

Automatic Effects of Alcohol and Aggressive Cues on Aggressive Thoughts and Behaviors

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Abstract

Numerous studies have shown that alcohol increases aggression. In this article it is proposed that the link between alcohol and aggression is so strong that mere exposure to alcohol-related cues will automatically activate aggressive thoughts and behaviors. Two experiments tested this automaticity theory of alcohol-related aggression. In Experiment 1, participants exposed to alcohol- or weapon-related primes made faster lexical decisions about aggression-related words than did participants exposed to neutral primes. In Experiment 2, participants exposed to alcohol- or aggression-related subliminal primes were more aggressive toward the experimenter than were participants exposed to neutral subliminal primes. In both experiments, the effects of alcohol-related cues were as strong as the effect of aggression-related cues on aggressive thoughts and behaviors. People do not need to drink a drop of alcohol to become aggressive; exposure to alcohol cues is enough to automatically increase aggression.

Keywords

alcohol, aggression, automaticity, weapons

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O God, that men should put an enemy in their mouths to steal
away their brains! That we should, with joy, pleasance, revel,
and applause, transform ourselves into beasts!

William Shakespeare, *Othello*

Alcohol and aggression seem to go together, like two peas in a pod. In fact, alcohol is sometimes deliberately used to promote aggression. For example, it has been standard practice for many centuries to issue soldiers some alcohol to drink before they went into battle, both to increase aggression and to decrease fear (Keegan, 1993). The link between alcohol and aggression has consistently been found in both correlational and experimental studies (for meta-analytic reviews, see Bushman & Cooper, 1990; Lipsey, Wilson, Cohen, & Derzon, 1997). It is less clear, however, why alcohol increases aggression.

Theories of intoxicated aggression can be divided into two broad categories: pharmacological models and expectancy models. Pharmacological models propose that alcohol increases aggression by impairing higher level cognitive functions such as inhibitory control. For example, alcohol myopia theory suggests that alcohol has a “myopic” or narrowing effect on attention (Steele & Josephs, 1990). Alcohol causes

people to focus attention on the most salient features of a situation and to not pay attention to more subtle features. In a hostile situation such as a barroom altercation, the most salient features are provocative cues, and these cues have a much stronger effect on drunk people than on sober people. Research has even shown that alcohol can reduce aggression if nonprovocative cues are more salient than provocative cues (Giancola & Corman, 2007).

Expectancy-based models propose that alcohol increases aggression because people expect it to. In line with this idea, research has shown that the mere belief that one has consumed alcohol increases aggressive behavior (see Bègue et al., 2009; Lang, Goeckner, Adesso, & Marlatt, 1975).

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The deviance-disavowal perspective provides an explanation for the link between alcohol-related expectancies and aggression (Critchlow, 1983). In many cultures, drinking occasions are culturally agreed-on “time-out” periods where people are not held responsible for their antisocial behavior (MacAndrew & Edgerton, 1969). Those who behave aggressively while intoxicated can therefore “blame the bottle” for their aggressive actions because “everyone knows” that alcohol increases aggression. Indeed, survey research on explicit expectancies shows that alcohol-related aggression expectancies are pervasive (Murdoch, Phil, & Ross, 1990; Paglia & Room, 1998), develop early in childhood (Query, Rosenberg, & Tisak, 1998), and show familial transmission (Johnson, Nagoshi, Danko, Honbo, & Chou, 1990).

The fact that social knowledge associates alcohol and aggression suggests that these two concepts might be linked in semantic memory as part of an associative network (Goldman, Brown, Christiansen, & Smith, 1991). Building on work on automaticity (e.g., Bargh & Chartrand, 1999; Todorov & Bargh, 2002), we propose that alcohol-related cues automatically activate aggressive thoughts just like aggression-related cues do (e.g., weapons; Anderson, Benjamin, & Bartholow, 1998). Relying on the ideomotor action principle (James, 1890), we also propose that aggressive thoughts can automatically produce related aggressive behaviors (see also Bargh, Chen, & Burrows, 1996). Thus, we propose that actual or expected alcohol consumption is not necessary to increase aggression: The mere presence of alcohol cues may be sufficient to automatically increase aggressive thoughts and behaviors.

To support our automaticity theory of alcohol-related aggression, we first must show that alcohol-related cues automatically activate aggressive thoughts. In line with this idea, a study by Bartholow and Heinz (2006) found that people exposed to images of alcoholic beverage bottles had faster reaction times to aggressive words than did people exposed to images of plants. Other studies, however, found that nature scenes can reduce aggressive thoughts (Kuo & Sullivan, 2001a, 2001b), which makes it difficult to know whether Bartholow and Heinz’s study demonstrates that alcohol-related cues increased aggressive thoughts or plants decreased them. In Experiment 1, we therefore used a more neutral control condition, namely, nonalcoholic beverage bottles (e.g., sparkling water, orange juice). Like Bartholow and Heinz, we included a condition in which people were exposed to images of weapons, which allowed us to directly compare the effect of alcohol-related cues on aggressive thoughts with the effect of aggression-related cues on aggressive thoughts.

To support our automaticity theory of alcohol-related aggression, we must also show that alcohol-related cues automatically increase aggressive behavior. Experiment 2 was conducted for this purpose. Because we are testing an automaticity theory, we presented alcohol-related cues outside of conscious awareness (Bargh, 1996). We also included

an aggressive-related cues condition to permit a direct comparison with alcohol-related cues. We wanted to show that alcohol-related cues automatically increase aggression in the same way that aggression-related cues do.

Experiment 1

Experiment 1 tested the hypothesis that mere exposure to alcohol- and weapon-related cues automatically increases the accessibility of aggressive thoughts. We hypothesized that participants would respond more quickly to aggressive words (but not to neutral words) after seeing alcoholic beverage bottles and weapons than after seeing nonalcoholic beverage bottles. Thus, we are predicting a significant interaction between type of prime (i.e., alcoholic beverage bottles vs. weapons vs. non-alcoholic beverage bottles) and type of word (i.e., aggressive vs. nonaggressive).

Method

Participants. Participants were 502 native French-speaking adults (246 men), 18 to 65 years old ($M_{\text{age}} = 38.06$, $SD = 13.4$), living in Northern France (Paris and Lille). They were recruited via newspaper advertisements and flyers and were paid €8 (\$13) for their voluntary participation. Participants constituted a representative sample of the French population living in the region, based on gender, age, and occupation.

Procedure. The experiment took place in a truck equipped with four computers. The truck visited several areas in Northern France and remained in each area for a couple of days. Participants were told that the study measured the speed of word recognition in the presence of distracting pictures. Participants completed a lexical decision task in which they decided whether a string of letters was a legitimate French word. On each trial, a photo was presented for 300 ms, followed by a 200-ms interstimulus interval, followed by a letter string. The letter string remained on the screen until the participants responded or until 3 s had elapsed (whichever came first). The interval between trials was 3 s. There were 15 photos: 5 weapons (e.g., guns, knives), 5 alcohol bottles (e.g., vodka, whiskey), and 5 nonalcohol bottles (e.g., sparkling water, orange juice). There were 15 aggressive words (e.g., *kill*, *assault*), 15 nonaggressive words (e.g., *glide*, *suggest*), and 15 nonwords (e.g., *sritter*, *marfle*). We used the same words and nonwords used by Bartholow and Heinz (2006), but they were translated into French. After 10 practice trials (with nonalcohol bottles and nonaggressive words), participants completed 135 actual trials (i.e., each photo was randomly paired with 3 aggressive words, 3 non-aggressive words, and 3 nonwords).

Participants also completed questionnaires assessing their drinking habits (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993) and their expectancies about the link between

Table 1. Mean Reaction Times (ms) and Error Rates (Proportions) to Aggressive Words, Nonaggressive Words, and Nonwords as a Function of Type of Prime

Prime type	Target word type						Mean aggression accessibility score ^a
	Aggressive		Nonaggressive		Nonwords		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Reaction times							
Alcohol	750	152	723	147	934	180	-27 _a
Weapon	758	153	737	150	944	182	-21 _a
Nonalcohol	761	154	723	151	941	176	-38 _b
Error rates							
Alcohol	1.1	0.04	0.5	0.02	5.9	0.09	-0.6 _a
Weapon	1.2	0.04	0.7	0.02	6.2	0.11	-0.5 _a
Nonalcohol	1.3	0.04	0.8	0.03	5.8	0.09	-0.5 _a

N = 422.

^aMean aggression accessibility scores were obtained by subtracting aggressive word reaction times from nonaggressive word reaction times. Subscripts refer to within-column comparisons among means. Means with the same subscript do not differ at the .05 significance level.

alcohol and aggression (Leigh, 1987). Finally, participants were debriefed.

Results

Preliminary results. There were no significant interactions involving gender, age, education level, occupation, drinking habits, and alcohol-related aggression expectancies (all *ps* > .38). Thus, these variables were excluded from subsequent analyses.

Reaction times. Outlying reaction times shorter than 150 ms or greater than 1,500 ms were deleted (less than 6% of trials). To reduce skewness, a log transformation was applied to reaction times for correct responses (Fazio, 1990). A 3 (prime type: alcoholic bottle, weapon, nonalcoholic bottle) × 2 (word type: aggressive, nonaggressive) repeated measures ANOVA revealed main effects for prime type and word type, $F(2, 842) = 12.46, p < .0001$, and $F(1, 421) = 214.55, p < .0001$, respectively. These main effects, however, were qualified by the predicted interaction between prime type and word type, $F(2, 842) = 7.11, p < .001$. To interpret this interaction, we computed two contrasts. This first contrast showed that the difference between aggressive and nonaggressive words was smaller for alcoholic and weapon primes than for nonalcoholic primes, $t(421) = 3.46, p < .001, d = 0.34$ (see Table 1). The second contrast showed that this difference was not significantly different for alcoholic and weapon primes, $t(421) = 1.41, p > .16, d = 0.14$ (see Table 1). Thus, alcohol primes were as likely to increase the accessibility of aggressive thoughts as weapon primes were.

Error rates. To rule out a speed-accuracy trade-off, we analyzed error rates using a 3 (prime type: alcohol, weapon, nonalcohol) × 2 (word type: aggressive, nonaggressive) repeated measures ANOVA. Error rates were higher for aggressive words than for nonaggressive words (*Ms* = 1.2%

and 0.6%, respectively), $F(1, 421) = 12.9, p < .001, d = 0.35$. However, the prime type main effect and Prime Type × Word Type interaction were both nonsignificant, $F(2, 842) = 2.27$ and 0.28 , respectively, *ps* > .11. Thus, the priming effects found for alcohol and weapon cues on aggressive words cannot be explained by a speed-accuracy trade-off (see Table 1).

Discussion

Consistent with Bartholow and Heinz (2006) and with our automaticity theory, Experiment 1 showed that alcohol cues and weapon cues automatically increased aggressive thoughts. Experiment 1, however, used a more neutral control condition than did Bartholow and Heinz (i.e., nonalcoholic beverage bottles rather than plants). Moreover, we found that the effect of alcohol cues on aggressive thoughts was just as strong as the effect of weapon cues on aggressive thoughts. These findings suggest that alcohol-related cues are linked to aggressive thoughts in semantic memory in the same way that aggression-related cues are.

In addition, Experiment 1 used a sample of French adults (rather than university students), which increases the generalizability of our findings. Alcohol and weapon cues increased aggressive thoughts in men and women of different ages, occupations, and education levels, regardless of their drinking history and their expectancies about the relationship between alcohol and aggression.

Experiment 2

Experiment 2 extended the results of Experiment 1 by testing the hypothesis that mere exposure to alcohol- and aggression-related cues increase aggressive behavior. Aggressive thoughts are bad, but nobody gets hurt. In Experiment 2, participants

were given the chance to hurt another person after being exposed to alcohol-related cues, aggression-related cues, or neutral cues. All cues were presented at a subliminal level because our automaticity theory proposes that alcohol cues increase aggression automatically, and subliminal priming allows us to test the nonintentional and nonconscious aspects of automaticity (Bargh, 1996).

Method

Participants. Participants were 78 French university students (8 men; $M_{\text{age}} = 20.57$, $SD = 2.98$) who received course credit in exchange for their voluntary participation.

Procedure. Participants were told that the researchers were studying visual perception. They were randomly assigned to one of three subliminal prime conditions: alcohol words (e.g., *vodka*), aggression words (e.g., *assault*), or neutral words (e.g., *water*). The random assignment was done by the computer program, thereby allowing the experimenter to remain blind to prime condition. On each trial, participants saw a fixation point for 50 ms, followed by the prime word for 17 ms. The prime word was embedded between two masks (50 ms each). Pretesting showed that participants were unaware of the presentation of the prime word. Thus, the prime words were presented at a subliminal level. Next, a picture containing a different number of colored circles (4 to 21) was displayed for 2 to 3 s (see Bargh et al., 1996, for details). Participants had to decide, as quickly as possible, whether the number of circles was odd or even. After 150 trials of this boring and difficult task, participants saw a “fatal error” message on the screen. The experimenter came back into the room and said he knew nothing about computers but would try to fix the problem anyway. To make participants angry at him, the experimenter said they would have to do the boring task again. After wasting more time trying to fix the problem, the experimenter finally said that the computer had apparently saved the data.

Next, participants were told that the chair of the Psychology Department was conducting an evaluation of all studies and experimenters. Participants anonymously rated the experimenter using two items: (a) “How would you rate the experimenter’s overall performance during the study?” (1 = *very bad*, 7 = *very good*) and (b) “To what extent would you recommend this experimenter to run future studies?” (1 = *lowest possible recommendation*, 7 = *highest possible recommendation*). The two items were highly correlated ($r = .72$, $p < .001$) and were therefore reversed and combined to form an overall measure of aggression. The form said that department chair would use the ratings to determine which experimenters to hire for future studies. Thus, participants could directly harm the experimenter by giving him negative ratings. We have used similar measures of aggression in our previous research (e.g., Bushman, Bonacci, Pedersen, Vasquez, & Miller, 2005).

Participants also completed questionnaires assessing their drinking habits (Saunders et al., 1993) and their expectancies

about the link between alcohol and aggression (Leigh, 1987). Finally, participants were debriefed.

Results

Preliminary results. There were no significant interactions involving drinking habits or alcohol-related aggression expectancies (all $ps > .44$). Thus, these variables were excluded from the primary analyses.

Primary results. To investigate the effect of prime type on aggressive behavior, we conducted an ANOVA with two orthogonal contrasts. The first contrast showed that participants who saw alcohol-related or aggression-related subliminal primes were more aggressive toward the experimenter than were participants who saw neutral subliminal primes ($M_s = 3.31, 3.52, \text{ and } 2.83$, respectively; $SD_s = 1.11, 1.23, \text{ and } 0.93$, respectively), $t(75) = 2.30$, $p < .024$, $d = 0.53$. The second contrast showed no significant difference in aggression between participants who saw the alcohol-related primes and those who saw the aggression-related primes, $t(75) = 0.71$, $p > .48$, $d = 0.16$. Thus, alcohol-related primes were as likely to increase aggression as aggression-related primes were.

Discussion

Consistent with our automaticity theory, Experiment 2 showed that both alcohol- and aggression-related cues automatically increased aggressive behavior. Moreover, the effect of alcohol-related cues was just as strong as the effect of aggression-related ones. Previous research has shown that mere exposure to weapons (Carlson, Marcus-Newhall, & Miller, 1990) and alcohol-related cues (Friedman, McCarty, Bartholow, & Hicks, 2007) can increase aggression. Experiment 2 is the first study, however, to present alcohol- and aggression-related cues at a subliminal level and to directly compare their effects.

General Discussion

These two experiments demonstrate that mere exposure to alcohol-related cues can increase aggressive thoughts and behaviors. Strengthening prior research (Bartholow & Heinz, 2006), Experiment 1 showed that merely seeing alcohol-related cues increased aggressive thoughts. Experiment 2 showed that alcohol-related cues also increased aggressive behavior. In both experiments, the effect of alcohol-related cues was just as strong as the effect of aggression-related cues.

These two experiments provide substantial support for an automatic perspective of alcohol-related aggression. We demonstrated that the mere presence of alcohol-related cues increase aggressive thoughts and behaviors in the absence of actual or expected alcohol consumption. Two main theoretical implications can be drawn from these results. First, alcohol cues increased aggressive thoughts and behaviors without any *actual* alcohol consumption. Thus, extrapharmacological

factors play a role in the link between alcohol and aggression. Second, alcohol cues increased aggressive thoughts and behaviors without any *expected* alcohol consumption. Thus, participants could not “blame the bottle” for their aggressive behavior, which is the key assumption underlying the deviance-disavowal perspective (Critchlow, 1983). Hence, our results demonstrate that extrapharmacological effects of alcohol can be found even when alcohol cannot be used as an excuse to behave aggressively.

Limitations and Future Research

In line with Bargh and colleagues, we have proposed a direct link between perception of alcohol cues and aggressive behavior (e.g., Bargh & Ferguson, 2000). However, it is still possible that this link is indirect. For instance, one possibility is that knowledge activation influences social judgments, which in turn influence behaviors (Higgins, 1996). Once aggression-related concepts are activated, they are more likely to be used to interpret stimuli. Because social stimuli are for the most part ambiguous and can be categorized in several ways, classification of a stimulus depends on the relative accessibility of the relevant categories. Therefore, if aggressive thoughts are activated by the presence of alcohol-related cues, they are more likely to be used to interpret other people's behavior. This would be consistent with a previous study showing that a hostile attribution bias could be elicited by the mere presence of alcohol cues (Bartholow & Heinz, 2006, Study 2).

Another possibility is that priming a construct temporarily alters one's self-concept, which in turn influences behaviors (Wheeler, DeMarree, & Petty, 2005; see also Bry, Follenfant, & Meyer, 2008). The active-self account argues that short-term changes in self-concept induce behaviors consistent with the changes. This account suggests that two mechanisms may be involved. First, the activated construct could prime relevant constructs in the person's chronic self-concept. Thus, alcohol-related cues could increase the accessibility of aggressive concepts in people who are already high in trait aggressiveness. Second, the content associated with the activated construct could be misattributed to the self (Higgins, Rholes, & Jones, 1977). Thus, alcohol-related cues could temporarily add “aggressive” to the person's self-concept. Even though future research might reveal this kind of mediation, alcohol-related cues still automatically increase aggressive thoughts and behaviors.

A second limitation concerns the inclusion of only 8 men in Experiment 2. However, Experiment 1 included similar numbers of men and women and found no interactions involving gender. Because the findings from the two experiments were similar, we think the results from Experiment 2 are likely to apply to men as well as women.

As a final limitation, we should mention that in Experiment 2 situational features maximized the likelihood of an aggressive response. Participants were asked to perform a

long and tedious task and were then told they had to do it again, all because of an incompetent experimenter. Future research should test whether alcohol-related cues increase aggression in nonangered participants.

Finally, we should note that although we applied our automatic perspective to alcohol-related aggression, it could also be applied to explain other alcohol-related behaviors. For instance, it has been shown that sexual attractiveness increases after exposure to alcohol-related cues (Friedman, McCarty, Förster, & Denzler, 2005). This, too, might happen automatically. Future research can examine this possibility.

Conclusion

In conclusion, people do not need to drink alcohol to become more aggressive. Exposure to alcohol-related cues may be enough. Hence, we showed that in a situation where aggressive tendencies can be expressed, simply being exposed to alcohol-related cues was sufficient to increase aggressive thoughts and behaviors. In some countries, it is common practice to forbid alcohol consumption during public events, such as soccer games. But is it wise to display alcohol commercials during these same events? Our results suggest it is not.

Next time you see an alcohol-related cue, such as a can of beer or a bottle of vodka, watch what you say and do. If you do not, you could become “transformed into a beast” (to borrow Shakespeare's words) without drinking a single drop of alcohol.

Authors' Notes

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