bartholow & Anderson, 2002; Bartholow, Sestir, & Davis, 2005; Bushman & Gibson, 2011; Konijn, Bijvank, & Bushman, 2007; for a review, see Anderson et al., 2010).

Many in the lay public and the media industry maintain the belief that playing a violent video game should be beneficial rather than harmful, as it can allow for the "release" of pent-up, unwanted hostility. Breuer and Freud (1895/1955) referred to this notion as the catharsis hypothesis. According to Freud (and others), human beings are hostile and aggressive by nature, and it is only through socialization and conditioning that people learn to control their aggressive impulses. If not permitted to "vent" in some appropriate manner – for example, by behaving aggressively in the virtual environment provided by a video game – these aggressive drives will ultimately find an outlet, likely through an aggressive action in the "real world". Survey research supports the notion that releasing anger is a relatively common motive for video game play among middle-school children, especially boys (Olson, 2010). Experimental research further shows that people led to believe that catharsis is effective in reducing anger are more likely than others to indicate a desire to play a violent video game when angry (Bushman & Whitaker, 2010).

Despite the apparent attraction of the catharsis idea, however, research generally shows that engaging in either real (Bushman, 2002; Bushman, Baumeister, & Stack, 1999) or virtual violent actions (see Anderson et al., 2010) is ineffective in reducing aggression at best and actually increases the likelihood of further aggression in many cases (see Geen & Quanty, 1977). In light of this evidence and given data indicating that violent video game exposure can increase anger (see Anderson & Bushman, 2001), it is not surprising that engaging in virtual violence by playing violent video games tends to increase rather than decrease aggressive behavior.

Theories and Models to Explain Cue Effects on Aggression

In recent decades, the effects of situational stimuli on aggression have largely been understood using social-cognitive information processing models (SCIP; e.g., Anderson & Huesmann, 2003; Crick & Dodge, 1994; Huesmann, 1988). Such models assume that exposure to aggression-eliciting cues increases aggression through priming. For example, if a strong association exists in memory between guns and aggression, merely being in the presence of a firearm could prime aggressive thoughts and feelings, thereby increasing the likelihood of aggressive behavior.

The GAM is arguably the most influential and comprehensive of the SCIP models and has guided considerable research on aggressive behavior (Anderson & Bushman, 2002). The GAM incorporates and builds on many domain-specific theories of aggression, such as

frustration-aggression theory (Dollard, Doob, Miller, Mowrer, & Sears, 1939), cognitive neoassociation theory (e.g., Berkowitz, 1989), social learning theory (e.g., Bandura, 1973; Mischel & Shoda, 1995), script theory (e.g., Huesmann, 1986), and excitation transfer theory (e.g., Zillmann, 1983), in an attempt to provide a comprehensive account of why and under what conditions aggression is likely to occur. In its most basic form, the GAM suggests that an aggressive action is a function of a three-stage process (see Anderson & Bushman, 2002; DeWall, Anderson, & Bushman, 2011). This process begins with the assumption that different individuals (i.e., personological factors) will react differently to the same environmental cue (i.e., situational factors). This interaction between the person and the situation influences the second stage by causing variation in three internal states – cognition, affect, and arousal – thought to mediate aggressive behavior. Importantly, however, the fact that these internal states may be activated by the presence of a situational cue does not necessitate an aggressive action. Rather, in Stage 3 of the GAM (appraisal and decision-making), individuals can still engage in higher-order self-regulatory control to override the influence of these heightened internal states and opt not to aggress. This multistep process arguably provides an elegant and comprehensive account of behavioral decision-making in virtually any circumstance in which an aggressive action is possible. However, although the GAM provides a unifying conceptual framework for organizing processes by which situational cues can influence aggressive outcomes, it is not a generative theory *per se*, in that it is difficult to generate falsifiable predictions based on the tenets of the model – it is hard to argue with the idea that behavior is driven by some combination of cognition, affect, and arousal processes and that these processes are influenced by the interaction of situational and person-level individual difference variables.

Unlike the GAM, the SIM (Loersch & Payne, 2011) was not initially developed specifically to account for aggressive behavior. Still, the model can easily be adapted to predict behavior in aggression-related situations. The SIM assumes people use the information made accessible by cues to answer the most salient question afforded by the environment. In the case of cues priming behavior, the most salient question is, "What will I do?" When applied to decisions concerning aggressive action, the question can be understood as, "How aggressive will I be?" Similar to other priming models (see Higgins, 1996; McNamara, 2005), the SIM suggests that exposure to a cue produces general construct accessibility that can be used flexibly to guide further information processing. Applied to the case of aggression-related cues, however, the SIM predicts that aggressive behavior should only occur when the accessible content is misattributed to one's natural reaction to the situation. Suspicion or knowledge about the potential influence of an aggression-eliciting cue should eliminate any potential influence of the cue on behavior. It is this attribution process that sets the SIM apart from other priming-based theories of aggression, such as cognitive neoassociation theory (Berkowitz, 1993), which posits a more-or-less direct association between activation of hostile thoughts and feelings by aggression-related cues and expression of aggressive behavior. In sum, the SIM posits that, following exposure to an aggression-eliciting cue, an individual should behave aggressively if (1) the cue activates aggressive mental content, (2) this activated information is attributed to internal, self-generated processes rather than to an external source (i.e., the cue itself), and (3) the individual is given an opportunity to aggress.

The general finding that exposure to guns, alcohol cues, and media violence increases aggressive behavior can readily be interpreted using the SIM. Consider first the weapons effect. As reviewed previously, the weapons effect tends to emerge when participants are unsuspecting of experimental procedures (Carlson et al., 1990). In other words, gun primes have little or no effect when participants are aware the gun could influence their behavior, presumably because they can make an external attribution for the thoughts and feelings

activated by the gun. Also, use of provocation (commonly employed in weapons- and alcohol-priming research) further complicates interpretation of priming effects in that (a) provocation turns "simple" cue-elicited responses into reactive aggressive responses (for an in-depth discussion of cognitive processes involved in reactive aggression, see Wilkowski & Robinson, 2010) and (b) provocation may cause participants to further confuse the source of the information made accessible by the aggressive cue (i.e., as originating from their own reaction to being provoked).

The SIM also can be applied to understanding media violence effects. In the context of violent media exposure, the SIM makes the somewhat ironic prediction that, compared to situations in which the violent media source is removed before participants are given an opportunity to aggress, individuals given that opportunity while in the presence of a violent media source should be *less* aggressive, because they should attribute any hostile feelings or thoughts to the violence on the screen (an external source) rather than to their own, self-generated reactions.

To test this hypothesis, Engelhardt and Bartholow (2013) had participants play a violent video game (Mortal Kombat 9) for 15 minutes, after which they were provoked (bogus essay evaluation) and then given an opportunity to aggress against the provocateur (CRT in Experiment 1; cold pressor task in Experiment 2). Importantly, participants in both experiments were randomly assigned to complete their respective aggression tasks in one of two conditions: "game on", in which the violent game continued to play in the periphery (a prerecorded loop of game action), or "game off", as in the typical video game experiment paradigm. Consistent with SIM-based predictions, results showed that participants in the "game on" condition were less aggressive following provocation than those in the "game off" condition. SCIP models of aggression (e.g., Anderson & Huesmann, 2003) would have difficulty accounting for this result in terms of a classic priming effect, because continued exposure to video game scenes should maintain accessibility of aggressive mental content.

As the previous example illustrates, the SIM and SCIP models appear to make very different predictions concerning effects of environmental cues on aggressive behavior. But it might be possible to integrate the SIM with at least some SCIP models, particularly the GAM. Both models posit that cues make relevant information highly accessible. The primary difference between the SIM and the GAM is in how that information is applied to aggressive decision-making. The SIM posits that, in order for accessible information to affect behavior, people must misattribute that information to their own, natural response to some aspect of the situation. Although the GAM also provides for the prospect that elaboration on accessible content, including attributional processing, will influence behavioral decision-making, it does not specifically propose misattribution as a causal mechanism. Additionally, the GAM specifies a role for relevant individual difference factors (e.g., trait hostility and history of violence), which in theory influences the type of content made accessible by various cues (see Bartholow, Anderson, et al., 2005; Bartholow, Sestir, et al., 2005); the SIM doesn't directly address individual differences. Thus, both models might arrive at similar predictions, so long as (a) the GAM's decision-making stage could be modified to explicitly incorporate misattribution and (b) the SIM could outline specific ways in which accessible mental content, the misattribution process, or both might differ as a function of important individual differences. Such an integration would be a fruitful avenue for future theory-building work.

Although the current review suggests that cognitive priming is an important causal mechanism in cue effects, it is by no means the only one. For example, processes related to desensitization – the blunted emotional or physiological reactions to a stimulus following repeated exposure to it (see Funk, Bechtoldt-Baldacci, Pasold, & Baumgartner, 2004; Rule & Ferguson, 1986) – also have been shown to enhance aggression. In one recent experiment, Engelhardt, Bartholow, Kerr, and Bushman (2011) recruited participants low and high in previous exposure to violent

video games and randomly assigned them to play either a nonviolent or violent game for 25 minutes in the lab. Participants then viewed a series of neutral and violent images while brain activity was recorded using event-related potentials (ERPs) and then completed an aggression measure (the CRT). Among participants with little previous violent game exposure, acute exposure to a violent game in the lab reduced brain responses to violent images, which in turn predicted increased aggressive behavior. Participants high in previous violent game exposure showed blunted neural responses to violent images regardless of the game played in the lab, suggesting that such individuals were already desensitized prior to the study (see Bartholow, Bushman, & Sestir, 2006).

Cue Effects in the Real World

This review focuses mainly on studies testing how exposure to weapons, alcohol cues, and media violence elicits aggression in the lab. Although relatively few studies have tested this phenomenon outside the lab, a few examples are worth noting. For example, Turner, Layton, and Simons (1975) equipped a pick-up truck with a gun rack containing either a military rifle (gun condition) or nothing (control condition). The researchers then found opportunities to position the truck in front of other cars at traffic lights, waiting 12 seconds before moving forward after the light turned green. In line with the weapons effect hypothesis, other drivers were quicker to honk at the unmoving truck in the gun condition than in the control condition. Similarly, more recent research has shown that motorists are more likely to drive aggressively when a firearm is present in their vehicle (Hemenway, Vriniotis, & Miller, 2006).

At a conceptual level, there is no reason to expect the mechanisms compelling increased aggression in the lab to be different from those outside the lab. For example, consider the Turner et al. (1975) findings. If seeing a rifle increases the accessibility of aggressive thoughts and feelings, at least in some people (Bartholow, Anderson, et al., 2005; Bartholow, Sestir, et al., 2005), then expressing some form of aggression (e.g., honking or otherwise expressing displeasure) should be expected. By applying the tenets of the SIM, if the mental content made accessible by the rifle was perceived to be self-generated (i.e., not caused by the gun in the window), increased horn honking is squarely within the range of behaviors afforded by the situation. What certainly will differ between the lab and real life is the potential consequences of aggressive behavior. Compared to the safety of the lab, there are many, more serious repercussions and a greater chance for bodily injury for behaving aggressively in the presence of guns in the real world (e.g., the potential to exchange gunfire with another individual). Also, whereas societal proscriptions might limit the extent to which people aggress against each other following exposure to media violence in their daily lives, other, related effects have been demonstrated. For example, Bushman and Anderson (2009) found that patrons of violent films are much less likely than patrons of nonviolent films to help an apparent injury victim just outside the theater.

Future Research

As this review illustrates, numerous studies have demonstrated that cues associated with aggression have the power to elicit hostile action in a number of contexts. An interesting avenue for future study suggested by the SIM is to identify conditions under which *increased* exposure to aggression-related cues produces *decreased* aggression. In general, we would predict that overt awareness of the possibility that certain cues might influence hostile thoughts will subvert aggressive behavioral responses, essentially "defusing" the mental bombs that such cues can otherwise ignite.

Another important avenue for future work could involve manipulating the amount of time between aggression-related cue exposure and the time at which aggression is measured. Based on the SIM, increases in aggression should be most evident when participants experience a *brief* delay period following cue exposure; the SIM posits that a delay or distraction should facilitate the dissociation between one's current mental contents and their true source, thus making priming effects more likely. However, as numerous priming studies have shown (see Pedersen et al., 2013; Sestir & Bartholow, 2010), too long a delay will result in decay of accessibility of relevant mental content, thereby eliminating cue-priming effects altogether.

The SIM also may be useful in understanding why increases in aggression following exposure to alcohol-related cues are most prominent among individuals who hold alcohol-aggression expectancies (see Bartholow & Heinz, 2006; Friedman et al., 2007). If a misattribution process is involved, a simple reminder that alcohol can make some people more aggressive should mitigate the typical effect of alcohol primes on aggression. Alternatively, similar to the video game paradigm discussed previously (Engelhardt & Bartholow, 2013), rather than removing the alcohol cues from the environment while aggression is measured, making the cues focal during this period could provide a legitimate external attribution source, thereby making it less likely that individuals with strong alcohol-aggression expectancies will behave aggressively in their presence.

In addition, cognitive neuroscience approaches hold considerable promise to better specify the neural bases of situationally cued aggressive behaviors. Although some attempts along these lines have been made (see Carnagey, Anderson, & Bartholow, 2007; Engelhardt et al., 2011), this area of research remains in its infancy. Research has consistently implicated regions of the prefrontal cortex in the regulation of many social behaviors, including aggression (see Giancola, 2000; Giancola & Zeichner, 1994; Grafman et al., 1996). However, whether activity in this region is implicated in situational cueing effects on aggression – for example, exposure to cues might lead to reliance on more automatic, less reflective modes of processing (see Stepanova, Bartholow, Saults, & Friedman, 2012), thereby limiting top-down regulatory control mediated by prefrontal regions – remains a vital question for future work.

Conclusion

This brief review was intended to summarize the current state of knowledge concerning the effects of three relevant situational cues (weapons, alcohol cues, and media violence) on aggressive behavior. Extant evidence suggests that such effects occur primarily through priming of associated mental constructs, but other mechanisms, such as desensitization to violence (see Bartholow et al., 2006; Engelhardt et al., 2011) and disruption of top-down regulatory control processes in prefrontal cortex, also should be explored as potentially important causal pathways, as should the mental operations people perform on accessible mental content, such as misattribution (see Loersch & Payne, 2011). Furthermore, although rare, demonstrations of similar effects in the "real world" suggest that laboratory findings have important implications for understanding everyday forms of aggression (see Anderson & Bushman, 1997). It is our hope that this review will encourage additional research investigating both additional situational factors not considered here as well as more systematic attempts to account for their effects.

Short Biographies

Christopher R. Engelhardt is a post-doctoral researcher at the Thomson Center for Autism and Neurodevelopmental Disorders at the University of Missouri. He completed his Ph.D. in 2013

at the University of Missouri, under the direction of Dr. Bruce Bartholow. He earned a B.S. from Penn State Erie, The Behrend College, in 2007. His research focuses primarily on how exposure to violent video games affects aggressive behavior and higher-order cognitive abilities. Dr. Engelhardt's dissertation research investigated novel explanations for how acute exposure to violent games primes aggressive responding. Dr. Engelhardt has authored articles appearing in outlets such as *Journal of Experimental Social Psychology*, *Aggressive Behavior*, *Autism, Research in Autism Spectrum Disorders, and Pediatrics*.

Bruce D. Bartholow is a Professor of Psychological Sciences at the University of Missouri. He earned a B.A. in Psychology from Minnesota State University, Mankato, in 1992, an M. S. in Experimental Psychology from Drake University in 1995, and a Ph.D. in Psychology from the University of Missouri in 2000. Bartholow's research focuses on understanding various aspects of social cognition and person perception, including expectancy effects, stereotyping and prejudice, and aggression, as well as on the effects of alcohol on cognition and social behavior. His recent work has focused on understanding the role of cognitive control in implicit measures of attitudes and on individual differences in neural and behavioral responses to alcohol cues. For this and related work, Bartholow was recognized with the Award for a Distinguished Early Career Contribution to Psychophysiology from the Society for Psychophysiological Research in 2007. His research in these and other areas has been funded by the National Institute on Alcohol Abuse and Alcoholism and the National Science Foundation and has appeared in outlets such as *Journal of Personality and Social Psychology*, *Journal of Experimental Social Psychology*, *Psychological Science*, *Personality and Social Psychology Bulletin*, and *Psychology of Addictive Behaviors*.

Endnote

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[1] Note that Carlson et al. (1990) focused on the effects of situational cues among participants who were already negatively aroused. While overlapping with some of the content covered by Calrson et al., the current review focuses primarily on more recent studies and is not restricted to situations involving negative arousal, thereby providing both an update and a broader examination of situational cueing effects.

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